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DECISION SUPPORT FOR CALL CENTER MANAGEMENT USING SIMULATION

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ABSTRACT

In an era of rapidly growing information and communications, call centers are becoming an integral part for a majority of corporations. Corporations are migrating their customer care operations to the Internet, investing in electronic care, sales automation tools, etc. A significant amount of human and computer systems investment is placed on call center setup. Moreover managing call centers has become a very complex task, as substantial resources and business impact is at stake. Consequently, it calls for practicing scientific decision-making methodologies and tools for strategic management. This paper discusses how simulation has added value as a decision support tool, during a major Reengineering Initiative at AT&T.

1 INTRODUCTION

AT&T is a major corporation that deals with thousands of customers everyday. In the competitive environment it is critical that a corporation focuses on cost reduction initiatives through added capabilities without compromising customer experience. To this end, AT&T's Business Services Division launched a major strategic Reengineering Initiative in 1998, spanning numerous processes and systems across business functions and organizations. Senior leaders took up the challenge to create the futuristic view of how to be a customer-driven competitive company in the radically changing marketplace. The futuristic view being five years from now when the capabilities created today are far better realized.

The Reengineering Initiative work was broken down into various teams. One such team was the Process Engineering Team (PET) that was charted to reengineer and design a seamless end-to-end process view. The PET consists of the Process Design team and the Simulation team. The processes will be designed to support the desired customer experience, process efficiency, time to deliver, and cost avoidance targets as defined in the Reengineering Initiative's framework document. The processes that are designed by this team will not only be scaleable to support the end-state vision, but will be flexible to meet future needs. As a result PET will drive tremendous systems and capabilities change. Bottom line, PET was responsible to design end-state processes and given the process enablers, technology enablers, and people/organization enablers calculate what is the customer value added and cost savings.

Communication or service types of industries typically have the following functions from an end-to-end view:

- Sales and Ordering
- Provisioning
- Maintenance
- Billing and Collections
- Customer Support

The PET consisted of subject matter experts from each area and was responsible for delivering seamless operational processes across the board. The integrated team approach between the Process Design team and the Simulation team is illustrated in Figure 1.

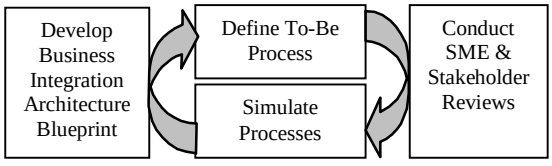

Figure 1: The Integrated Team Approach

The business integration architecture blueprint is a document that lays out the strategy and the vision where the corporation needs to be directionally. As described in the above diagram it is critical that not only the Process Design team but also the Simulation team is connected to and has a thorough understanding of the business integration architecture blueprint. Conducting a review with the Subject Matter Experts (SME) and the Stakeholders is a very critical step. The review is part of a

buy-in process, which is crucial to the success of any reengineering effort.

The Reengineering Initiative discussed primarily focuses on a top down view. Hence, the effort is focused on how to improve the business and add value from an end-to-end perspective and not to improve just within individual chimney stacks. Because the gains are very limited and it also generates a lot of negative energy and finger pointing among organizations, which could have serious implications on customer experience. As depicted in Figure 2 all functions are performed in the call center or work center environments.

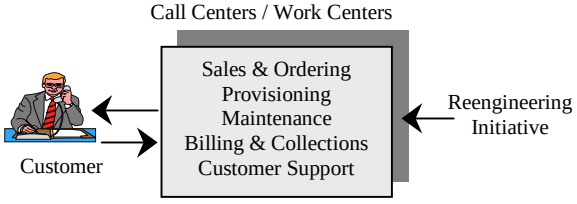

Figure 2: Reengineering Impact on Call Centers

The Internet has opened up avenues for electronic care, which gives an entirely different spin on the call center management approach. Managers today face challenges, as how to handle the traffic that comes through the Internet into the call center. One of the areas of focus within the Reengineering Initiative's emphasis was to integrate electronic care and allow real time provisioning of services. It is easier said then done, it entails changing the entire customer care platform on both fronts, processes and systems to enable the capabilities to provide real time provisioning.

Managers in the past have relied on back of envelope calculations or spreadsheet models to create business cases and get into deep trouble when any "what if" type of questions are posed. Unfortunately, these techniques cannot take into account the complex dynamics and variation inherent to a real life system such as a call center. The case discussed in this paper illustrates how simulation can help managers make sound business decisions.

2 SIMULATION MODEL

It is extremely crucial that the simulation team is in sync with the process designers and the system architects. As part of the "to-be" design effort, the Process Design team requires a deeper understanding of the impact of proposed changes prior to implementation. Thus, the objective is to understand impacts of processes in relation to:

- Costs
- Cycle Time
- Customer Experience

And on continuous basis balance resource scenarios based on above factors, determine which changes are most critical to the success of the effort to support educated decision-making. If we further explode into "simulate processes" (Figure 1) activity, we need to create the simulation model, perform "what if" analysis, and analyze the results which feeds back into "define to-be processes" effort. Figure 3 shows the exploded business simulation approach.

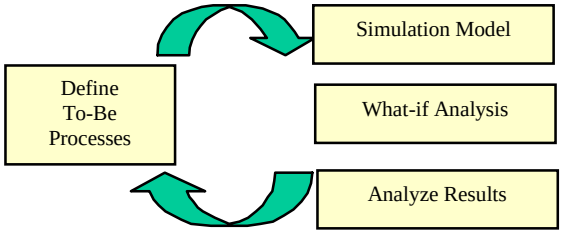

Figure 3: Business Simulation Approach

It is recommended to go through an iterative process of "define to-be processes" and simulate them. The benefit to that, one understands the value added of the change and how it impacts other interfaces and linkages.

Simulation is one of those decision support methodologies that can effectively and accurately model a call center environment and study its performance to solve a majority of issues. The simulation case summarized in this paper illustrates one of the many ways in which the technology can enhance call center management. The information published regarding the case discussed is for presentation purposes only. Due to proprietary information laws the numbers are made up in such a way that it still conveys the message. The main steps followed during the case are:

2.1 Problem Definition

The primary objectives behind doing simulation as part of the Process Engineering Team's responsibility are:

- Help visualize futuristic processes and use it as a communication tool
- Validate assumptions of processes prior to implementation
- Analyze end-to-end impact of change
- Predict high-level resource requirements
- Perform "what if" analysis
- Estimate cost savings for the business case purpose

2.2 Formulation

It is highly recommended to investigate and study the existing system if it exists or study other systems that have close behavioral resemblance. The simulation model should always be designed to focus on achieving primary objectives and not only imitate the real life system precisely. As soon as the flow of the entities and functional relationships of activities within the system is understood, a graphical architecture diagram should be generated. The simulation model architecture for the case in discussion is depicted in Figure 4. The diagram helps communicate and better understand the processes involved.

As depicted in Figure 4, the simulation model consists of various modules like Manage Customer Contact, Establish, Change or Disconnect Service, Non Service Requests, etc. Each module consists of detail process activities and algorithms for rework and entity distributions. The arrival of customer requests is an input to the model and there are various different types of requests, e.g. customer wants to buy new (N) service, change (C) existing service, or disconnect (D) service. While not show in Figure 4, customer contact with the call center can span multiple media's, such as telephone call, over the web, fax etc. If the request is handled through electronic care if follows different process steps without human intervention. Based on historical data, the inter-arrival rate is calculated and inputted as *expo(x)*. All the process activities have activity times associated with them and are inputted in the model. Model inputs are discussed in greater details in the following section. Outputs of typical interest involve cycle time, resource utilization, and load balancing across resources or modules. Entities also flow through different modules. For example, if the customer wants to buy a new service and calls the toll free number at the highest level the entity would flow through manage customer contact where initial information gathering will take place. Since, it is a new service it will go through the Establish, Change, or Disconnect Service module and steps like ordering, provisioning, test and turn up will take place. Then the Bill Invoice module would receive the information and it will send the bill to the customer. If the customer has a question about the bill or the service the Non Service Request module will take care of it. The formulation is the one of the key phases as most models are superior through their design.

2.3 Model Inputs

The main inputs into the simulation model are typically:

- Inter-arrival rates
- Service activity mix
- Process times
- Number of resources

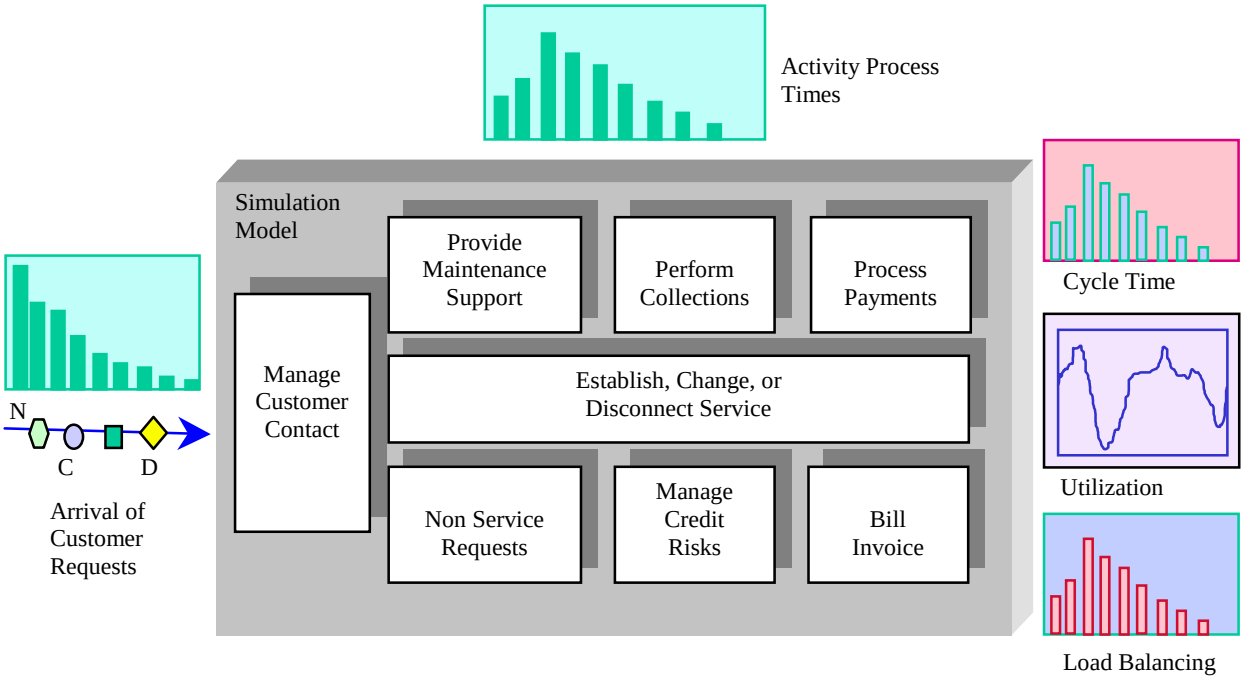

Figure 4: Simulation Model Architecture

The inter-arrival rate represents the average time between each entity entering the system, which in this case is the arrival of customer requests. One of the challenges faced by this team was that since the customer requests could come through various mediums how do we incorporate it in the model. The incoming customer requests where classified into various categories. Then variables where defined to represent the various categories.

The service activity mix determines what type of work will have to be performed as a result of the customer request. The mix can be typically calculated using historical data of tracked work transactions. Some of the main transactions performed are Billing Inquiries, Sales Requests, Service Requests, Support Requests, Maintenance Requests, and Other Requests. Based on historical data, the percentage mix is calculated and used to distribute the entities within the system. One of the key assumptions in the Reengineering Initiative framework was that end-state vision was to handle 50% of the transactions through electronic care channel. A detail cost impact analysis of the assumption is described in the Experimentation section.

Each activity has an associated process time in the model. Time and motion study is an acceptable methodology to calculate the process times. A less expensive methodology is to interview Customer Service Agents and Subject Matter Experts, and ask for their estimates of time it take to perform the particular activity. It is recommended to take minimum, maximum and most likely values of the time estimates because it can be translated into a triangular distribution. The modeler can use the inherent advantages of triangular distribution since we are approximating process times.

The final number of resources is a desired output from the simulation model results. It is recommended to find out the number of resources available to do the work during the "as-is" or current state. And perform experimentation by plugging those resources into the model and through optimizing with given constraints predict the required resources in the end-state to work the futuristic processes.

2.4 Model Building

The model building phase is where simulation modeling expertise and creativity comes into picture. The good thing about simulation modeling is that there is no such thing as “The Best Model”. The simulation model was built using BPSimulator™, simulation software by Systems Modeling, Sewickley, PA.

The model was built very modular meaning that all the major assumptions were variables that could be very easily tweaked to perform "what if" analysis. If the focus is on analyzing end-to-end impact of change, which in this case it was. It is recommended to build one large model, that incorporates all the process interfaces and linkages. Thus, it is important to focus on achieving the primary objectives when building the model, but keeping in mind issues like secondary results and scalability.

2.5 Experimentation

During the experimentation phase, the model was run multiple times and some critical statistical tests were conducted to identify the steady state and run length of the model. Once the Process Design team had formalized their final processes, the simulation team had built a master model. The simulation model was ready for "what if" analysis. Due to proprietary information laws the analysis discussed has been modified, yet conveys the findings. The "what if" analysis was conducted in various areas but for the purpose of demonstration only two will be discussed. The two areas are:

- Electronic Care (ECare)
- Sales Automation (SA)

It is intuitive to feel that electronic care would have significant impact on savings. But how much? Is the question that simulation can answer. Figure 5 illustrates how electronic care can impact your cost savings. One of the end-state assumptions was to operate electronic care at 50%. Four scenarios where created i.e. electronic care at 50%, 40%, 30%, and 20% of the customer arrival requests will be handled through ECare and the savings is calculated based on reduction in resources. The chart demonstrates that there is significant difference between ECare 50% and ECare 20%. Customer adoption rates might play an important role in realizing the stated savings, and the focus should be on strategies to address it. The analysis very evidently makes a convincing case to pursue investing in ECare.

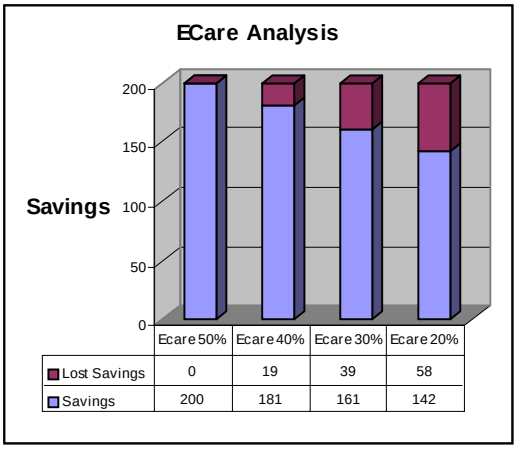

Figure 5: ECare Savings Impact Analysis

The second interesting analysis was done in the area of deploying Sales Automation tools to reduce the amount of support work that is currently provided to the sales force. Similar approach, the end state assumption is 80% reduction in queries by the sales force due to the Sales Automation tool. Three scenarios tested are SA 80%, 40%, and 10%. Results illustrated in Figure 6, very clearly demonstrates that Sales Automation tools does not have a significant impact on savings relative to some other areas e.g. ECare. Even the difference between SA 80% and SA 10% is relatively small. Based on the analysis the Sales Automation deployment is probably last on the list from a prioritization perspective.

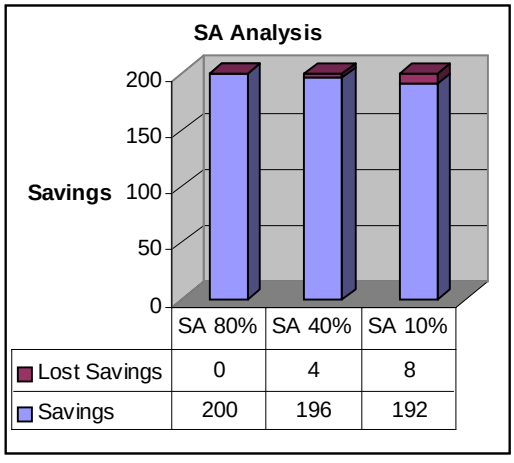

Figure 6: Sales Automation Impact Analysis

The results from the master model helped the team estimate the cost savings for the business case purpose, and that was the baseline used to compare different scenarios.

3 KEY TAKEAWAYS

The simulation team was successful in achieving all the primary objectives listed in the Problem Definition section. The Process Design team was extremely happy to see a tool that can help them visualize the process. The simulation model validates that the process works and works efficiently. The results of the simulation model where the key basis of the business case and contributed to the measures of benefits section for the Process Engineering Team. The "what if" analysis helped us understand the impact of various scenarios allowing better decision-making. A prioritized implementation strategy was designed based on the findings of the "what if" analysis. For example, ECare of certain business transactions would be on the top priority. The Animated model helped as a wonderful communication tool to the senior management and other organizations especially software development outfits. The main reason why development outfits liked it was because they can better understand information flows.

It is very important that the team, stakeholders, and the senior management understand the scientific basis behind the results and the analysis. Otherwise, it is very easy to be known as the psychic reader with the crystal ball who can predict the future. Simulation loses its position as soon as it is being viewed as a crystal ball. It is the simulation team's responsibility to educate other member enough to comprehend the power of the methodology.

Animation is a great communication tool, but can very easily be misinterpreted. Lot of modelers come from very strong analytical and quantitative backgrounds and hence forget that each individual mind perceives animation differently. For example, when we represent a process activity with multiple resources but graphically people might see it as just one resource. It is recommended that if you plan to use animation as communication tool then please do some user (non-modeler) testing before you conduct any presentation.

4 CONCLUSION

The PET as a whole did see valued added by using simulation as a decision support tool. Scientific decision-making using analytical and quantitative techniques is extremely important in the fast paced marketplace. The Reengineering Initiative is in the implementation phase. The simulation team is now working on simulating much lower level processes and systems. Unleashing the power of simulation as a decision support technique continues to be a significant source of pride and accomplishment for the entire simulation team.

Call centers are here to stay for a long time, since industries are becoming more and more customer service oriented. Thus, call center management continues to be a challenging job in the changing times of industry focus, and technology.

ACKNOWLEDGEMENTS

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