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NETWORK OPERATIONS PROCESSES PLANNING

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ABSTRACT

This paper describes simple and powerful processes re-engineering methodologies that consist of an operations system analysis method, processes modeling tool, and simulation. This set of planning tools would benefit operations planners in carrying out their complex tasks including processes description and re-engineering.

1. INTRODUCTION

Telecommunications network and service managers have three basic planning needs, namely the service, network, and operations planning. The objective of service planning is to define service requirements by market research and business feasibility studies. The service requirements are then used as inputs for network planning, which specifies the network architecture plans.

Operations planning is, based on the network plan, to set the direction for services and network Operations, Administration, and Maintenance (OA&M) methods. An operations plan describes the present operations mode, sets the performance objectives, and suggests the future operations mode with transition plans.

To recommend appropriate strategies, the planners will analyze operations processes and evaluate the alternatives. A comprehensive operations planning task usually includes operations system analysis, process flow-charting, and what-if analysis. Traditionally, these three tasks for operations planning are done by different planners and based on different methodologies. Without a consistent and systematic approach, managers have been limited to receive the full range of benefits that planning efforts can provide. This paper reports our experience of an attempted integration for three methodologies or tools.

First, Operations System Analysis Information Diagram (OSAID) [1] is introduced as a method for constructing and analyzing operation flows. Second, AT&T CAPTURE [2] is described to show how to create and store operations flow information. Third, a queuing simulation tool, AT&T Q+ [3] and [4] is introduced for operations scenario analyses.

2. OPERATIONS PLANNING

Operations Systems (OSs) have been used to assist telecommunication operations for more than two decades. Because of the increasing use of new technologies to manage telecommunication operations and the amount of highly automated, intelligent, and stand-alone equipment or network elements, modern operations have to deal with information management to a much greater extent.

Considering an OS as a processing system, in which either physical work or information is provided to perform certain OS function(s), is the basis of this diagram approach. A sub-process or step is to complete a task that will add value to the whole process. It can be either information processing or physical work. Basic elements for analyzing operations are, therefore, related to the components that affect the process. It is necessary to know what, who, and how to perform the work and its way of transformation (input and output). OSAID is a diagram (see Figure 1) in which five elements are written onto designated positions of a large box, which has an upper and lower rectangle. The upper part is used to name or number the operation. The lower part is divided into four small triangles for task, organization, data source, and output. They are placed at left, top, bottom, and right triangles. The five elements of OSAID are explained in the following.

1. Name of the operation
2. Task(s) to be accomplished or Value-added information
3. Organization(s) responsible for the operation
4. Data source to support the work
5. Result or Output of the operation

Figure 2 shows an OSAID model for a trouble reporting and resolution process. For the

illustration purpose, the example shows partial work flows and data sources. In the next section, a process modeling tool is introduced to show how the operations processes can be described easily.

3. PROCESS MODELING

AT&T's CAPTURE is a Windows-based software tool that incorporates process management and improvement methodology and provides a set of integrated features for capturing, analyzing, documenting and managing processes. The objectives are to enhance the capability and productivity for process planning through the provision of an integrated tool set.

The tool offers an easy to use graphical interface. All tasks, including construction of process diagrams, generation of documents, and process analysis, are done through simple "point and click" mouse operations.

Currently, CAPTURE provides the following features.

1. Drawing Process Diagrams :
   - Customized drawing palette
   - Connectivity
   - Hierarchical decomposition
   - Graphical editing
2. Process Characterization, Documentation, and Analysis :
   - Process description
   - Process documentation
   - Process analysis
3. Object Linking & Embedding (OLE) : OLE client functionality has been implemented to enable linking and communicating with other Windows tools, such as EXCEL and MS-WORD.

Figures 3, 4, and 5 show CAPTURE generated screen examples. Figure 3 is an example of the process information dialog box. As a result of using the the template, Figure 4 shows an associated process contains the name of operation, work center, and operations system. Figure 5 illustrates a high-level analysis showing a matrix of function vs. organization relations and a proportional view based on cost data, for the process in Figure 4.

4. OPERATIONS SCENARIO ANALYSIS

Planners often need to address reasons for whatever they recommend. To persuade decision makers to select one alternative over the others, it is necessary to assess the tradeoff between alternatives.

To compare alternative plans, simulation has been proven to be a reliable and scientific method. OSAID provides a structured mechanism for planning operations as a queuing network, and Q+ provides the simulation capabilities.

The AT&T Queuing+Analysis Software (Q+), is a visual, discrete-event, simulation modeling tool developed by Bell Laboratories. Q+ has a large number of built in primitives, including representations for probabilistic behavior, priorities, blocking, routing, service disciplines, class-dependent behavior, multiple resource possession effects, etc. Detailed descriptions of Q+ can be found in [3] or [4]. Q+ has been used to model a wide variety of communications, computing, and business operations applications.

An example of a trouble reporting and resolution process, is illustrated here to show that information collected by OSAID can be easily incorporated into a Q+ simulation model. Figure 6 shows a trouble reporting and resolution process model generated on Q+. The example process is identical to the previous process (in Figures 2 and 4). A customer reports service problems to Long Distance Repair Service Center (LDRSC), the first "station" shown in Figure 6. Similar process models can be created for other provisioning and maintenance processes by Q+. When the appropriate data is provided for the model, a simulation can begin.

There are many statistics that can be collected from the simulation for trade-off analyses. The most obvious one is the amount of time it takes to close a trouble ticket, which is the "network sojourn time" in Q+. Other performance measures include "node utilization" which indicates how busy the service agent are, and is useful for sizing the staffing level.

5. SUMMARY

Operations planning is an important part of telecommunications planning; the operations decisions have direct impacts on the services and network operations constantly. A high quality operations plan is the first step toward the success of well managed networks and services.

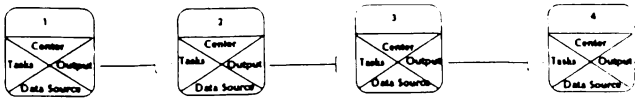

Figure 1. Example of OSAID Diagram

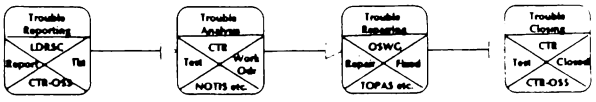

Figure 2. Example of Trouble Resolution Process

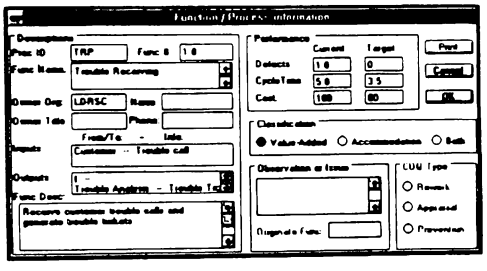

Figure 3. Example of CAPTURE Information Dialog Box

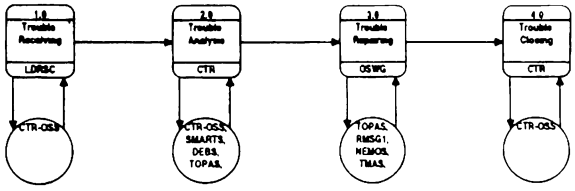

Figure 4. Example of CAPTURE Generated Work Flow

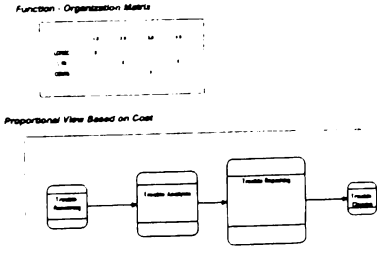

Figure 5. Example of CAPTURE Analysis

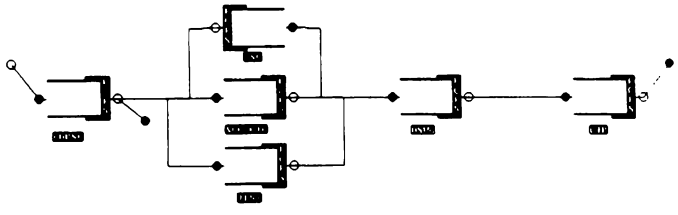

Figure 6. Example of Q+ Generated Model

Productivity and flexibility of operations planning can be increased when the right tools are available. This paper has discussed the desired capabilities for producing higher quality plans.

The combination of the tools discussed in this paper has stretched the scope of traditional operations planning. Operations planners can be more creative in modifying operations plans and predicting the systems performance results promptly.

Soon, the enhancement for these tools is expected to include at least the following two kinds of integration.

1. Create exact OSAID type templates on CAPTURE : The data input method such as the template that CAPTURE currently has is a desirable function to add. The OSAID methodology has already identified the information components for operations system planning; modification of the existing CAPTURE template by using the OSAID format is recommended (for operations planning.)
2. Build connections from CAPTURE to Q+ : To reuse the data base created on CAPTURE, it is necessary to build a convenient and automatic transfer method to carry over the information into the simulation stage for Q+ to use.

When the above interconnections are provided, the new operations planning tool will be more capable and can generate additional useful results (plans).

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AUTHOR BIOGRAPHIES

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