Paper 116-25

Information Delivery: Exploitation Strategies and Best Practices

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ABSTRACT

This paper presents a conceptual and technical overview of an award winning information delivery system in a medium sized managed care/health insurance company. Univera Healthcare/CNY, recipient of the 1999 Best Practices Award for Small Companies and Workgroups from The Data Warehouse Institute, has implemented an information delivery system which employs the SAS System® for data access, data management and exploitation. The paper is intended to provide data warehouse/information delivery professionals and business managers with an overview of how the SAS "toolbox" can be used to develop an end to end information delivery solution. SAS System products discussed will include Base SAS®, SAS/AF®, SAS/EIS®, SAS Warehouse Administrator®, SAS ODBC Drivers®, SAS/Access®, and SAS IntrNet®.

INTRODUCTION

Univera Healtcare/CNY is a health maintenance organization (HMO) servicing Central New York and the Southern Tier of Central New York. Our use of the SAS System dates back to 1988 when we first licensed the SAS System for personal computers. The Health Care Analysis Department began to do basic reporting using large summary files provided by our MIS department. Prior to using the SAS System for personal computers most analysis was done using printed reports generated directly from on-line transaction processing systems (OLTP). Data from these reports were frequently keypunched to LOTUS spreadsheets for display and analysis. Using the SAS System was much more effective than manually transferring data to spreadsheets.

Recognizing the potential for enhanced information delivery using the SAS System, we purchased a SUN Microsystems Sparcstation 1. In 1990 we licensed the SAS System for UNIX. SAS's multi-vendor architecture allowed us to easily move our data and SAS code from the personal computer to the UNIX workstation. The UNIX workstation provided significantly greater computing power and maximized the capability of the SAS System. With this enhanced capability we were able to begin using larger detail data downloads. Through the 1990s the Health Care Analysis Department grew to become the primary source of information for the corporation.

UNDERLYING ASSUMPTIONS AND CONSIDERATIONS

INFORMATION DELIVERY KEY SUCCESS FACTORS

There were at least four key success factors in our information delivery initiative. The first success factor was that the initiative was customer driven. In contrast to many data warehouse/information delivery initiatives which are IS driven, our initiative was resident in the Health Care Analysis Department. The staff working on the information delivery system was also responsible for doing business analysis. The second success factor was our focus on delivering information versus simply storing data. The third success factor was phased approach which allows us to yield visible results in the early stages. Early visible results allowed us to gain credibility and generate momentum. The fourth success factor was our ability to leverage successes for future development.

UNDERSTANDING CUSTOMER NEEDS

One of the most important dimensions of developing an information delivery system is understanding, in general terms, what customers need. There are a number of critical things to understand about most information delivery customers. First, customer information delivery needs are most often very specific and very limited. Second, frequently customers are not very good at articulating their needs. Third, customers' needs are frequently immediate. Fourth, customer needs are often highly variable. Here, variation occurs, both from customer to customer but also for the same customer. Fifth, customer needs are often temporary. For example, a customer may have a business question which is very analytically complex but may never be asked again. Sixth, customers who do not use existing office automation tools will likely not use new tools. Finally, customers who are currently using existing office automation tools with be reluctant to abandon those tools in favor of new tools.

ATTRIBUTES OF A CUSTOMER DRIVEN SOLUTION

This mix of customer needs required us to take a different view of data warehousing. We chose to redefine the data warehouse from a technology-driven solution to a customer-driven solution. As a user-driven solution we chose to define the data warehouse as a collection of met needs rather than a particular database engine on a computer platform. Ultimately we ended up broadening our scope to be a system for delivering information rather than a system to house data.

DECISION SUPPORT LIFE CYCLE

In an effort to fully understand the demand for information delivery, we employed a conceptual framework. Figure 1 shows the "Decision Support Life Cycle". The "Decision Support Life Cycle" allows us to understand the nature of information delivery requests and leverage all of the work that we do. For example, typically all information delivery requests originate as ad hoc reports (left side of Figure 1). Approximately 70% of our work has a life span which does not go beyond the ad hoc report. The balance of the work we do consists of information delivery requests which began initially as an ad hoc report and evolved into something larger. We have positioned ourselves so that moving from ad hoc report to any other stage along this life cycle can be done with a minimal effort and almost no re-work. Development is simply a function of further articulating the delivery of the information.

OPTIMIZING ON INFORMATION DELIVERY

As an additional aspect of our effort to meet the needs of our customers we sought to optimize on information delivery. This optimization occurs along two dimensions, the pertains to the data we provide. Optimizing on data means providing only the data that the customer has requested. The second dimension of optimization relates to understanding customers' reluctance to learn and use new applications software.

INFORMATION DELIVERY CUSTOMER CONTINUUM

An additional tool to help us develop a strong conceptual understanding of issues in information delivery is the "Information Delivery Customer Continuum" (Figure 2). The customer continuum illustrates how we view our different types of customers. This model guides us in our responses to customers.

APPLICATIONS DEMONSTRATION

DATA MANAGEMENT, REPORTING AND DATA DISPLAY

Typically, a request for information begins as an ad hoc report requiring basic data extraction, summarization and report generation. Then we might see repeated requests for the same general report with minor changes in the report parameters. At

this point in the life cycle of this request for information we would "macro" code the program used to generate the ad hoc report. Macro coding the program involves placing symbolic references in the code. The symbolic references are used to represent the changes in report parameters. Here the programmer only needs to change the report parameters one time in one location. For example, changing a date range for a report requires a parameter (date range) to be coded in part of the program where the data is extracted and also in the report title. Using macro code this change need only be done one time. While this might seem simplistic it can provide huge efficiencies in more lengthy and complicated reports. An example of this type of report is shown in Figure 3.

In this actual scenario we used Base SAS to manage the large volume of detail transaction data that goes into the report, generate the report and display the data and to macro code the underlying program.

Recognizing that an information request may have a life cycle that ends with the ad hoc report we can generate such a report with minimal effort. For those reports that do have longer life cycles we can leverage the work done when creating the ad hoc report. In the example above we took an ad hoc report, macro coded the program, and then created a user-friendly front end so that our customers could request the report themselves.

APPLICATIONS DEVELOPMENT

Developing user-friendly front-end applications represents the next progressive step in the decision support life cycle. Figure 4 shows how we were able to take the Plan Experience Report from Figure 3 and incorporate it into an automated report generation application. Using SAS/AF we provide our customers a flexible way to create their own reports. Figure 4 is part of a series of screens in an application we developed to facilitate the delivery of information to our customers. Figures 4 displays an extensive range of parameters the customer may select in generating a report.

DATA DISTRIBUTION

Shortly after we developed our customer applications for generating reports we began to give data files to selected customers. Initially we produced ASCII files which our customers could import into worksheets and database packages. This was very successful. Here, we could empower our more sophisticated customers with manageable information which they could in turn manipulate and display to their own liking. Since this initiative was so successful we acquired the SAS ODBC drivers which allowed us to create files which could be read directly by Microsoft Excel® and Microsoft Access®. Figure 5 shows a typical detail data file and a meta data file retrieved using the ODBC drivers for Microsoft Office.

An additional example of leveraging our investment is our ability to incorporate the choice to download an ODBC file in place of a report in our customer application (see lower right of Figure 4).

EXECUTIVE INFORMATION SYSTEMS (EIS)

Moving along the continuum represented in the "Decision Support Life Cycle" we find the Executive Information System (EIS). The EIS represents our response to a demand for a more graphic display of the data contained in the Plan Experience Report. The EIS is designed as a reference tool for senior staff. This EIS was developed using SAS/EIS software. Again we were able to use existing programs for the EIS and add the user interface with SAS/EIS. Figure 6 shows an example of one of the screens in our EIS.

WEB/INTERNET APPLICATIONS

During late 1997 and early 1998 our information delivery customer base expanded outside the walls of our organization. In response to the need to deliver information to customers beyond our walls we began to make use of the world wide web and the internet. In early 1998 we began to deploy information to a web site as static reports. This was done by using just a few lines of code that we retrieved for the SAS Institute research and development web page. An example of our static web reporting capability appears in Figure 7 and Figure 8.

During the summer of 1998 we began developing interactive applications. This is what we consider a fully "articulated" information request. Here users can access our web site, specify parameters and request reports or data. An example of this interface is shown in Figure 9. During 1998 and 1999 we added approximately 15 web applications.

BEST PRACTICE ATTRIBUTES

There are several characteristic which need be considered in establishing a best practice information delivery system. Here I am borrowing loosely from characteristics outlined by the Data Warehouse Institute. The first best practice characteristic is that you earn the trust and respect of your customers. We were able to gain the trust and respect of our customers by being very good at doing ad hoc reporting. If you become effective at delivering ad hoc reports that are useful to your customer they will trust you and provide you with the freedom and flexibility to expand the scope of what you are doing beyond ad hoc reporting.

The second characteristic that you need to consider in building a best practice information delivery system is assembling the correct mix of people. For us, the correct mix of people included the information delivery customer, the staff in the Health Care Analysis department and the Information Systems department. An important part of this "mix" was the varied background of the Health Care Analysis staff. We had the benefit of talented, technically oriented business analysts and a business-conscious technical staff. In addition to the varied background of the staff, we had a wide variety in the type of work available for the staff, ranging from ad hoc reporting to applications development. The variation in types of work available allows us to retain staff and keep them engaged.

The third characteristic for consideration in developing a best practice information delivery system is data cleanliness. The data in the data warehouse needs to be accurate and reflective of the data on the companies operational systems. We have developed a process of reconciling information in the information delivery system with data on our operational databases.

The fourth characteristic to consider in developing a best practice information delivery system is a willingness to think and "work outside the box". We have worked outside the box on at least four levels. First, we employ conceptual models to guide in our management of our customers and the work that we do. Second, we chose to define the data warehouse abstractly as a collection of met needs. Third, the breadth and depth of the initiative is beyond the scope of what is typically found in a data warehouse initiative. Fifth, we have employed the latest in information delivery technology.

The fifth characteristic to consider in developing a best practice information delivery initiative is having a solid business driver and being willing to show a healthy disrespect for terminologies, methodologies and technologies. As a business analysis/research shop, we are expected to deliver a product not a terminology, technology and methodology. Our success hinges upon delivery of a viable product regardless of the methodology we use to produce it or the terminology used to describe it. When this initiative began there was no such thing as the "data warehouse." This project was done outside the IS Department (driven by the "end user" department).

The sixth characteristic for consideration in developing a best practice information delivery system is understanding that information delivery infrastructures must allow you to develop and deploy products in very short time frames. Delivering real products in realistic time frames has always been high priority for us. Our database design and leveraging capability allowed us to

easily deploy future products and services. For example our Executive Information System application developed under an evaluation contract for SAS/EIS software (45 days), our preliminary web applications were developed under an evaluation contract for SAS/INTRNET software (45 days), subsequent Web applications deployed in days/weeks; and transitioning from ad hoc reports to web applications is nearly seamless.

The final characteristic for consideration in developing a best practice information delivery system is maintaining a good balance of old and new technology. In balancing new and old technology we recognized strong ad hoc reporting capability is the most important part of the initiative. It is important to remember that most information delivery challenges are definitional not technical and that getting good information tomorrow on paper is better than having it in a web application next week. To this end we used the right technology for the right purpose. We employed old technology for data manipulation/reduction, and ad hoc reporting and new technology for automation, database administration, application development, and web applications.

CONCLUSION

This paper has provided an overview of a award winning information delivery system. We have tried to demonstrate that by incrementally leveraging your investment in information delivery you can employ best practices. We have also shared some of the underlying assumptions and models that guided this initiative.

CONTACT INFORMATION

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FIGURE 1

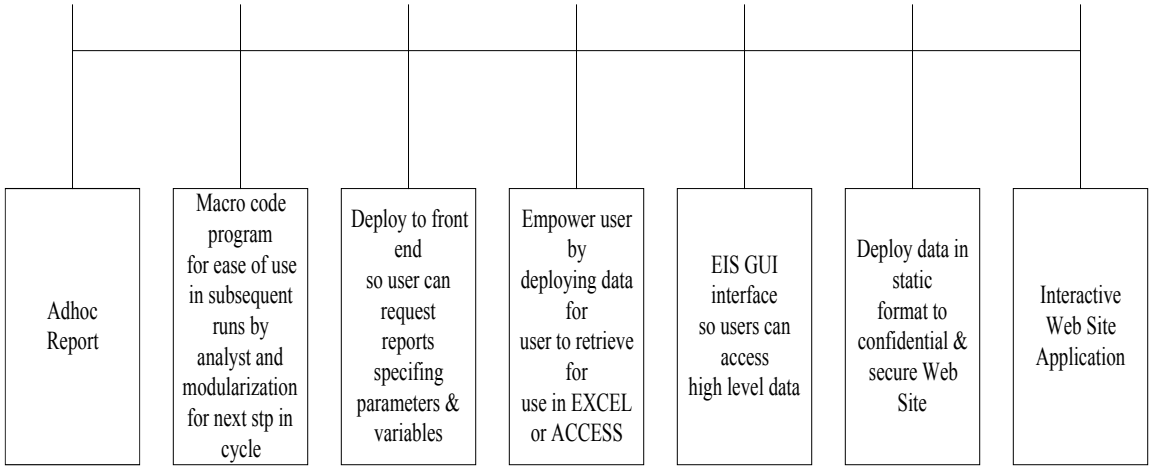


FIGURE 2

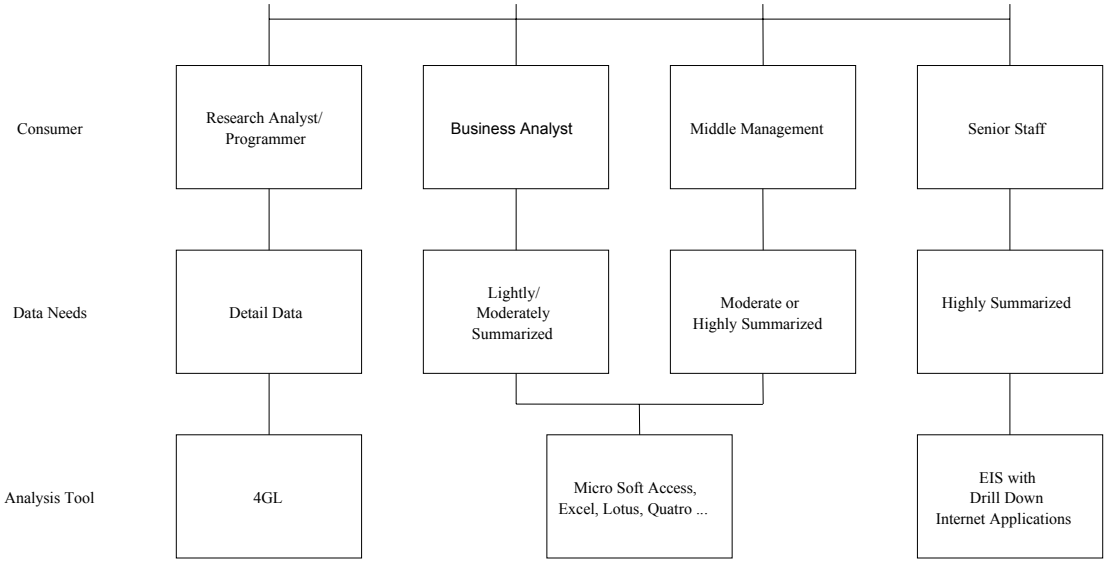


FIGURE 3

Sample "Plex" Report

HSMC - HEALTH CARE ANALYSIS DEPT 31DEC97
PLAN EXPERIENCE
LINE OF BUSINESS: PREPAID HEALTH PLAN
NETWORK: SAMPLE - PHO

01JAN97 THROUGH 31MAR97 - CUTOFF DATE 30NOV97

BILL TYPE ALL SERVICES		Number of Procedures	Amount Requested	Actual Payments *1	Simulated Payments *2	Total Amount Paid *3	Withhold Cost	Copay	Total Cost *4
A Professional Services	A1A Office Visits	11,374	$646,663	$465,983	$0	$465,983	$45,484	$77,181	$588,649
	A1B Inpatient Visits	533	$75,779	$46,381	$0	$46,381	$3,895	$155	$50,431
	A1C Emergency Room Visits	254	$33,185	$26,762	$0	$26,762	$1,436	$0	$28,198
	A1D Injections/Immunizations	2,364	$91,050	$60,958	$0	$60,958	$1,726	$293	$62,976
	A2 Laboratory	13,073	$411,104	$182,746	$23	$182,769	$7,155	$216	$190,140
	A3 X-Ray	2,546	$364,917	$188,169	$90	$188,259	$9,587	$71	$197,916
	A4 Physical Therapy	200	$12,003	$10,607	$0	$10,607	$2	$419	$11,027
	A5 Prosthetics/Appl./SupplS.	485	$81,290	$69,709	$0	$69,709	$374	$6,103	$76,186
	A6 Substance Abuse OP	0	$0	$0	$0	$0	$0	$0	$0
	TOTAL	41,030	$3,029,669	$1,709,202	$247	$1,709,449	$118,197	$119,704	$1,947,351
B1 Hospital Pool - Institutional Svcs	B1A Inpatient	223	$786,033	$211,805	$273,456	$485,261	$0	$3,400	$488,661
	B1B Outpatient Services	236	$301,497	$153,811	$0	$153,811	$0	$0	$153,811
	B1C Skilled Nursing Facility	1	$26,250	$26,250	$0	$26,250	$0	$0	$26,250
	TOTAL	460	$1,113,780	$391,866	$273,456	$665,323	$0	$3,400	$668,723
B2 Hospital Pool - Special Services	B2A Emergency Room	255	$100,969	$56,935	$0	$56,935	$0	$7,968	$64,903
	B2B Radiation Therapy	2	$909	$727	$0	$727	$0	$0	$727
	B2F Home Health Care	43	$45,453	$44,468	$0	$44,468	$0	$0	$44,468
	B2G Other Miscellaneous	52	$55,003	$33,487	$0	$33,487	$0	$675	$34,162
	TOTAL	409	$228,633	$160,334	$0	$160,334	$0	$8,643	$168,977
TOTAL ALL SERVICES		41,899	$4,372,083	$2,261,402	$273,704	$2,535,106	$118,197	$131,747	$2,785,050

*1: Simulated payments for capitated/contracted vendors excluded.
*2: Capitated/contracted vendors only. Amount paid is equal to the allowed amount (lesser of the fee schedule or requested amount) less copay.
*3: Total Cost to HSMC. Actual Payments + Simulated Payments
*4: Total Cost to HSMC and Patient. Total Amount Paid + Withhold Cost + Copay
Does not include DME and bad debt & charity.
stndplex (hmcca)

Health Services Medical Corporation
Health Care Analysis Department

FIGURE 4

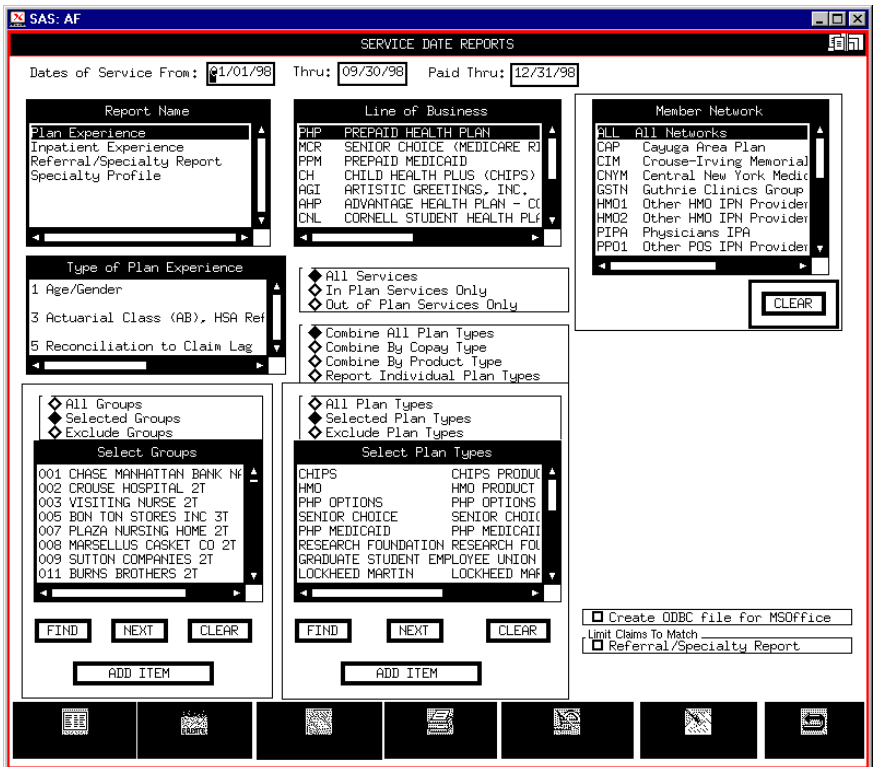


FIGURE 5

ODBC to Access: Meta & Detail

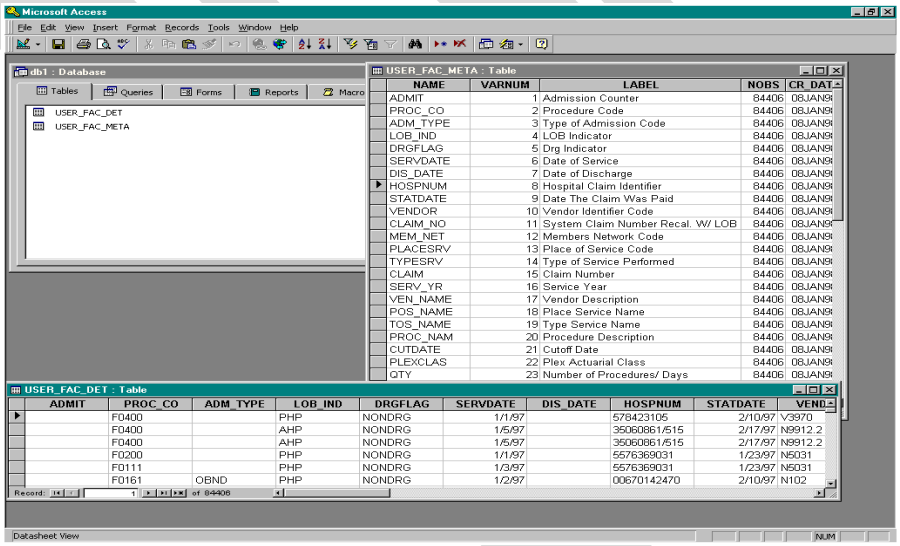


FIGURE 6

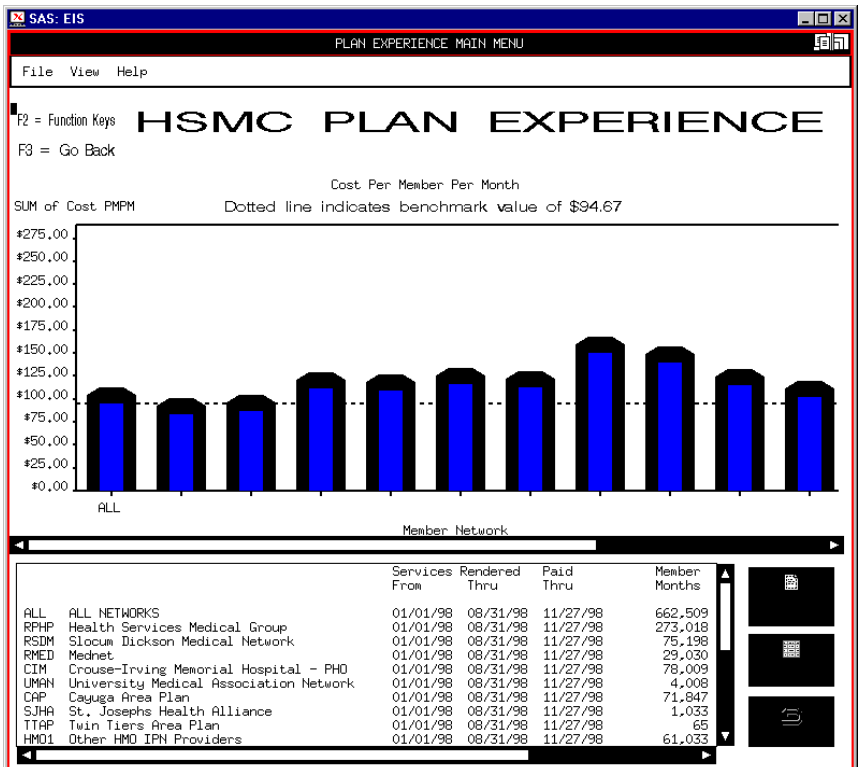


FIGURE 7

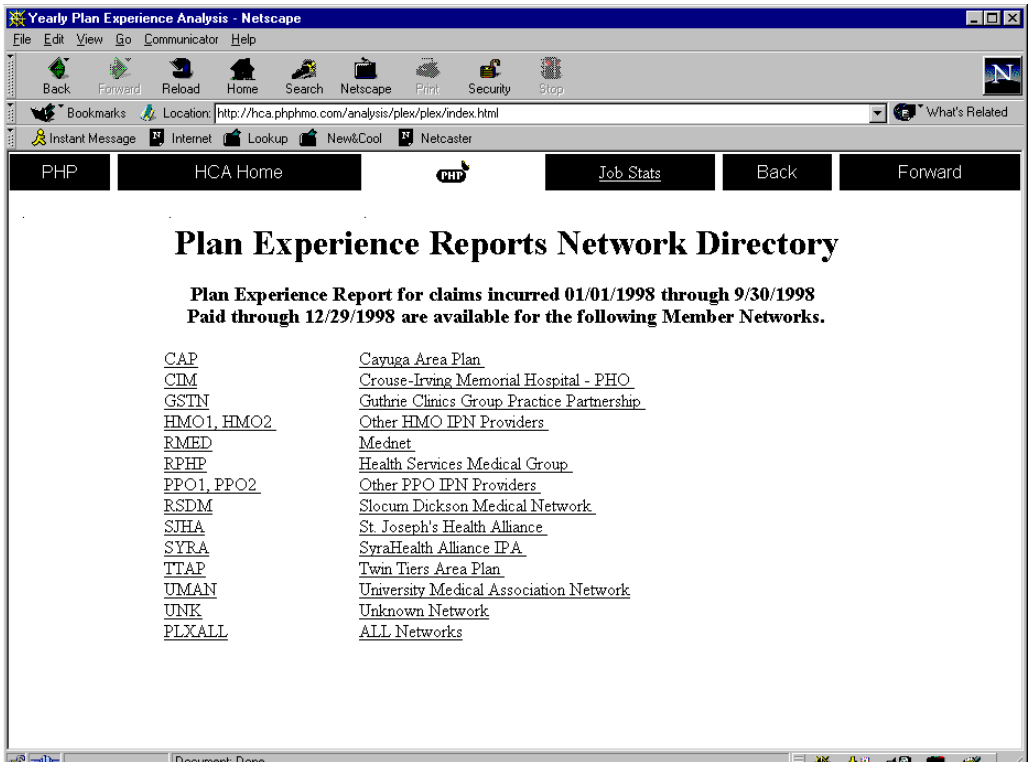
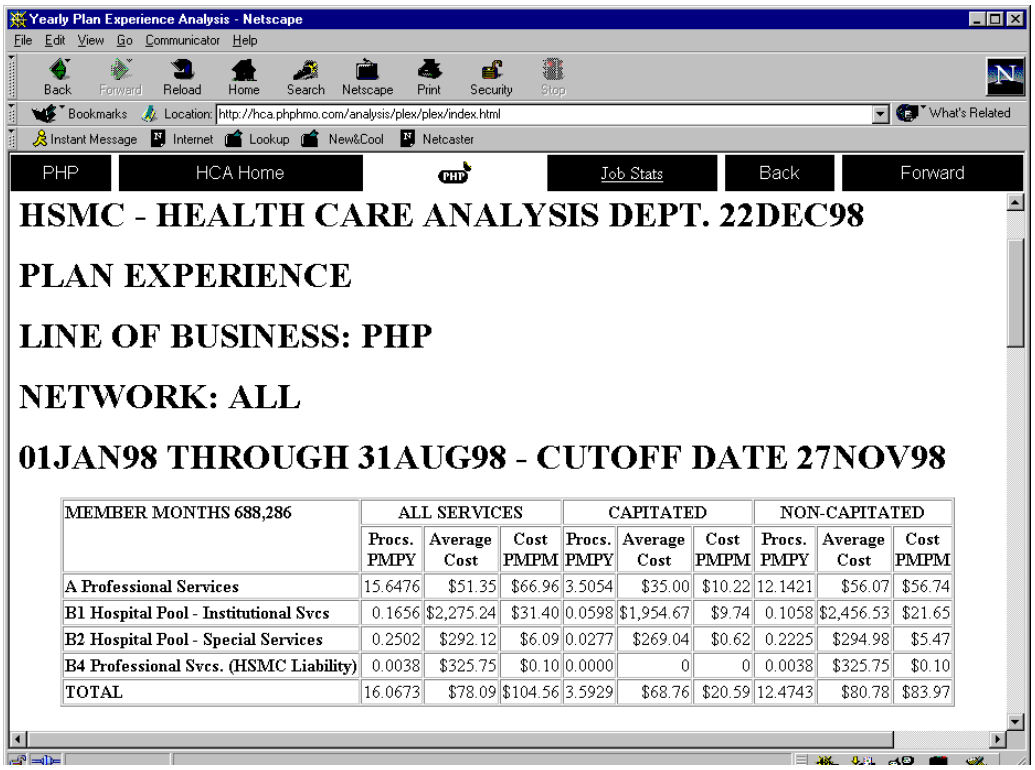


FIGURE 8



MEMBER MONTHS 688,286	ALL SERVICES			CAPITATED			NON-CAPITATED		
	Procs. PMPY	Average Cost	Cost PMPM	Procs. PMPY	Average Cost	Cost PMPM	Procs. PMPY	Average Cost	Cost PMPM
A Professional Services	15.6476	$51.35	$66.96	3.5054	$35.00	$10.22	12.1421	$56.07	$56.74
B1 Hospital Pool - Institutional Svcs	0.1656	$2,275.24	$31.40	0.0598	$1,954.67	$9.74	0.1058	$2,456.53	$21.65
B2 Hospital Pool - Special Services	0.2502	$292.12	$6.09	0.0277	$269.04	$0.62	0.2225	$294.98	$5.47
B4 Professional Svcs. (HSMC Liability)	0.0038	$325.75	$0.10	0.0000	0	0	0.0038	$325.75	$0.10
TOTAL	16.0673	$78.09	$104.56	3.5929	$68.76	$20.59	12.4743	$80.78	$83.97

FIGURE 9