Reviewing the Performance of ORMA's Voice Response System for Automated Business Permit Information: Integrating Technical, Cost-Based, and Customer-Oriented Evaluations of System Performance

CTG.ORMA - 10

Center for Technology in Government
University at Albany / SUNY

Executive Summary

The Center for Technology in Government, located at the State University of New York at Albany, is a collaborative research center which pursues new ways of applying computing and communications technologies to the practical problems of information management and service delivery in the public sector. The Center conducts projects through partnerships between the University, drawing and faculty members, state, and local government agencies, and over two dozen corporate partners.

The New York State Office for Regulatory and Management Assistance is a small, non-traditional agency with diverse program responsibilities. ORMA programs include providing permit information to new or expanding businesses or non-profit undertakings; reviewing State agency rules before they become effective; conducting a regulatory reform program to improve the existing regulations; providing a Master Application Procedure to clients with complex business undertakings and facilitating projects to encourage innovation and increase productivity within government.

The Permit Assistance Program is the oldest, most mature and most widely recognized program of the Office. The foundation for the program can be found in Section 887 of the Executive Law which directs the Office to provide a free permit information, coordination and assistance service

At the high point in staffing, ORMA had seven full time professional permit coordinators, but because of statewide fiscal problems over the past several years staffing levels have been reduced to a total of four full time professionals. Client inquiries have not stopped, however, but have continued to increase every year of operation. In order to transform the way its Permit Assistance Program operates and to allow the agency to redeploy limited resources to other program areas, ORMA proposed to investigate advanced interactive voice response and information technologies. ORMA expected that an interactive voice system would increase client contacts, provide faster response, offer greater availability of services, increase personnel productivity, improve client satisfaction, lower operating costs, provide a higher and more consistent quality of service, and allow the agency to move ahead with its increased management and regulatory assistance efforts.

As a mechanism for investigating the feasibility and effectiveness of implementing an advanced interactive voice response system, ORMA submitted a project proposal to the Center For Technology Government. This project was subsequently selected as one of four to be conducted by the Center. The goal of the project was to enable the Office for Management and Regulatory Assistance to increase operational efficiency in its Permit Assistance Program, increase the quality, of services provided, expand the array of services available and enable management to redeploy resources which have been freed up through the use of advanced voice information and response technologies to other program areas within the agency. The project objectives are outlined below.

1. Report Purpose and Overview

This report presents the results of the Center for Technology in Government's (CTG) formal efforts to evaluate a New York State Office for Regulatory and Management Assistance (ORMA) prototype voice response system for automated business permit information. Other CTG reports, memos, and working papers report details of the original proposal and the project deliverables. This report has four specific objectives: (1) To review the original research objectives of the ORMA project as it was proposed by ORMA; (2) To document how those original and rather narrowly focused research objectives were eventually expanded to include a broader set of questions; (3) To summarize a multi-method research approach that has been used by CTG to evaluate this entire project; and (4) To present answers to each of the research questions posed. These answers draw from threads of investigation taken from the several methods that make up the overall research approach. For more complete methodological or substantive details concerning each of the sub-studies referred to herein, interested readers are referred to the more complete texts of the research studies commissioned by CTG to support the ORMA project. These are listed in the References and cited in the text of this report.

Original Objectives of the ORMA Project

As originally proposed, the ORMA project had four key objectives:

1. Investigate the range of advanced voice information and response technologies available and how they can be integrated into the delivery of services to clients offered through the Permit Assistance Program of the agency.

2. Evaluate how well the integrated voice response solutions meet the needs of ORMA clients.

3. Design, develop and implement an integrated voice response solution which will enable the Permit Assistance Program staff to better focus their efforts, thus increasing personnel productivity, and will offer clients faster and more consistent responses to inquires and a greater availability of services

4. Enable clients to prepare their own business permit assistance information kits using their own telephone equipment as an input device.

2. Expanded Objectives of the ORMA Project

The original project objectives focused sharply on the process of developing, installing, and evaluating a prototype automated business permits systems within ORMA. As this process progressed, it became increasingly clear that in addition to those questions associated with the prototype technology itself, a number of other issues centering on how this new system would fit into existing processes, procedures, and technologies within ORMA also needed to be addressed. In turn, ORMA's existing processes, procedures and technologies were seen as just

one part of the larger system that New York State utilizes in disseminating business permit information to its citizens. Ultimately, citizens who call ORMA wish to do business with other agencies. Their goal is to understand and deal with relevant local, state, and federal governmental entities and regulations in New York State. Hence, the scope of the evaluation effort associated with the project expanded to include issues and questions that were focused more broadly than those related to the prototype system alone (CTG.ORMA-006).

As shown in Appendix A, the final and expanded list of project objectives occur at three levels--(1) evaluation of the prototype; (2) evaluation of how the prototype fits into a broader picture of service delivery within ORMA; and (3) issues centering on how New York State disseminates business permit information and assistance to its citizens. At each level. the project focused on technical objectives, on issues of relative efficiency (volume of calls, cost of services, savings due to the system, and so on) and issues relating to effectiveness (comparative citizen satisfaction with services, accuracy of information collected, and reliability of responses).

In the following discussion the original objectives are indicated in *italics*.

3. CTG's Approach to Evaluating the ORMA Business Permits Information Dissemination System

In order to attain this expanded set of project objectives, CTG used a multi-method approach to learning about the prototype and how it fit into a broader picture of ORMA and New York State processes. As described below, five separate threads of activity and research are woven together to create the conclusions of this report. The first major category of lessons was arrived at in a "learn by doing mode." In the process of completing the project, a number of issues were raised and resolved and the record of these issues and their resolution form a major source of insights and lessons for the project. CTG has installed a careful project archiving process and the systematic review of the project archives is the major source of learning for this thread.

The remaining four research threads represent formal research efforts designed to investigate specific questions related to the expanded set of research objectives. All five research and evaluation threads are described below.

Archival Analysis of Prototype Project Records

To a large degree, lessons from the ORMA project have been "learned by doing." In the course of solving problems associated with building the prototype or interacting with ORMA's staff or customers, a number of lessons about voice response systems in general and ORMA's business permits application process, in particular, have been learned. CTG maintains an extensive archive on each of its projects. Major documents associated with each project are in a separately numbered working memo series. All of these working memos are available at the cost of reproduction and distribution to any interested party. In addition, the detailed working notes and sketches of the entire project are captured in a formal archive. One of the working

memos, CTG.ORMA-008, “Index to the Full CTG Archive for the ORMA Project,” is an index to CTG's complete archive for the ORMA project. Many of the insights and lessons reported below are documented in the archive.

Benchmarking Literature Review

Early on in the project process, CTG staff completed a literature search on telephone answering and voice activated systems to provide background to project managers and to examine a number of specific questions posed by ORMA. The results of this benchmarking literature are presented in Giguere (CTG.ORMA-004).

Cost Performance Modeling Conference

During October, 1994 a team of researchers from CTG met with senior ORMA staff responsible for the permit assistance program. At that time, substantial progress had already been made on creating a prototype system. The purpose of this meeting was to analyze the costs and benefits of providing business permit information through an automated system. This conference elicited from the management team the costs of the new system in terms of hardware, software, and data entry plus miscellaneous expenses such as postage and copying associated with mailing out packets and the cost of faxing packets to citizens. The conference also elicited the costs associated with providing this same business permit information through human operators. An important portion of this conference was spent estimating how long it would take to serve a citizen through an automated system versus a human operator.

The cost performance modeling conference focused almost entirely on the provision of business permit information for the “Top 5” and “Top 20” most high volume business models measured in terms of average number of calls per year per business model. ORMA had previously identified these "Top 5" and "Top 20" business models as the highest volume and hence the best candidates for automation. The results of this modeling conference revealed that for the current volume of calls, hiring one more human operator would be a more cost effective way than purchasing and installing an automated system to handle the business permit inquiry process (costs were estimated over a five year time horizon). The conference also revealed that the full costs and benefits of the automation could not be fully evaluated by looking only at the "Top 5" or "Top 20" business models in isolation.

The results of the conference indicated that the potential impact of adding additional ports to the existing telephone response system to handle screening of all calls needed to be examined. The cost and performance modeling conference proposed that a more complete simulation model of ORMA's automated permit assistance processes be constructed and analyzed. That model is discussed immediately below. The full report of the cost and performance modeling conference is presented in Andersen and Rohrbaugh (CTG.ORMA-005).

Process Simulation Model of Automated Permit Assistance Procedures

Between November of 1994 and February of 1995 CTG constructed and analyzed a system dynamics simulation model of the ORMA's complete permit assistance program. The model simulated incoming calls including call backs, pre-screening by the automated system, forwarding to an automated permit assistance program, forwarding to human operators, and

the client service activities of human operators. Within a simulated environment, this model explored the implications of hiring more operators, adding more telephone lines, and adding more ports to the system supporting the voice response and automation system. The model also explored the implications of adding these various types of capacity in the face of constant customer demand for information, or constant volume as well as a doubling and tripling of the base level of demand. The simulation is capable of analyzing operator utilization, client waiting times for services, total call volume, estimates of number of lost calls, plus a number of other variables relevant to the operation of the permit assistance program. The model relied on data from the prototype system as well as data from ORMA's present system.

The simulation model confirmed the results of the cost performance modeling conference that under present levels of client demand, hiring one more operator would be more efficient than automating the permit assistance program. However, this analysis demonstrated that hiring an additional operator without expanding the base capacity of the basic phone system and computer system supporting those operators would lead to low marginal productivity of human operators and wasted resources. The model demonstrated that at higher volumes of demand, the automated permit assistance program could substitute for one or more human operators. In addition, the model demonstrated that the volume of inquiries being handled by the current ORMA system is probably limited by internal capacity constraints, rather than demand (i.e., ORMA appears to lack sufficient capacity to respond to existing incoming calls). A complete description of the assumptions, structure, data needs, and results of this simulation exercise is contained in Mojtahedzadeh and Andersen (CTG.ORMA 94-007).

Experimental Survey of ORMA's Clients

Whereas the prototype development process focused primarily on technical issues and the cost performance and process simulation models focused primarily on measuring and analyzing system efficiency (volume, costs, capacity constraints and utilization), a final research thread concentrated on looking at the relative effectiveness of various approaches to disseminating business permit information. During January, February, and March of 1995, CTG conducted an experimental evaluation of how well ORMA's permit assistance program met the needs of clients seeking permit-related information.

Under quasi-controlled circumstances approximately 60 citizens (most of them graduate students in business and public administration) were directed to find and report permit information necessary to start one of six types of businesses in a New York State setting. The six business types chosen were ones for which the existing prototype system could provide the necessary information. These sixty students were divided evenly into three groups--one group of twenty was directed to use ORMA's prototype system as developed and tested in the CTG project, one group was directed to call into ORMA's existing system (eventually connecting to human operators), and the final group was given no information about the existence of ORMA and was told to solve the problem of getting permit information using other existing information sources (e.g. the public library or the phone book). All participants in the experiment were asked to limit their search to two hours. Participants turned in an answer sheet that described what permits they needed to start their assigned business as well as what forms and fees would be required. In addition, all participants turned in a time log

demonstrating how they used their time and completed an extensive survey to find out their reactions to doing business with New York State through their experimental condition (knowing about the Prototype, knowing about ORMA, not being directly referred to any assistance). Participants were paid twenty dollars for completing the experiment.

The experiment gathered information on how accurately and reliably information was being gathered through the three types of treatments (referred to Prototype, referred to ORMA, or control group). Overall, participant satisfaction with the information search process was elicited along with satisfaction and frustration measures for sub-components of the information search process (quality of phone lines and connections, quality of interaction with human operators, pattern of referrals to other agencies, and so on). Participants were given several opportunities to report their overall reactions to doing business with ORMA and with New York State, in general. Finally, participants were asked to rate their willingness to pay a fee for several enhanced levels of services that New York State or ORMA might make available to citizens who were planning to open a business in New York State (for example, how much would participants be willing to pay for a service that located all of the necessary forms and actually filled them out and returned them for signature after an initial interview). The complete details of the experiment and participant survey are contained in Andersen, Avery, Hyde, Kelly, and Kim (CTG.ORMA-009).

4. Results and Issues Arising from the Prototype and Its Evaluation

Results from the above five types of research activities yielded answers to the expanded set of research questions posed by the overall ORMA project. Summary answers to the research questions are presented below. Readers who are interested in the details, including the full methodological details for each thread of investigation, are referred to the separate research reports available as project memos from CTG.

4.1 Level I: Evaluating the Feasibility of Automated Business Permits Prototype Systems Prototype Level Technical Issues.

1. Can the dissemination of complex business permit information be automated?
The prototype has clearly demonstrated that information as complex as that for obtaining business permits clearly can be automated within the context of a voice response system and made available over the phone to clients. How well this technology is received by citizens as well as its costs and benefits are discussed below.

2. What is the range of advanced voice information and response technologies available?
The prototype utilized speaker-independent voice recognition (SIVR) as an alternative input method for callers who did not indicate that they had a touch-tone telephone. The SIVR was capable of understanding the spoken digits "Zero" (it would also accept "Oh") through "Nine," and the words "Yes" and "No." An alternative form of voice recognition, speaker dependent voice recognition (SDVR), was investigated. In general, SDVR can recognize a

wider vocabulary than SIVR, but it needs to be "trained" to understand different voices. Because this was impractical for an agency which services many thousand individual callers, SIVR was chosen.

Call routing is available on the Precision Systems, Inc. UniPort system. Through the use of call routing, a caller can indicate if he wishes to be transferred to a different agency without having to hang up and dial a different number. This capacity requires an additional component, known as a front end switch, to be added to the system. Due to the expense involved in obtaining a front end switch, call routing was not part of the prototype.

The UniPort system is capable of using pre-recorded voice files for delivering information to callers. It is also capable of converting textual files (such as the ORMA permit assistance database) into spoken speech (text-to-speech). The prototype design relied upon pre-recorded voice files since text-to-speech technology does not yet produce a speech sounding as lifelike as pre-recorded voice files. However, when ORMA implements a complete system, text-to-speech may prove better suited so that no additional modifications would be needed if information in the permit assistance database changes. If pre-recorded voice files were used in the final system, the voice file would have to be modified to match the change in the information contained in the permit assistance database.

3. How can these advanced technologies be integrated into the delivery of services to clients offered through the Permit Assistance Program of ORMA?

The prototype system implemented by the CTG project created a voice response system that could be easily integrated into the existing phone response system being used by ORMA. This enhanced prototype system contained voice response features, fax back features (not evaluated in the experiment), and an automated business permits information module for the "Top 5" business models.

In order to fully utilize the capabilities of the new system, ORMA would have to install a total of 2 T-1 telephone lines. Each T-1 line is the equivalent of 24 normal telephone lines, and the UniPort system is equipped with 48 input ports. Using 2 T-1 lines would thereby fully utilize UniPort's input capacity and would provide ORMA with the capability of serving 48 separate callers simultaneously.

The fax-back capacity of a final production system would provide immediate transmission to callers of the information already contained in ORMA's permit assistance database. Currently, the permit coordinators must manually retrieve the information from the database, assemble hard copies of all relevant material, and send it to the caller by mail. In the event that the caller did not have a fax machine, the system would also allow the caller to leave a name and address at the end of the inquiry process so that ORMA permit coordinators could send the material by mail.

4. How should ORMA's automated business permit system be linked to the agency's main data base of permit information?

ORMA had originally intended to create a link between the new voice system and the mainframe which stored its permit assistance database. This would have required some programming efforts on both the new system and the mainframe, together with a physical interface joining the two systems. This proved difficult since the mainframe was no longer supported by its producer.

Late in the prototype process, it was discovered that there was no need to link the prototype system to the agency's main data base of permit information, since all of the relevant permit information could be contained within the computer used to handle phone traffic and run the automated permit assistance program. However, having this additional capacity available to ORMA would require an upgrade from its then existing equipment.

Prototype Level Cost and Performance Issues (Efficiency).

5. What are the relative costs and benefits of automating complex business permit information?

This turned out to be a rather complex question that was analyzed both in terms of the cost and performance modeling conference and the process simulation model. Both threads of investigation returned similar, but complementary insights. At the present volume of calls, automating the Top 5 or even the Top 20 business models appears not to be cost justified. Under present conditions, ORMA fields approximately 150 inquiries per day and only about 35% of these are business permit inquiries. In turn, only a fraction of the business permit inquiries are handled in the Top 20 (about 20% of all business permit inquiries) Hence at present call levels, automation of the business permit assistance function would handle only a handful of calls per day (8 to 10 per day on average) and it turns out to be more cost effective to add more phone lines and then to add a human operator who could answer all types of questions--not just the Top 20 business permit questions.

6. How do these costs and benefits change as the number of business models automated increases?

ORMA provides business permit information for literally hundreds of different types of businesses and most of these business types have unique features and may only come up once or twice a month. An analysis of volume of calls by business types indicated that it would not be cost effective to consider automating more than the Top 20 most frequently inquired about types of businesses. The marginal cost of automating more business models is more or less fixed and the marginal benefits decrease because of declining frequency of calls beyond the Top 20.

7. How do these costs and benefits change as the volume of customers calling ORMA increases?

The process simulation model explicitly analyzed how the volume of incoming calls affects the cost-effectiveness of an automated permit system. Due to the fact that a higher number of calls will generate more Top 20 inquiries, the system becomes more cost beneficial as the volume of calls increases. When the volume of calls doubles and when additional lines and

ports have been purchased, automating the Top 20 business permits has the same effect on overall system response as hiring an additional operator.

The same effect holds for a tripling of volume. Of course, if call volume were to increase by a very large amount (say a factor of 5 or 10), automation of the Top 20 could trade off for more than one operator. These extremely high volume increases were not explicitly analyzed in the present simulation analysis, but the analysis could easily be extended to include increases of this scale.

Prototype Level Customer Reaction Issues (Effectiveness).

8. Is the information being disseminated by an automated business permit system accurate and reliable?

Logically, the accuracy of information dissemination divides into two parts--the accuracy and completeness of the information being given out by some source and the accuracy and completeness of the information as received by a client. This analysis must assume that the information encoded in the prototype is accurate and that the information base of ORMA operators is complete and accurate. Hence any inaccuracies are a combination of incomplete information being either sought or given and inaccuracies in how information was perceived and recorded by participants in the experiment. The best measure of the accuracy and completeness of information thus defined is the final score that participants received on their answer sheets. Recall that participants were asked to obtain complete information about the agencies with whom they would need to interact to start a business, forms that they would need to file, and fees that they would need to pay.

Within the context of this experiment, the grading of participant answer sheets demonstrated that for all groups tested, the accuracy and completeness of information being collected was low. The average accuracy and completeness rate for all experimental participants was only 38%. This means that when the information search was complete, the average participant, including those who called the prototype or ORMA, wrote down less than half of the information that they should have collected. The highest score for all participants in the experiment was 74%, indicating that even the best performing participant missed roughly one quarter of the information that should have been collected. The large standard deviation in responses indicates that this rather low overall accuracy varied quite a bit from participant to participant. Several participants received a score of zero, indicating that after 2 hours of information searching, they were not able to come up with any correct information.

Ironically, in light of the relatively low scores for information collection, 43% of all of the participants were either confident or highly confident that they had obtained all of the information that they needed to file for the permits related to their business problem. A statistically significant correlation was found between participants' actual accuracy score and their confidence level in having obtained all of the necessary information for the experiment.

Table 1, below, presents the number of individuals in each group, the mean and standard deviation for percent correct on permit answers for each of the conditions in the experiment, as well as the percentage of participants in each group who indicated that they were confident or highly confident that they got all the needed information. Notice that in Table 1 a fourth condition has been created--"Control Group with ORMA Contact." Of the 16 useable responses in the control group, 5 respondents found out about and called into ORMA. Their responses are broken out from the rest of the control group. Of those five who learned about ORMA during the course of the experiment, four indicated their source. Two people indicated that they were referred by the Small Business Development Center at the University at Albany. Another individual indicated that they obtained information about ORMA from the phonebook, while another learned about ORMA during a telephone conversation with the NYS Department of Commerce.

Table 1
Accuracy and Reliability of Responses by Group (with Group Measures of Confidence in Responses)

Experimental Group	Group Size	Mean Score on Permit Responses	Standard Deviation of Mean Score	Fraction Confident Got All Information
ORMA Group	16	36	23	.50
Prototype Group	18	47	16	.50
Control with ORMA Group	5	49	21	.40
Control with no ORMA Group	12	21	13	.25
TOTAL	**51**	**38**	**21**	**.43**

Of the four groups shown in Table 1, the portion of the control group which never had contact with ORMA stands out as lower than the other three groups with respect to mean score. Appropriate statistical tests indicated that the completeness score for the control group was consistently and significantly lower than the other three groups which had contact with either ORMA or the prototype. This demonstrates that, based on this sample, interacting with ORMA does have a significant and positive effect on overall accuracy of information gathering.

Additional questions remain as to why those participants who had contact with ORMA in one form or another, did so poorly in terms of accuracy and completeness and why there was such a high degree of variability in scores. An item-by-item analysis of the answers which were missed did not reveal any strong pattern for either the ORMA or Prototype group. Missed answers seemed to be spread randomly in the answer sheets. There is some evidence from the experiment that participants using the Prototype were having some difficulty capturing all of the necessary information as it came to them over the phone (the FAX back feature was not working during the test). On average, a participant spent 39 minutes interacting with the

prototype phone system. Of the participants which interacted with the prototype system, 61% indicted that they had to have options repeated several times while 89% indicated that they had to have options repeated at least once.

With respect to those individuals who contacted ORMA's current system, the data also suggest that participants had some difficulty navigating their way through the system. For example, one third of the participants who reported having contact with the present automated screening system did not report having made contact with a human operator. It appears that these individuals hung up before they got to an operator believing that no further assistance was available to them. It is necessary to contact a human operator under the current system in order to obtain the permit information. The inability of these individuals to get through to the human operator provides some explanation as to why the scores were so low.

The experiment provides no clear answers as to why the overall participant accuracy and completeness scores were so low. These results point to a clear need to understand, in more depth, the behaviors of clients who call into the systems and how information can be more effectively transferred to these clients.

9. How satisfied are customers who interact with an automated business permit system? How do these measures of customer satisfaction compare with other customers who interact with human operators?

Client satisfaction with the prototype can be decomposed into several component parts. First, the level of client satisfaction with their overall experience calling into the prototype and this level of satisfaction relative to that of the participants who contacted human operators at ORMA must be considered. Second, it is necessary to examine how the levels of satisfaction vary by different components of the overall experience such as getting through on a phone line, being pre-screened by the automated voice response system, and finally receiving more complex permit information from the voice response system or from human operators. Finally, an analysis needs to be done to determine whether the survey results provide any suggestions as to why clients are more or less satisfied with various components of the service that they get from the prototype. Each of these components of satisfaction are discussed below.

Table 2 presents a summary of level of satisfaction of participants who interacted with the prototype as compared to those who interacted with ORMA--both human operators at ORMA and the present automated call screening system at ORMA. Each cell reported in Table 2 presents the percentage of participants in that group who agreed with the survey item. For example, 81% of the participants who called into the prototype either agreed or strongly agreed that they were "overall satisfied with the interaction".

Table 2:
Comparison of Satisfaction Measures for Participants Calling into the Prototype versus those Calling into ORMA by Selected Components of ORMA Service
Percentage of Total Agreeing with Satisfaction Statements

Survey Item	Prototype	ORMA Human Operators	ORMA Automated Call Screening
Overall Satisfaction with Interaction	81%	100%	NA
Easy to Get Information	53%	100%	NA
Enjoyed Interaction	41%	100%	11%

As shown in Table 2, 81% of the prototype clients expressed overall satisfaction with their interaction. However, only 53% agreed that it was easy to get information from the prototype system. The data also indicates that 30% disagreed with the statement that it was easy to get the information from the prototype system (not shown in the table). As indicated, 41% enjoyed their interaction with the system. This contrasts with a 100% satisfaction measure for all clients who interacted with human operators at ORMA for all three components. However, when asked about the portion of their interaction that involved ORMA's automated call screening, only 11% of the ORMA clients who responded agreed that they enjoyed this portion of the overall interaction.

Table 3 further examines these interactions by comparing client satisfaction with the 800 phone line system connected to the prototype in comparison to the 800 and 474 phone lines currently being used by ORMA. The 800 phone line associated with the prototype was a commercial service maintained by the vendor. Service was interrupted for one day of the prototype test, consequently 90% of the prototype participants agreed that they had no difficulty getting through and 94% were satisfied with the timeliness of their phone connection. These two figures contrast with 92% and 100% satisfaction with ORMA's 474 service but a much lower 44% and 38% satisfaction with ORMA's present 800 phone line system. This table indicates that performance of ORMA's 800 phone line service was detracting from customer satisfaction during the time of the experiment.

Table 3
Comparison of Client Satisfaction with Various Types of Phone Line Connections

Survey Item	Prototype 800 Phone Lines	ORMA 474 Phone Lines	ORMA 800 Phone Lines
No Difficulty with Phone Connection	90%	92%	44%
Satisfied with Timeliness of Phone Connection	94%	100%	38%
Got Through on First Call	89%	73%	17%

Table 3 also provides some explanation as to why clients are relatively dissatisfied with phone connections at ORMA, particularly the 800 phone system. While 89% of the clients calling

the prototype got through the first time that they called, this percentage dropped to 73% for ORMA's 474 phone system and to 7% for ORMA's 800 phone system.

As shown in Table 4, 70% of those individuals who accessed the prototype system either agreed or strongly agreed that the recorded information was useful and appropriate for their needs. The remaining 30% were either neutral or disagreed with the statement. Of those individuals who interacted with the prototype, 47% indicated that they agreed with the statement that the process of obtaining this type of information was too complex to be handled by an automated system. Sixty-five percent of those using the prototype indicated that they perceived the recorded information to be complete.

Table 4
Participant Perceptions of Prototype System (Percent in Agreement With Statement)

Statement	Disagree	Neutral	Agree or Strongly Agree
Recorded Information was Useful	12%	18%	70%
Process too Complex for an Automated System	47%	23%	30%
Recorded Information Complete	12%	23%	65%

With respect to overall satisfaction with the prototype system, 89% of the participants calling the prototype had to have options repeated at least once in order to get the needed information. This data seems to indicate that obtaining all of the necessary information from an automated system may be difficult. In addition, the average client calling into the prototype spent 39 minutes getting information about business permits. This figure includes one or more call backs for most of those calling into the prototype. On the other hand, clients who called into ORMA reported that they spent on average 10 minutes getting permit information from human operators.

In sum, clients who called into the prototype system expressed relatively high levels of satisfaction with their interactions in spite of the fact that they did not find it easy to get the complete amount of information and most of them did not enjoy the interaction. The data indicates that those participants who called ORMA and spoke with human operators enjoyed the interaction more and felt that it was easier to get information.

These conclusions from the experiment interact in important ways with those results from the cost-performance model and the process simulation study. These studies indicate that for present call volumes, it is not more cost-effective to automate business permit information as opposed to hiring another operator and that automating business permit information does not significantly improve the overall performance of the system. Hence, at present call volumes,

automating business permits would not reduce costs (with respect to the alternative of hiring another operator), would not significantly improve overall system performance, and would lead to relatively lower levels of customer satisfaction. However, at higher caller volumes (the model examined volumes that are double and triple the present call volume), the automated permits system can reduce costs and improve overall system performance with respect to total volume of calls processed. These cost reductions and capacity improvements will become increasingly higher as the volume of incoming calls increases. At these higher levels of incoming calls, ORMA's management will have to carefully weigh these cost and overall capacity enhancements against a potential decline in customer satisfaction caused by an inability to directly contact a human operator.

10. What Suggestions Do Clients Have For Improving the Operation of the Automated Business Permits System?

Overall, 18 experimental participants used the prototype automated business permits system and all of these participants were asked what they liked best about the system, what they liked least about the system, and what changes would have made the system easier to use. Responses to questions such as these are often anecdotal and can sometimes be contradictory, with one participant wanting faster responses with less repetition in the system and another participant wanting slower responses with answers repeated more frequently. However, answers to this type of question can also be quite helpful because they provide for a type of focused and detailed insight into how the overall system functions and how it might be improved.

Table 5 presents a summary of what participants liked best and least about the prototype system. In general participants appreciated most that the system existed and that they could get quick and easy access to quite a bit of information with abundant referrals. On the other hand, they found some of the details of the prototype itself to be difficult to work with--the number of and hierarchy of options was sometimes difficult to work with and participants wanted more ability to move freely within the menu of available choices.

Table 5
What Participants Like Most and Least About the Prototype System

What did you like best about the system?	What did you like least about the system?

-quick and easy access (5 persons) -organization of main menu (4 persons) -the idea itself of the system -lots of information -easy to understand what to do -clear voice, non annoying tone of speaker -referrals for information & accessing an operator	-too long -it was hard to go back and forth between options (2 persons) -the repetitiveness -too fast -model was too flat, needed to be more hierarchical -amount of options -once in a menu it was hard to go back to the original fields without going back to the main menu -often there is not enough time to write down the information

When asked for suggestions as to system improvements, participants quite logically suggested that many of the features that they liked least be fixed (for a full description of participant suggestions, see the appendix of CTG.ORMA-009). In particular, participants indicated three broad classes of suggestions. First, they wanted to have more control over how they navigated through the system by being able to "skip around" more, by being able to "cut off" lengthy responses that they were not interested in, and by having access to "some sort of an index system." Second, participants wanted to have repetitious information (for their purposes) eliminated so that they could get through the menu more quickly. Finally, participants wished that they could gain access to more information, usually visual information. One participant wanted to have a general pamphlet available that could be mailed out and other participants wanted to be mailed a hard copy of what was being said over the phone (recall that the fax back feature of the system was not operational during the experimental evaluation). Another participant wanted even more referrals and detailed information about permits and licenses.

Several participants believed that they got themselves caught in repetitive loops of information that they identified as bugs in the prototype system.

4.2 Level II: Evaluating ORMA's Overall Approach to Disseminating Business Permit Information ORMA Level Technical Issues.

11. Can we develop a system that will enable clients to prepare their own business permit assistance information kits using their own telephone equipment as an input device?
The prototype, as developed, contained a feature which would enable clients to prepare and receive by FAX, their own custom-tailored business permit assistance information kits. However, this particular feature was not operational during the time that the prototype was being evaluated. Therefore, the impact of this feature on client reaction to the system has not been assessed.

Had the FAX-back feature been operational during the evaluation period, callers would have been given the option of having relevant information faxed to them. The information faxed to the caller, would have contained a one page document for each type of business permit required. These documents represent the actual records currently contained in the ORMA permit assistance database. Additionally, the caller would have received a faxed memo indicating any necessary additional steps, such as how to obtain a Federal Employer Identification Number from the Internal Revenue Service, or how to file incorporation papers.

The particular package of information received by the caller would have been assembled by the UniPort system in response to the caller's menu selections and verbal or touch-tone responses to inquiries from the system.

12. How does the automated business permits assistance system interact with other types of telecommunications capacity such as the number of incoming phone lines and available ports in a computer system to answer the phone?

The process simulation study explicitly analyzed the effects of varying combinations of number of phone lines, computer port capacity, level of automated permits, and number of human operators (CTG.ORMA-007). A relatively complicated set of relationships exists between these various types of capacities. In consideration of hiring additional staff or purchasing additional equipment of any kind, ORMA must carefully analyze which of these types of capacity are slack and which are fully utilized. For example, in the base run of the simulation model which represents ORMA's current configuration of operators, phone lines, and computer ports, hiring an additional operator without expanding the number of additional phone lines or ports would be relatively inefficient. This is because a relatively higher rate of marginal productivity of operators could be achieved with the addition of computer ports which would support the call screening features of the automated system and therefore free operators to address the more complicated calls. At this base volume, operators could not effectively be traded off for automation of permit assistance for the Top 20 model. As discussed above, the Top 20 model represents those business permits which comprise 20% of the total business permit transactions that ORMA handles. However, at higher volumes of calls, an automated permit assistance system, similar to that of the prototype, could replace human operators if the appropriate number of lines and computer ports were in place. In short, the relationships between types of capacity are complex and need to be carefully analyzed prior to the acquisition of additional resources.

These observations about the need to carefully analyze how various types of capacity interact are especially important if ORMA were to plan to expand or modify substantially its business permits operations. As volume grows, the system moves through differing modes of capacity constraint and experience managing the system in a low capacity mode will most likely not apply at a much higher volume of business. ORMA should determine whether a simulated version of an expanded service system would "fly on paper" before it attempts to change its actual pattern of operations.

ORMA Level Cost and Performance Issues (Efficiency).

13. Can we design, develop and implement an integrated voice response solution which will enable the Permit Assistance Program staff to better focus their efforts, thereby increasing personnel productivity?

As discussed immediately above, the automated permit assistance program will not effectively substitute for human operators at the present volume and at the present cost of operators and software and other support for the permit assistance program. However, at higher volumes of calls, these trade-offs do lead to important increases in personnel productivity. At the base call level, expanding the number of lines and ports on the answering system immediately increases the marginal productivity of human operators.

The process simulation model also indicates that the present ORMA system is capacity constrained (CTG.ORMA-007). Hence, adding lines and ports (and eventually operators) will relieve pressure on capacity. This will make it easier for callers to get through which will lead to the higher call volumes which will cost justify further automation. While these effects of capacity constraints were discussed in the simulation model analysis, they were not formally analyzed as the time horizon of the formal model was one day. These reputational effects will most likely take place over a much longer time period such as 18 or 24 months. The model captured these possible effects by assuming, as scenarios, that calls had increased by a factor or 2 or 3 for various simulation runs.

The implications of these relatively long run reputational dynamics are very important in the consideration of shifting the overall scope of ORMA's business permits and information operations.

14. Will the new system offer faster services

In examining the impacts of the new system on the amount of time it takes clients to do business with New York State, it is useful to think in terms of two states of affairs. First, ORMA continues to do business basically the same way that it does now, giving out permit information and using technology to disseminate that information or refer clients to other state agencies. Second, ORMA could consider drastically changing the way New York State interacts with its business clients by re-engineering its business processes as well as those of other state agencies.

In the first instance, time impacts from the new system would be of three types--(1) time spent on the phone interacting with ORMA; (2) time spent following up on referrals; and (3) time spent getting copies of forms. As reported above, the automated permits system will most likely increase the amount of time that a client spends on the phone with ORMA. As previously indicated, those participants who called ORMA spent approximately 10 minutes on average, interacting with human operators and the automated screening system. Data from the experiment indicated that those participants who interacted with the prototype spent approximately 39 minutes on the phone. Based on this data, the increase in time spent per customer phone transaction could be as high as 400% (CTG.ORMA-009).

Given the fact that the prototype system did not have a call routing feature which would have routed callers to the phone number of the next agency that they need to interact with, the

potential savings from such a feature has not be ascertained. Sections reported below document the number of agencies to which clients were referred and participants' estimates of the amount of time it would take to contact and obtain information from the referrals. Finally, the prototype system did have a FAX back feature built into it. As mentioned above, this feature was not operational during the prototype evaluation period. Consequently, no data exists to measure the potential impacts of this feature on client turn-around time. Additionally, given the truncated time frame in which the participants were asked to work, comparative data on time to obtain referral information across groups would most likely have been invalid.

If ORMA were to consider offering new types of services to its clients, clients might be able to considerably reduce the amount of time and bother associated with dealing with state regulations and requirements. Since these new products and services were not implemented in the prototype system, it is not possible to determine the potential time savings which would accrue to clients as a result of these features. However, as discussed in sections below, a proxy for time savings was collected in the survey in terms of a willingness to pay for services. The modal participant indicated a willingness to pay between $21 and $100 for a single phone-based service which would provide all of the needed forms and permits from one call and between $101 and $200 for a service that would actually fill out the forms based on information obtained from the client during an interview (possibly over the phone) (CTG.ORMA-009). These results are more fully discussed below.

15. What are the trade-offs between creating and maintaining an automated business permit system and hiring more human operators? How do these trade-offs change as the volume of incoming calls changes?

These important trade-offs are fairly complex and have been treated explicitly in the process simulation model (CTG.ORMA-007). A summary of those findings are also presented above.

16, What are the implications of having business permit information available on a 24 hour per day basis?

This issue was not explicitly and completely analyzed within the context of the process simulation model(CTG.ORMA-007). However, the major effect of 24 hour availability would undoubtedly be to relieve some of the peak load on the overall ORMA system. In the short run, this would allow ORMA day-time operators to provide service to a larger number of callers. Additionally, customer satisfaction levels associated with an increased ability to get through on the phone, would be expected to increase. This would have the effect of increasing ORMA's overall quality and quantity of services. The discussion in the simulation model indicates that, over time, these longer term reputational dynamics would draw more callers to ORMA, eventually leading to a new strain on capacity except at a higher equilibrium level.

ORMA Level Customer Reaction Issues (Effectiveness).

17. How well do integrated voice information and response solutions meet the needs of ORMA clients?

This larger issue was broken down into a number of components including the, accuracy of information dissemination, reliability or consistency of information given out, and overall client satisfaction with the process and its various parts (such as quality of phone service and connection or quality of interactions with operators). These components of client need are discussed separately below (CTG.ORMA-009).

18. Will the new system offer more consistent responses?

Because the new system utilizes a computer to respond to a logically fixed set of questions through a fixed menu structure, the system will generate consistent answers. Each time a client enters the same set of responses to the system prompts, the computer will respond with the same set of answers. It would be expected that the consistency in responses would be higher with the automated system than those from an operator, everything else held equal. However, as shown in Table 1, above, groups of participants who called into the system with a matched set of questions did not, in aggregate, score very well on completeness and accuracy. In addition, there appeared to be a high degree of variability in those scores

The best measure of consistency of responses available from the experiment is the standard deviation in the graded responses from the four experimental groups presented in Table 1, above--the prototype group, the ORMA group, the control group who called into ORMA, and the control group that never contacted ORMA. Since each group of clients was given exactly the same set of cases to solve, any differences in the standard deviation of the responses should reflect relative differences in the consistency of the responses as they were heard, interpreted, and written down by participants.

Table 1 shows that the standard deviation for the completeness and accuracy score for the Prototype group was 16. This was less than the standard deviation for the ORMA group (23) and the control group that called ORMA (21), but less than for the control group that did not call into ORMA (13).

In sum, the completeness and accuracy scores for those participants accessing the prototype system were found to be slightly more consistent than those who did not access the prototype. However, these scores may depend as much on the way that human clients listen to, respond to, and interact with the information disseminating systems than with the internal consistency of the information disseminating systems themselves. This suggests that perhaps ORMA should focus less on issues of consistency in the information disseminated and more on facilitating the ease of interpretation of that information. The Fax-back option implemented in the prototype system (but not tested in the experiment) may address this issue. If the participants had received a hard copy of the information disseminated by the prototype, less information would have been lost through participant misinterpretation, misperception, or inability to note quickly enough the system responses as they navigated through the system. ORMA might also focus on the manner in which the information is communicated. To do this, ORMA might engage in detailed debriefing of selected clients to assess the quality of the information communication as perceived by clients. Since gathering this data would be time

intensive both for ORMA and the clients, this information quality monitoring should probably be carried out for a statistically drawn sample of ORMA clients.

19. Will the new system offer a greater availability of services?

In principle, the new system could be set up to provide additional services. The prototype did not, however, attempt to re-engineer ORMA's existing ways of doing business, so the experiment and simulation study provide no data with respect to the potential impacts of new or different ranges of services.

There are, however, many additional services which could be incorporated into the new system, either upon initial implementation or at a later date. The system could be programmed to fax to the caller the actual permit application form in addition to the information summaries currently contained in ORMA's permit assistance database. This would require cooperation between ORMA and the other agencies which issue permits.

A call routing feature would enable callers who need to contact another agency following their interaction with ORMA, to immediately be transferred to that other agency without having to hang up and dial a different number.

By intercepting the caller's Automatic Number Identification (ANI), the system could also provide callers with the address and telephone numbers of offices closest to the caller which he or she may need to contact (county or village clerks, branch offices of state agencies, etc.).

Even though the prototype did not implement any of these advanced features, the survey did ask participants to estimate how much they would be willing to pay for selected enhanced levels of service. Those results are presented in the report of the experiment and are summarized in sections below.

20. How do customer satisfaction measures differ when information is disseminated by the prototype automated permit system versus by human operators versus when customers seek information on their own?

Several parts of this question have already been answered in the comparative discussion of client satisfaction with the prototype system as presented above. Table 2 compares client reactions to the prototype system to those who interacted with ORMA human operators and the existing ORMA automated call screening system. The data indicates that clients enjoy interacting with human operators best, followed by interacting with the prototype, and least interacting with the existing automated screening system. Table 3 compares customer satisfaction with various types of phone line connections and indicates that overall, clients appear to be satisfied with the Prototype 800 connection and ORMA 474 connection. However, on all measures presented, clients were relatively less satisfied with ORMA's present 800 phone lines.

While these analyses of components of overall satisfaction are interesting, the participant survey also asked several questions which provide a summary measure of overall satisfaction. These summary judgments were collected for the prototype, ORMA, and control groups so

that an overall summary comparison of relative satisfaction across treatments can be made. Table 6 presents a summary evaluation of client satisfaction crossing over all treatment groups. Note that Table 6 breaks out separately those members of the control group who found out about and called into ORMA for business permit assistance.

Table 6
Overall Satisfaction Percent of Clients Agreeing With Indicated Statement

Survey Statement	Prototype	ORMA	Control with ORMA	Control no ORMA
Easy to Get Necessary Information	72%	69%	60%	42%
I was frustrated by the Experiment	0%	25%	20%	25%

When asked a summary satisfaction question concerning the ease of access to information during the experiment, the prototype, ORMA, and control group portion which contacted ORMA reported similar results. Between 60 and 72 % of these participants agreed that it was easy to get information. However, only 42 % of the control group who had no interaction with ORMA agreed with this statement, indicating that not having access to some sort of an organized business permit information system (human or otherwise) does appear to make a difference with respect to client perception of ease of access to information. However, when asked the reverse question about frustration with the overall experience, none of the prototype participants indicated that they were frustrated, while 20-25 % of the participants in the ORMA and two control groups agreed that they were frustrated by their attempts to gather information.

These results need to be treated with some caution for two reasons. First, the number of participants responding, especially to the frustration question, was so small that formal statistical tests for difference could not be conducted. For example, only five persons in the control group found out about ORMA and then only one of these five were frustrated by the information seeking experience (yielding the result of 20% agreeing that they were frustrated). Second, the experiment was designed so that all of the business permit information being sought was, in fact, available from the Top 5 business models built into the prototype system. Hence, participants who were directed to the prototype were assured by the design of the experiment that the system could answer their questions. Under the best of circumstances, ORMA management estimates that if and when the Top 20 business models are automated, only 20% of the clients calling into the system will be able to have their questions answered by the system. Therefore, it is certain that 80% of those who call into the automated business permit system will be pre-screened only to discover that the system can not answer their questions and they will then be referred to a human operator. The experiment did not test for this effect and hence probably overestimates satisfaction and underestimates frustration with respect to what would occur in a fully functioning version of the system. Additionally, the experimental participants did not “need” the information in the same manner that a true ORMA client would. Therefore, the levels of frustration experienced by the experimental participants may not, in fact, be representative of that of “real” clients.

21. How do different classes of customers feel about doing business with ORMA?
All participants who were in either the Prototype or ORMA group were asked an open-ended question concerning there feelings about doing business with ORMA. These open-ended questions were reviewed and coded as "positive", "neutral", and "negative". The results of these coded responses are presented in Table 7, below.

Table 7
Coded Responses to the question "How do you feel about doing business with ORMA?" by treatment

Treatment	Negative	Neutral	Positive
ORMA	8%	25%	67%
Prototype	6%	6%	88%

Table 7 indicates that 67% of those in the ORMA treatment as opposed to 88% in the Prototype treatment, felt positively about doing business with ORMA. Also shown in the table, only a slightly larger proportion of the participants in the ORMA group indicated that they felt negatively about doing business with ORMA.

As was the case with the previous question, these results need to be treated with caution due to the relatively small number of responses. Of those participants in the prototype group, the 6% negative and 6% neutral each represented only one person. Additionally, as indicated above, the experiment was set up so that all of the business permit information could be obtained from the prototype system without further referral to human operators. This may have lead to higher levels of positive reaction for those individuals in the prototype group than would be experienced under full system implementation.

4.3 Level III: Issues Relating to how New York State Services the Information Needs of Businesses in the State

New York State Level Technical Issues.

22. How much do citizens who are seeking information get referred from one information source to another?
In order obtain the necessary forms for business start-up, ORMA clients would, under the current process, be required to contact a number of additional agencies. Participants in both the ORMA and the Prototype treatments were encouraged to obtain as much information as possible, including forms, from those agencies to which they were referred by ORMA operators or the prototype. For all of the assigned vignettes, it was necessary for the participants to follow up with a minimum of one additional agency. Table 8, below, indicates the proportion of individuals from each of the two groups which reported that they were

referred to at least one additional agency. The mean number of referrals indicated by each group is also shown.

Table 8
Fraction of Participants Reporting at Least One Referral and Mean Number of Referrals By Treatment

Treatment	Percent Reporting Needing Referrals	Mean Number of Referrals Per Participant
Prototype	76%	5.4
ORMA	69%	4.4

These findings indicate that for both groups, over 24% of the participants reported that they had not been referred to another agency for either forms or additional information. The table also shows that a smaller proportion of the ORMA group reported having been referred to another agency. In the Prototype group, 13 out of the 17 people who interacted with the automated permit assistance system indicated that they were referred to at least one other agency while 11 out of 16 individuals in the ORMA group indicated that they were referred. The source of this difference in reporting referrals across groups could be attributed to either the source of the information or to characteristics of the participants, themselves. The participants in the experiment were randomly assigned to the three treatment groups and we can assume that the level of perception and recording are relatively equal across the two groups. Then difference in the percent indicating that were referred may be attributed to either the level of information being given out by the human operators at ORMA versus the prototype system or the manner in which the information is given out by the two mechanisms. The data from the experiment indicates that the prototype system may be more successful in disseminating information about clients' need to contact other agencies.

Also shown in the table, for those participants who did report having been referred, the average number of referrals were 5.4 and 4.4 for the Prototype group and ORMA group, respectively. Given the fact that the same set of vignettes was given to each group, the data from the experiment strengthens the above conclusion that the either the information disseminated by the prototype was more comprehensive or the manner in which that information was disseminated by the prototype was more easily interpreted or recorded by the participants.

Table 9
Percentage of Respondents Agreeing with Statements about Aspects of the Referral Process by Treatment

Treatment	Had Time to Contact all Referrals	Able to Get Full Information	Able to Obtain Forms

Prototype	21%	33%	32%
ORMA	36%	38%	25%

Table 9 presents a summary of respondents' self-perceptions of how successful they were in completing their contacts with the referrals they received when calling into either ORMA or the prototype system. As previously stated, the participants were asked to work on their information gathering activities for a maximum of two hours, regardless of the degree to which their search was complete. Approximately 36% of the respondents in the ORMA group indicated that they had time to contact all of the referrals during the allotted time, as opposed to 21% for those who interacted with the prototype system. This difference may be, at least in part, accounted for by the difference in the mean number of referrals as indicated in Table 8, above. In other words, if the participants in the ORMA group perceived a lower number of total referrals, it is likely that they were able to complete their contacts of that smaller number at a higher rate than the Prototype group which was aware of a larger number of total contacts. Another factor related to the difference in the percentage indicating that they had time to contact all referrals is the difference in total time spent gathering preliminary information from either a human operator at ORMA or the prototype system. As previously indicated, the Prototype group reported that they spent on average, more time, on the phone with the Prototype system than the ORMA group did with the human operators. Therefore, the Prototype group had, on average, less time to spend contacting referrals than did the ORMA group. A larger proportion of those participants in the ORMA group, 38%, versus 33% in the Prototype group, indicated that they had been able to get full and complete information from the sources to which they were referred. The data indicates that the reverse was true in the area of obtaining forms. In this case, the prototype group indicated a higher proportion of individuals who believed that they were successful in this area. It is expected that this difference would have been substantially larger had the Fax-back feature of the prototype been operational during the study period.

While a minimum of 21% indicated that they were successful for each of the three categories described above (having time to contact all of the referrals, being able to get full information, and being able to obtain forms), a review of graded responses, as indicated above, indicates than none of the respondents actually obtained full information. As previously indicated, the high score for all participants on the accuracy and completeness scales was around 75%. This data indicates that a discrepancy exists between individuals' perceptions of the completeness and accuracy of their information search and the reality which was captured in the grading process.

The participants were also asked to indicate the number of referrals that they were able to complete in the course of the experiment. The indicated mean number of completed follow-ups for those participants who interacted with the prototype was 2.4, while that for those individuals who interacted with the operators at ORMA was 2.1. This indicates that for both groups, approximately 2 follow-ups were perceived by the participants to have been completed in the allotted time.

New York State Level Cost and Performance Issues (Efficiency).

23. How do citizens who never learn about ORMA seek and find business permit information?

Table 10, below, indicates the order in which participants would use various information sources in their search for business permit information. Each numeric cell in Table 10 represents the number of participants who indicated that they use each of the sources in the specified sequential order. For example, 21 of the 51 respondents reported that they would use the phone book as their first information source, while 16 indicated that they would use the phone book as their second source of information. The library was also indicated by a number of participants as their second source for permit information.

Table 10
Participants' Priority of Information Sources in Searching for Business Permit Information by Type of Information Source (absolute number of participants reporting that source in that priority)

	Priority In Reported Search Strategy				
Source	First	Second	Third	Fourth	Fifth
Phone Book	21	16	8	3	0
Personal Contacts	19	9	12	5	0
Library	8	16	18	2	1
On-Line Searches	0	2	2	10	9
Note: Not all rows sum to 51 as an “Other” category was also provided					

Table 10 indicates that individuals would first seek business permit information from the phone book or through personal contacts and use libraries, on-line searches, and other types of information sources second. This implies that in order to maximize exposure to its services, ORMA could examine how and where it is listed in the phone book as well as the availability of information about ORMA in libraries. Additionally, ORMA could investigate the degree to which other referring agencies such as small business development offices and regional development offices make referrals to ORMA's services.

Within the control group, 6 of the 15 participants did learn about ORMA through these information search strategies. As previously indicated, four of those six people indicated the source. Two of the four indicated that they were referred by the Small Business Development Center at the University at Albany, one found out about ORMA from the phone book, while the fourth was referred by the NYS Department of Commerce. It is interesting to note that those in the control group who found out about and subsequently, contacted ORMA, did the best overall in terms of completeness and accuracy (See Table 1) and seemed to be the most satisfied with their experiences during the experiment. Hence, expanding the ways in which citizens learn about ORMA’s services may be an important lever for improving citizen perceptions of ORMA's overall effectiveness.

As discussed above, the participants in the experiment were university students, not actual entrepreneurs in the process of starting a business. Therefore, the results indicated above regarding information search strategies may not necessarily be representative of those of ORMA clients. For example, one might expect university students to rely more heavily on published sources (e.g., library or formal reference sources) and less heavily on informal or word-of-mouth sources (other persons who have started a similar business). These caveats need to be taken into account when interpreting these results (CTG.ORMA-009).

24. Would citizens who are seeking business permit information be willing to pay for that information? If so, how much would they be willing to pay?

Respondents were asked to report how much they would be willing to pay for enhanced information services related to ORMA's business permit assistance program. Table 11 presents four hypothetical types of services in increasing order of intensity and a summary of participants reported willingness to pay for these services. The first service, "Phone Service," is one where information about obtaining all permits for business start-up could be obtained from a single phone call. In this case, it would still be necessary to contact referrals in order to obtain and file forms. The second service "Single Phone," would preclude referrals to other agencies. In this case, a single phone call would result in all of the necessary information, as well as all of the necessary forms one would need to file for a specified business. The third service would be a "one stop shopping" phone center where an operator obtains information from the caller and partially completes the necessary forms. Under this scenario, the forms would be mailed to the caller for completion, signature, and submission to the appropriate agencies for filing. The fourth service option represents a face-to-face "one stop shop." In this case, information would be obtained during a face-to-face interview. This single agency would prepare all necessary forms and interact on the client's behalf with all relevant government agencies. The associated cost figures in each row indicate the low, median, high willingness to pay ranges as were derived from the survey. Note that for all types of services, the median range was also the modal range. Also shown in the table, are the percentages of total respondents who indicated each of the ranges of for the various levels of services.

Table 11
Willingness to Pay for Selected Enhanced Services Median, High, and Low Ranges and Percent of Total Participants Indicating that Range

Type of Service	Lowest Range Indicated	Median and Modal Range	Highest Range Indicated
Phone Service, You Get Forms	$0 27.5%	Up to $20 41.2%	$201-500 5.9%
Single Phone, You Fill Out and You File Forms	$0 3.9%	$21-100 45.1%	$>500 4%
One Stop With Forms Fill Out Assist	$0 5.9%	$21-100 45.1%	$>500 4%
Face-to-Face, Interaction Done for You	$0 9.8%	$101-200 31.4%	$>500 6%

Note: Percentages do not sum to 100% as all of the ranges are not presented in the table

As can be seen from the table, the modal range for the first type of service was Up to $20, while that for both the second and third service packages was between $21 and $100. Also shown, the modal range for the fourth option, where all of the steps toward business start-up could be completed during one face-to-face interview, was $101-200. The rightmost and leftmost columns indicate the highest and lowest ranges, respectively, of willingness-to-pay for each of the types of services. For service packages 3 and 4, the highest indicated willingness-to-pay for the top was greater than $500. Four percent of the total respondents indicated that they would be willing to pay this amount for the third service package while 6% indicated they would be willing to pay this amount for the fourth set of services. Also of note, only 3.9% and 5.9% of the respondents indicated that they would not be willing to pay anything for service packages three and four, respectively.

Two important caveats need to be addressed in the consideration of the data discussed above. First, the reported data may be biased based on the anchors used in the survey. In other words, the ranges, (e.g. $0, Up to $20), were choices offered to the participants in the experiment. These ranges set bounds on how much one could indicate they would be willing to pay for the services. The ranges put forth were not based on any empirical data and may, therefore, have biased the responses of the participants. Second, as discussed throughout, the participants were university students being paid $20 to participate in the experiment. In theory, as rational consumers, none of the students should have been willing to pay more than $20 for services that would assist them in their information seeking endeavors. The respondents, however, were asked to answer these question as if they were actually in the process of starting their assigned businesses. We cannot be sure that the willingness-to-pay as projected by university students is, in fact, representative of that of actual entrepreneurs attempting to start a new business.(CTG.ORMA-009). One might expect that university students value both their time and their money differently than individuals in pursuit of a business start-up.

With these caveats in mind, the willingness-to-pay data can be used as a proxy for demand for these various types of services. The data shows an increasing willingness to pay for an expanded set of services. ORMA might consider offering these expanded services for a set fee in order to increase customer satisfaction and to help finance a more user-friendly front end to doing business in New York State. While the data from the experiment may not be wholly representative of ORMA's clients, it does indicate that individuals would be willing to pay some amount of money for assistance in dealing with the process of obtaining information and navigating the processes involved in starting or expanding a business in New York State.

25. How big is the pool of underserved or unserved citizens trying to get information concerning business permits?

The simulations and experiments do not provide any direct evidence to help answer this question. The process simulation model contained an explicit theory of the call back, hang

up, and "give up on ORMA" behaviors of clients which was able to reproduce the two available data points--150 calls answered per day and approximately 19,000 unanswered calls per day in the base run. However, any number of model-based hypotheses could match these data. This important point needs further research.(CTG.ORMA-009)

New York State Level Customer Reaction Issues (Effectiveness)

26. How do different classes of customers feel about doing business with New York State?

This question was asked once as a forced response item of all participants and again as an open-ended question which was subsequently coded as “generally positive,” “generally negative,” or “neutral.”

Table 12, below, indicates the coded responses from the open-ended question, the purpose of which was to gather participants’ perceptions of doing business in New York State. The individual responses were reviewed and subsequently coded by survey reviewers. As shown in the table, the Control group which had no contact with ORMA indicated the highest percentage of negative perceptions. Of those participants, 36% indicated that they felt negatively about the process of starting a business in New York State. The highest proportion of positive perceptions was found in the Prototype group, where 56% of the total participants indicated positive perceptions about starting a business in New York State. Half of those individuals in the ORMA group indicated positive perceptions while 17% reported negative perceptions following their interactions with ORMA. While the Prototype group indicated the highest proportion of positive responses, they also indicated the second highest proportion of negative perceptions. It appears that those individuals who interacted with the prototype had strong feelings about it, one way or the other. Overall, the ORMA group seems to have indicated a smaller proportion of negative perceptions as well as the second highest proportion of positive perceptions.

Table 12 Participants Feelings About Starting a Business in New York State, by Treatment			
Treatment	**Negative**	**Neutral**	**Positive**
Prototype	33%	11%	56%
ORMA	17%	33%	50%
Control With ORMA	20%	40%	40%
Control No ORMA	36%	18%	45%

Table 13, below, summarizes responses to three additional survey questions designed to elicit participants' perceptions of the business environment in New York State, as well as their perceptions of New York State's efforts in disseminating business permit information.

Table 13 Percent of Participants Agreeing With Statements Related to Doing Business in New York State by Treatment (Percent in Agreement With Statement)			
Treatment	**NYS Regulatory Environment is Complex**	**Business in NYS More Complicated Than Expected**	**NYS Does a Good Job of Information Dissemination**
Prototype	39%	67%	72%
ORMA	38%	50%	44%
Control With ORMA	20%	40%	60%
Control No ORMA	47%	42%	25%

As shown in the table, the Prototype and ORMA groups indicated relatively equal proportions in agreement with the statement that the NYS regulatory environment is complex. Those individuals in the Control Group who contacted ORMA indicated the lowest proportion in agreement with the statement. Of those individuals in the Control group, who had no contact with ORMA, 47% agreed with the statement. While no statistical tests were conducted for significant differences across the groups due to small sample sizes within each group, it appears that those participants who had no interactions with ORMA perceived the regulatory process to be more complex than those who did interact with ORMA in some manner.

The Prototype group indicated the highest proportion of individuals agreeing with the statement that doing business in New York State is more complicated than expected, with the ORMA group showing the second highest proportion. Assuming that the information given out by the human operators at ORMA and the prototype system was the same or very close, the perceptions of level of complication, may be related to the difference in obtaining information from an automated system versus a human operator.

As shown in the right most column of the table, those participants in the Prototype group indicated the highest proportion, 72%, in agreement with the statement that NYS is doing a good job of disseminating information related to business permits. Only 44% of those in the ORMA group agreed with the statement while 60% of those participants in the Control group who contacted ORMA agreed. The Control group participants who did not learn about or interact with ORMA had the lowest proportion in agreement with the statement.

5. Conclusions and Implications

This section of the report is a compilation of observations and recommendations put forth by members of the team responsible for conducting the evaluation of the ORMA prototype. The first section of implications and recommendations is based on the assumption that ORMA intends to maintain a telephone-based information dissemination operation and therefore, includes suggestions for the improvement of that operation based on our research. The second section is based on a relaxation of the assumption that ORMA intends to maintain its current business scope and processes and provides speculation as to how New York State as a whole, might address the needs of clients interested in business start-up. This second view speaks to the broader issue of re-engineering the basic processes used to support this class of customers in New York State--an issue that has not been exhaustively analyzed in this prototype project.

Recommendations For Improving ORMA Business Practices

Maintain and Expand Client Reaction Surveys. (CTG.ORMA-009)
ORMA currently maintains a system which allows for client contact and survey after they have received information from the agency. This follow-up survey collects a number of broad measures of client satisfaction and the effectiveness of ORMA's services. ORMA should continue these efforts because they can provide valuable time series data which would indicate changes in overall client satisfaction--an important measure of ORMA's performance.

However, ORMA should attempt to supplement these client surveys with a more detailed, ongoing examination of client satisfaction. The survey used in the experiment to evaluate the prototype contained a number of broad client satisfaction items similar to those presently used by ORMA. These measures indicated a client base that was generally satisfied with the services that it had received from ORMA and did not show substantial differences in client satisfaction between the different mechanisms of service delivery such as service by a prototype versus human operators. These measures did, however, demonstrate differences in levels of satisfaction between the Control group and those groups which accessed ORMA's services in some manner.

Our overall satisfaction indices masked the fact that clients felt quite differently about various sub-components of the service package. For example, of those participants who accessed ORMA's current system, 100% were satisfied with their interactions with the human operators while simultaneously very dissatisfied with the service (i.e. ability to get through) on the 800 phone line. In addition, it seems clear that this overall satisfaction index contains

an important "halo" effect. Members of our Control group who discovered that ORMA existed on their own (as opposed to being informed of ORMA's existence as part of the experiment) seemed to be most grateful for the service that they got from ORMA. The satisfaction of discovering ORMA's existence seemed to cast a positive light on all subsequent ratings of interactions with ORMA.

The high overall satisfaction levels with ORMA's services observed in our experiment did not take into account the fact that the reliability of the information received by the participants (as opposed to the information being disseminated) was relatively low. That is, while the participants in the experiment reported that they were quite satisfied with the information and the service that they had received the information actually collected and reported was incomplete and/or inaccurate in significant respects. These issues are discussed in more detail below.

Monitor Carefully the Effectiveness of Current Information Dissemination Processes
The results of our experiment suggest that ORMA should strongly consider conducting more detailed follow-up interviews or focus groups with a sample of its customers in order to more completely assess the accuracy and completeness of the information as gathered and utilized by the clients. If the results of these client follow-ups replicate those from the experiment, ORMA should carefully re-examine its processes in order to identify ways in which the effectiveness of its information dissemination processes might be improved. Some of the potential related issues are discussed immediately below.

Institute a Quality-Type Program Focuses on Reliability of Information Dissemination. (CTG.ORMA-009)
Whereas customer surveys can help to identify the final completeness, accuracy, and utility of the information that ORMA is disseminating, a thorough exploration of the causes for (and consequently the cures for) incomplete or unreliable information reception by clients will probably involve careful reflection by ORMA's staff. Quality-type management programs such as New York State's Quality Through Participation help front-line employees in creating a focus on and articulating causes for, high or low quality products (in this case information dissemination and reception products) being produced by the agency.

The results of our experiment hint at what a more thorough examination would look like. It appears likely that the incompleteness of customer-recorded information can be traced back to different components of the process. Some incompleteness can be traced to the simple fact that clients are having trouble getting into ORMA's phone system, particularly those who called into the 800 number. Other clients seemed to "get lost" in the automated phone screening system and were unable to navigate themselves to a human operator.

It also appears as though some of the participants were either unable to interpret or fully retain the information that the operators were relaying to them. The following anecdote may help to make this point. After the experiment was over and the results were in, a member of ORMA's operator team mentioned in an informal interview, that during the study period, the operators occasionally recognized the experimental callers. Since the operators had previously drawn

up the answer sheets for the CTG team, in several cases the operators used the answer sheet for the caller's particular vignette and read them the answers. These answers were precisely those which were used by CTG in grading the responses. However, not one of the participants scored above 75% on the composite completeness and accuracy score. Apparently, some loss of information occurred between an operator reading an answer over the phone and a participant recording that information. Again, it is important for ORMA to conduct a similar study of its own clients in order to determine whether the same type of information loss is occurring with actual ORMA clients. The information loss noted in the experiment may be due, at least in part, to the composition of the experimental group. It could be the case that real ORMA clients have more invested in gathering accurate and complete information than a group of participants in an experiment and therefore they would pay more attention and care to the information gathering activities.

Several participants noted that they needed more visual information to supplement the auditory cues that they received over the phone. Several of the participants indicated that they "got lost" in the hierarchy of possible responses in the phone system. These details seem to be related to the levels of incompleteness, inaccuracy, and unreliability in information reception. Examining these process details closely is key to improving the overall quality of the information being received by clients.

Keep Up the Marginal Productivity of Operators By Investing Sufficiently in Telecommunications and Computing Capacity.

The process simulation model clearly indicates that at current caller volume, ORMA does not have sufficient phone line and automated screening capacity. This additional capacity should be put on line as soon as possible. The effect of not having sufficient capacity is that operators are currently handling simple inquiries that could be easily screened by the automated system (such as requesting general information packets). The result of this is that operators are spending their time doing things that the automated system could be doing instead of focusing on those services, such as disseminating permit information, which only they can provide. This lack of automated support leads to relatively low marginal productivity of human operators.

Should caller volume increase sharply, in the range of twice that of the present volume, automating the Top 20 business models would become an effective way to substitute equipment (e.g. software, phone lines, and port capacity) for human operator time. However, the level of caller volume is a critical determinant of whether or not it is cost-effective to automate additional functions and the current level does not appear to support business permit automation.

Learn More About Customer Information Seeking Behavior

The participants in the experiment were predominately graduate students in business and public administration. It seems reasonable to expect that this population may have more sophisticated, or at least different, information searching behaviors than an average member of the public. However, only about one third of the Control group ever learned about the existence of ORMA or the services that the agency provides. If ORMA wishes to expand its

outreach, an effective mechanism for doing this would be to further examine how "real" ORMA" clients learn about the agency or conversely, how potential ORMA clients go about searching for business permit information.

Results from our survey suggest that multiple and diverse listings in the phone book would be the first and perhaps, most effective way of improving client outreach because simple phone book searches were reported to be the most frequent first search strategy. A second search strategy (and the one that seemed to get participants to ORMA) is a word-of-mouth approach via other persons or agencies such as regional economic development offices or small business administrations. Reaching out to these other contacts may also be an effective mechanism for client outreach.

Our research produced little information as to the number of potential clients who learn about ORMA and are subsequently unable to contact the agency in a timely manner because of capacity constraints. ORMA could investigate this population more thoroughly by conducting random surveys of callers at various points in the call-in queues (those most likely to hang up or give up soon) to learn more about call-in and hang-up behaviors.

Complete a Detailed Analysis of Capacity Expansion Dynamics *Before* Stimulating Client Demand. (CTG.ORMA-007)

The process simulation model and the related discussion contained some important lessons that should be considered by ORMA's management prior to any attempts at stimulating client demand or enhancing public outreach. One very interesting and potentially very significant observation emanating from simulations of the model is that internal performance cues (such as operator utilization, customer satisfaction, and measured customer waiting time in the system) could all be positive while at the same time, external customer perception is that it is extremely difficult to get through on the phone and that service is therefore terrible. This paradox can occur as a result of a mismatch between operator capacity, port capacity, and line capacity. In these cases, the only cues that would indicate that the system is not working effectively would have to come from somewhere other than the system itself, such as customer calls to ORMA's management or to a State Senator or Assemblyman to complain.

In addition, the simulation model showed that as the system grows in size, the correct or most effective mode of system management will change. At relatively low volumes, close to present levels, attention needs to be paid to matching line and port capacity with the hiring of new operators. As volume doubles, attention needs to shift to matching human operators to enhanced automation of services, such as the automation of the Top 20 business permit models. At three times the volume, the best strategy mode appears to shift yet again.

ORMA has no experience managing this system across these different ranges of caller volume. A strong possibility exists that effective management policies developed at one volume will generate system clogs and failures at higher volumes. Our study recommends that ORMA utilize a simulation approach to managing the system throughout its future growth so that agency management can better understand the dynamics of the system and develop the best strategy for managing those dynamics.

Consider a Graded Pricing Scheme to Prevent Reputational Dynamics from Overwhelming the System (CTG.ORMA-007)

None of our formal analyses examined in detail how reputational dynamics can cause the system to grow when properly managed or conversely, constrain its growth when mismanaged or ignored. The simulation model report presents an informal review of these issues. If ORMA were to provide excellent and consistent information services, free of charge, the system could be still constrained at higher call volumes. That is, in a capacity-constrained environment, if ORMA were to expand its capacity to handle calls by a factor of two, it is conceivable that ORMA could handle twice the current call volume while still being overwhelmed by long waiting lines and dissatisfied customers.

The solution to this dilemma does not rest in a continued expansion of capacity. Rather, ORMA should consider taking a more market-oriented view. Our surveys indicate that some of ORMA's clients may be looking for and willing to pay for, enhanced information services, up to and including tailored assistance with filling out forms and navigating through the maze of state regulations. ORMA should recognize these potentially different types of information needs and customer willingness to pay for them. It should avoid the trap of a "one size fits all" information dissemination strategy. There exists the possibility that fees charged to users seeking relatively high intensity information services could be used to subsidize the provision of relatively low level information services to a broader range of citizens. In this manner, high information need clients who are willing to pay could ultimately get the services that they want and clients who have relatively lower information needs could gain access to a system that provides a basic level of service at no cost.

No empirical data exists to support or refute these claims. If the reputational dynamics as described in the process simulation model do exist, they may be among the most important forces to be considered by ORMA's management. This area needs further refined study and consideration.

Recommendations For Improving Information Dissemination to Businesses in New York State

More Carefully Analyze Client Demand and Willingness to Pay and Design Information Products to Meet Client-Focused Demand.

No analysis was conducted as to the types of information products ORMA's actual clients are seeking. Experimental participants were asked to obtain certain information and their attempts to get that prescribed information were observed and measured. However, we did ask these participants about their willingness to pay for a graduated set of information products. The median respondents did indicate that they would be willing to pay between zero and twenty dollars for a simple, single call phone service which would provide information about where and how to get all of the necessary forms. Participants stated that they would be willing to pay between twenty and one hundred dollars for more sophisticated services that

actually delivered the forms to them or helped them fill them out. For a full face-to-face service where one contact yielded all of the filed forms, the median respondents were willing to pay between one hundred and two hundred dollars. Wide variability existed in willingness to pay with some participants expressing a willingness to pay over five hundred dollars for some of the more complex information services while others indicated that they were unwilling to pay anything at all.

If these preliminary results were to be verified for a base of "real" ORMA clients, ORMA might seriously consider tailoring services to meet this wide range of demand. Fees charged for these custom services could make them self-supporting or could be used to subsidize less intensive information services.

Promote Cross Agency Re-Engineering

Ultimately, ORMA's business permit information system is a user-friendly front end to a complex, difficult, and frustrating web of regulation. ORMA may improve its dissemination of business information; this alone will not remedy the overarching problem of the regulatory burden associated with doing business in New York State.

Technology can be used to facilitate a number of more radical approaches to easing this regulatory burden. Many of these approaches were foreshadowed in ORMA's original proposal to CTG, but were not fully implemented in the prototype. The capability to fax-back to the caller all required forms is one such idea that was implemented but not fully tested. Direct call forwarding and referral was discussed in the proposal, but not implemented in the prototype. An expert system to automatically fill out multiple applications for multiple agencies from a single input screen has already been designed and tested in a different context, for example, by the New York's State Office for the Aging. Such a technical approach could be used as a wedge to promote a technology-based virtual integration of the regulatory process in New York State. This approach could more fully integrate point of customer contact, while leaving in place many of the separate processes conducted within the multiple regulating agencies.

Of course, the ultimate re-engineering effort would involve an actual cross-agency approach to integrating regulations. Such an effort was not within the scope of the present CTG project, but technology can be a powerful ally in a radical re-engineering approach. These more radical re-engineering approaches are the most difficult to implement, but ultimately have the largest and most lasting impacts.

Examine Alternative Media for Client Contact (CTG.ORMA-009)

One of the most important technical products of the CTG prototype was a codification of the regulatory requirements for the Top 5 business models and the construction of a logical flow of questions that yield the correct information for a particular client query. While this overall logic has been implemented in a voice response mode with clients entering input through a telephone key pad or using voice commands, the same logical structure could easily be implemented through an information Kiosk, over a server on the World Wide Web, or through

on-line information services available through New York's network of public libraries. In the near future, interactive cable may exist that would be capable of disseminating this information.

Most of these media have as an advantage their ability to provide visual cues that may be more reliable and interpretable and may be better able to generate hard copy. However, they rely on technologies that are not widely available and, according to our survey, are not in the commonly used information search path for most citizens. As these media gain in popularity and utilization, ORMA should actively consider replicating its information dissemination systems in multiple, diverse media.

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Center for Technology in Government
University at Albany / SUNY
1535 Western Avenue
Albany, NY 12203
Phone: 518-442-3892
Fax: 518-442-3886
info@ctg.albany.edu
www.ctg.albany.edu