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The Health Care Information Factory: An Overview of the SAS® Enterprise Business Intelligence Environment at the Minnesota Department of Human Services

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ABSTRACT

In these times of tight budgets and rapid increases in health care costs, agencies who administer health care programs are under increasing pressure to monitor, analyze and report on health care data. The Minnesota Department of Human Services (MN DHS), which oversees the state's Medicaid program, is answerable in this respect to many different stake holders, including federal and state authorities. Turning volumes of raw health care data into salient, actionable information can be a formidable task; the SAS® Enterprise Business Intelligence Platform makes this task easier by providing an integrated solution for both data analysis and information dissemination. This paper offers a brief overview of how MN DHS uses the SAS EBI Platform to address health care reporting and analysis needs.

INTRODUCTION

Through its largest health care programs, Medical Assistance (Minnesota's Medicaid program) and MinnesotaCare, the Minnesota Department of Human Services administers or oversees health care coverage for more than 800,000 persons each month[1]. These two means-tested programs are paid for by a combination of State and Federal funds, or, in the case of some MinnesotaCare eligibility subgroups, state funds only. With so many people receiving health care coverage, large volumes of data are produced on a regular basis (we typically add around 166 GB of health care data each month to our data warehouse that retains about ten years of historical data). Administering these health care programs involves many reporting and analysis obligations, including:

1. Monitoring and reporting on current health care enrollment, utilization, and cost
2. Predicting future trends of enrollment and expenditures
3. Measure performance and quality of care
4. Detecting and hopefully preventing fraud, waste, and abuse

In order for the raw health care data we collect to be of value, it must be distilled into the relevant information that can be used for reporting and analysis, then delivered to appropriate stakeholders and decision makers. Using SAS EBI Platform tools, data analysts at MN DHS extract raw data from our data warehouse or import it from other sources, cleanse and transform the data into timely, meaningful information, and distribute that information to appropriate audiences.

OUR ENVIRONMENT

[1] "Minnesota Health Care Programs" DHS-4932-ENG 2-12 https://edocs.dhs.state.mn.us/lfserver/Public/DHS-4932-ENG 31 May 2012

At present MN DHS's SAS BI environment is deployed across three machines: A dedicated metadata server, a compute server, and a web server. MN DHS data analyst "Power Users" (roughly equivalent to a BI Content Developer in SAS parlance) use the SAS BI client tools Management Console, Enterprise Guide, OLAP Cube Studio, and Information Map Studio to extract and refine data. Oftentimes, the end product is in turn disseminated to content consumers – policy staff, managers, help desk staff – via Web SAS Report Studio or the SAS Information Delivery Portal.

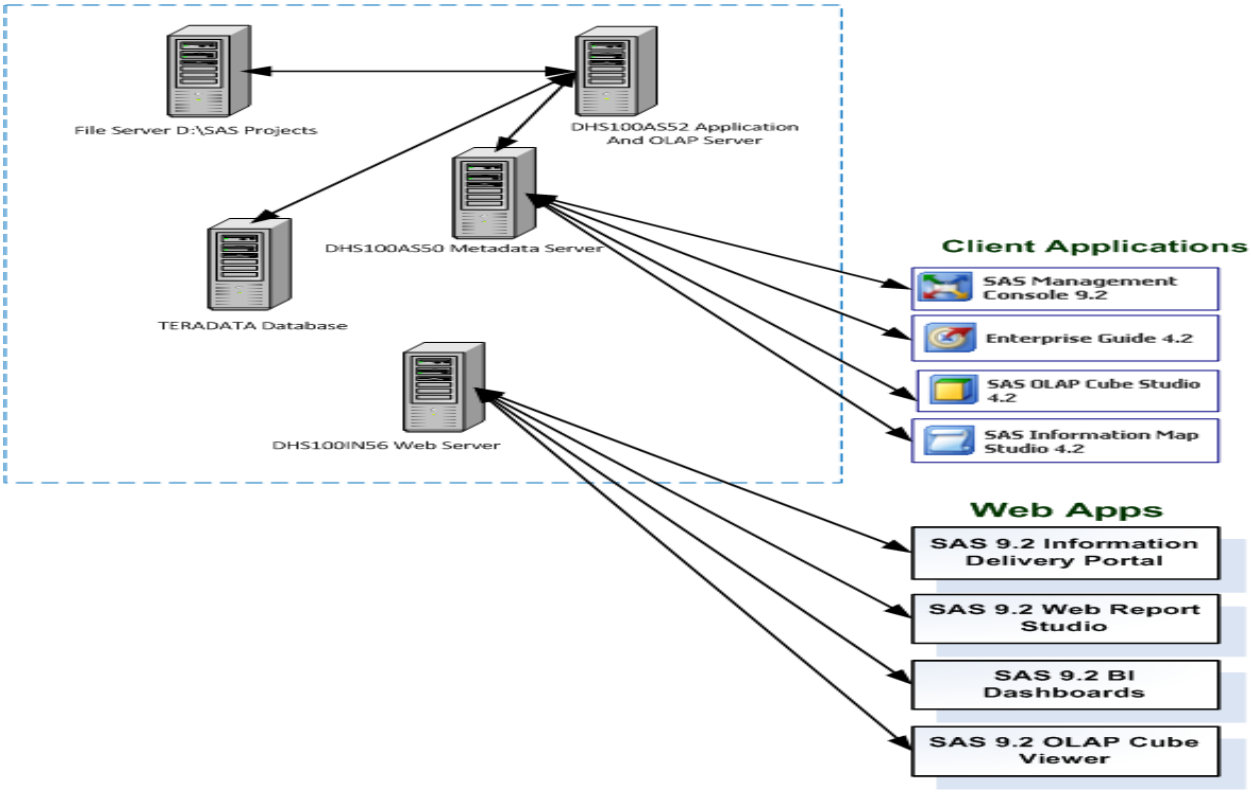


Figure 1: MN DHS SAS Enterprise Business Intelligence Platform

The primary source of raw data is the MN DHS Data Warehouse, a Teradata platform housing raw enrollment, claims, screening, demographic, and other records for our Medicaid and MinnesotaCare participants.

HOW SAS SUPPORTS OUR REPORTING AND ANALYTICAL NEEDS

So how do we bridge the gap between the raw information from our data warehouse and a finished product a decision maker can use? To illustrate, I will use three brief examples representative of what occurs in our production environment on a routine basis.

MN DHS Example Project One:

"I don't want to have to ask for this report each month – is there any way you can update it automatically?"

This is a direct quote from a request a data analyst received from a content consumer, and certainly redolent of many requests content consumers have had over the years. In this case the consumer wanted a weekly update of a price list for nutritional supplements covered by our health care programs – a very simple list report. The data analyst who completed this project decided to schedule a report to run every Sunday, deployed the report in the Information Delivery Portal, and notified the content consumer of the report's update schedule so she could have access to it whenever she wished.

To accomplish the task, the data analyst employed SAS Enterprise Guide to write a program that utilizes the SAS ACCESS Interface to Teradata in order to pull down the necessary information from the data warehouse, built an information map, a report, and used the schedule manager in SAS Management Console to ensure the information was updated every week. An overview of the workflow displays in Figure 2.

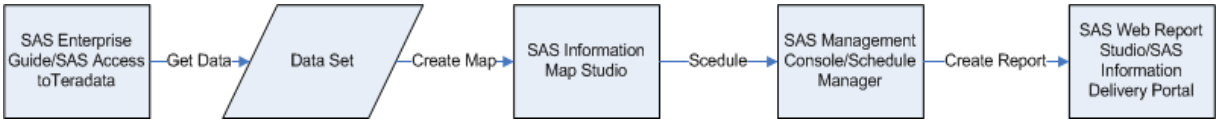
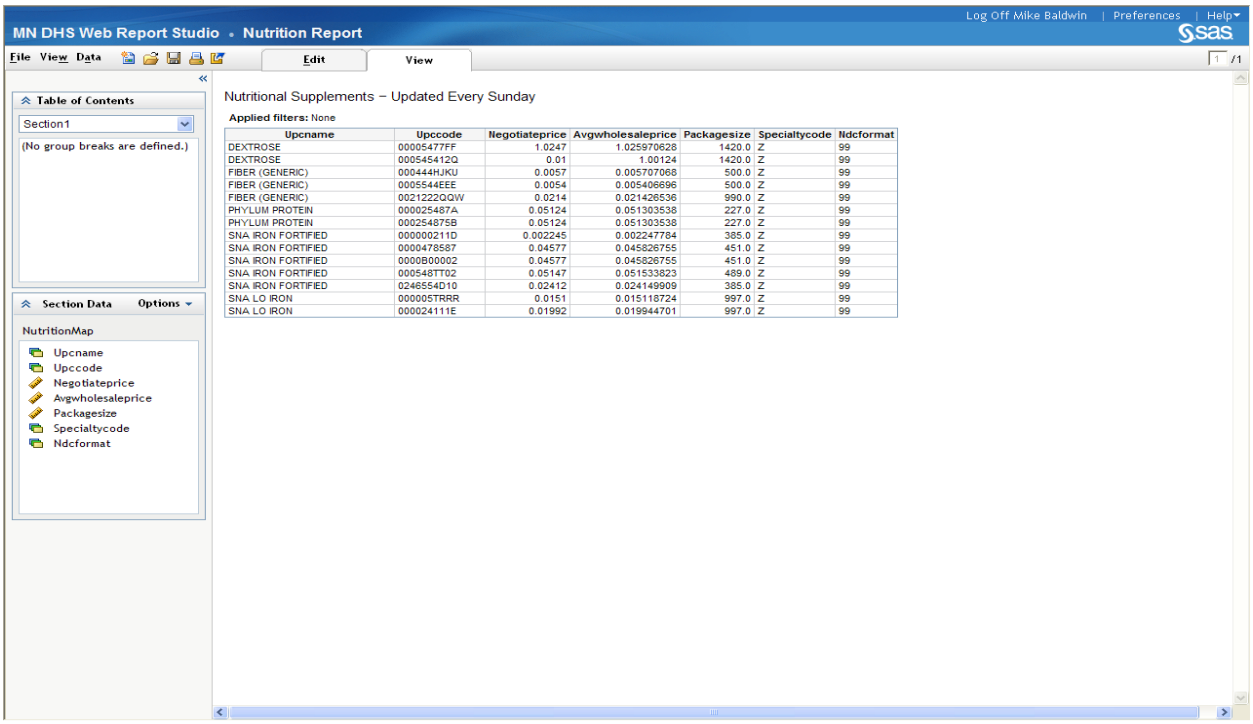


Figure 2: MN DHS Example Project One Workflow

An example of the deliverable from that project, the "Nutritional Supplements Report," appears in Figure 3.



Upcname	Upccode	Negotiateprice	Avgwholesaleprice	Packagesize	Specialtycode	Ndcformat
DEXTROSE	00005477FF	1.0247	1.025970628	1420.0	Z	99
DEXTROSE	000545412Q	0.01	1.00124	1420.0	Z	99
FIBER (GENERIC)	000444HJKU	0.0057	0.005707068	500.0	Z	99
FIBER (GENERIC)	0005544EEE	0.0054	0.005406696	500.0	Z	99
FIBER (GENERIC)	0021222QQW	0.0214	0.021426536	990.0	Z	99
PHYLUM PROTEIN	000025487A	0.05124	0.051303538	227.0	Z	99
PHYLUM PROTEIN	0002548758	0.05124	0.051303538	227.0	Z	99
SNA IRON FORTIFIED	000000211D	0.002245	0.002247784	385.0	Z	99
SNA IRON FORTIFIED	0000478587	0.04577	0.045826755	451.0	Z	99
SNA IRON FORTIFIED	0000B00002	0.04577	0.045826755	451.0	Z	99
SNA IRON FORTIFIED	000548TT02	0.05147	0.051533823	489.0	Z	99
SNA IRON FORTIFIED	0246554D10	0.02412	0.024149909	385.0	Z	99
SNA LO IRON	000005TRRR	0.0151	0.015118724	997.0	Z	99
SNA LO IRON	000024111E	0.01992	0.019944701	997.0	Z	99

Figure 3: MN DHS Example Project One Deliverable

MN DHS Example Project Two:

The Minnesota Department of Human Services expenditure forecast is completed twice each year in February and November. The forecasting process involves merging information from many different sources into a Microsoft Excel workbook. Methods used to complete the forecast vary, but data in a time series format (e.g., a data set containing one observation for each month of a year, ordered sequentially, showing aggregate monthly expenditures) is a constant theme. As the forecast information ultimately resides in an Excel workbook, the SAS Add In for Microsoft Excel is a very efficient way to deliver the data to a consumer.

The following example assumes an economist would like to forecast the number of people eligible for a health care program and the expenditures they will incur. Accordingly, the economist asks a data analyst for historical monthly counts of persons eligible for that health care program and their associated expenditures. The data analyst amasses the data per the economist's specifications via SAS Enterprise Guide and the Access to Teradata module. The resulting SAS table in then directly opened into a Microsoft Excel table (or pivot table) via the SAS Add in for Microsoft Excel; the workflow is shown in Figures 4 and 5 below.

Figure 4: MN DHS Example Project Two Workflow

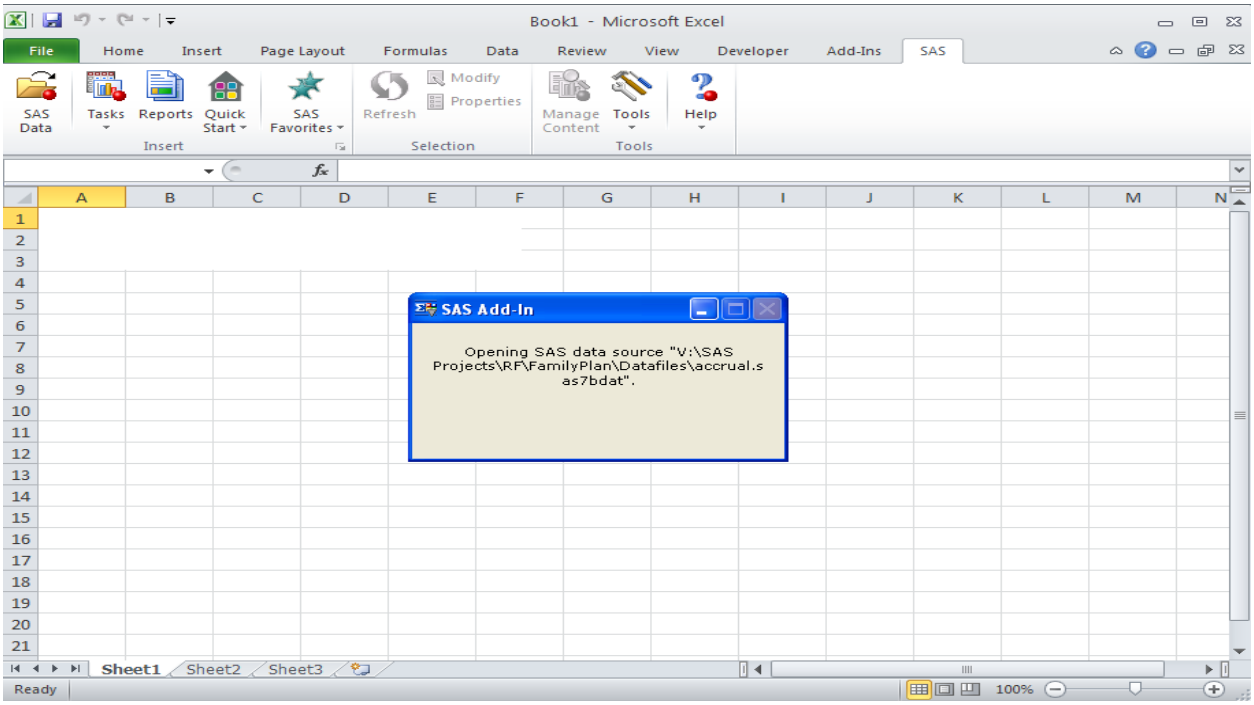


Figure 5: MN DHS Example Project Two (Process)

The deliverable is a Microsoft Excel table as shown in Figure 6 below.

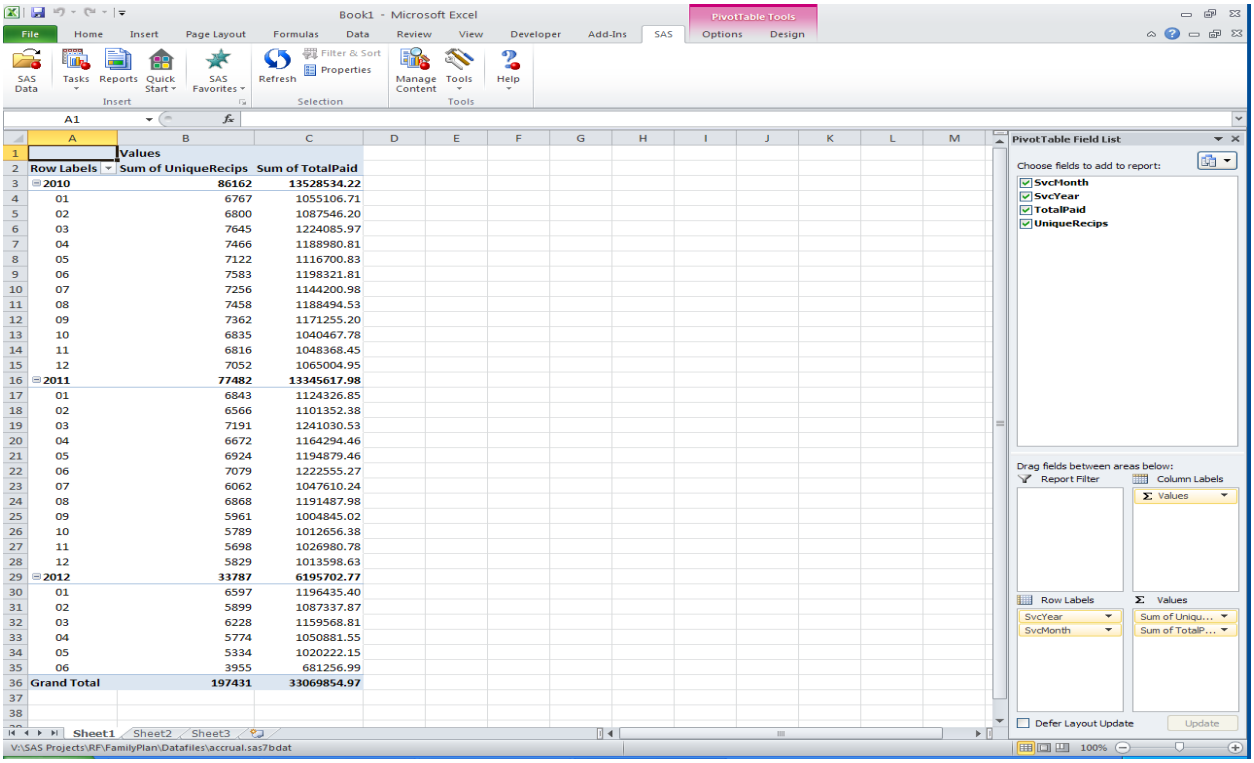


Figure 6: MN DHS Example Project Two Deliverable

MN DHS Example Project Three:

A great strength of SAS Enterprise Business Intelligence web tools is flexibility. When required, one has the ability to create dynamic reports that are more robust than traditional static list reports (like the one shown in MN DHS Example Project One).

The final example project assumes the need for a report whereby a Help Desk staff person would be prompted for some basic information in order to receive a report on health care provider specialties (e.g., Neurosurgery; Gerontology; etc.), with the ability to display the report results by state region and by one or more provider specialty code . In the "old days" producing such a report would have required either the time and expense to obtain a license for a "thick client" application plus a considerable investment to train the consumer how accurately to extract the

information, or the request would command the time of a data analyst who could otherwise be working on something else.

With SAS EBI web tools and some judicious planning, a data analyst can create a dynamic report that is intuitive and easy to use that meets Help Desk staff requirements. To accomplish the task the data analyst once again compiles the relevant data, creates an Information Map, then builds a report in Web Report Studio that employs a couple basic filters to allow the Help Desk staff person to specify input parameters needed for a particular request; an overview of the workflow displays in Figure 7.

Figure 7: MN DHS Example Project Three Workflow

The addition of a filter when building the SAS Report (or Information Map) prompts the Help Desk staff person in this example to enter one or more “Region” codes and “Provider Specialty” Codes. So, let’s say a Help Desk staff person wants to see a list of providers in the metro area who specialize in Internal Medicine –he simply selects the values he wants and then views the report:

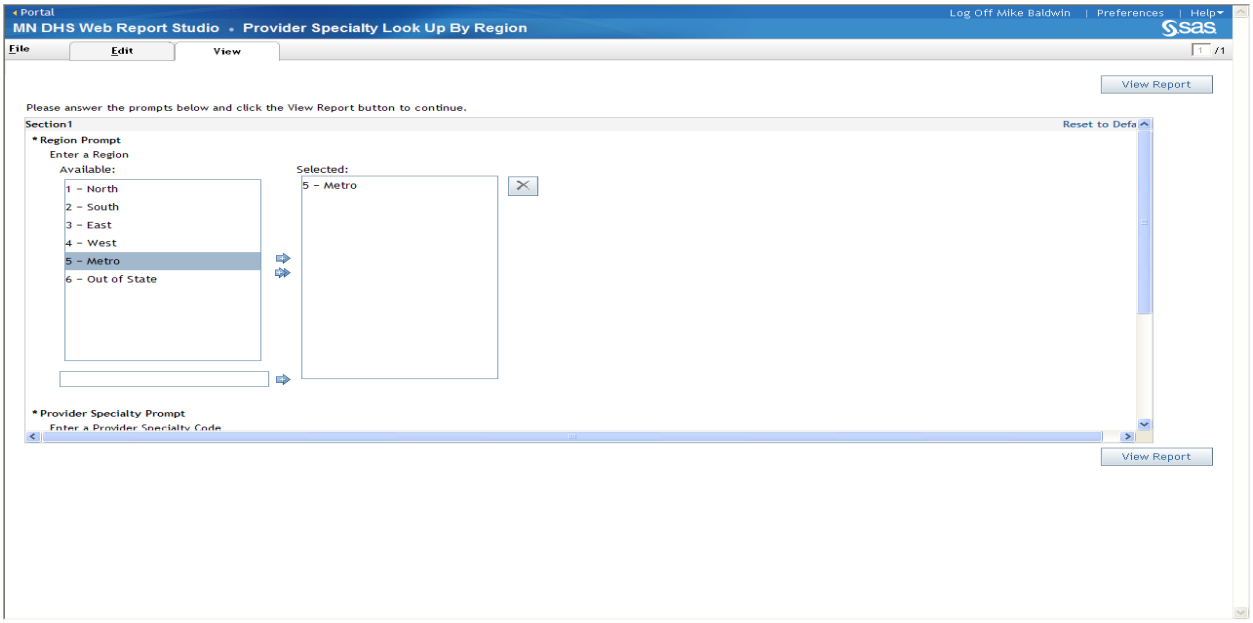


Figure 8: MN DHS Example Project Three Process

The deliverable is a SAS report as shown in Figure 9.

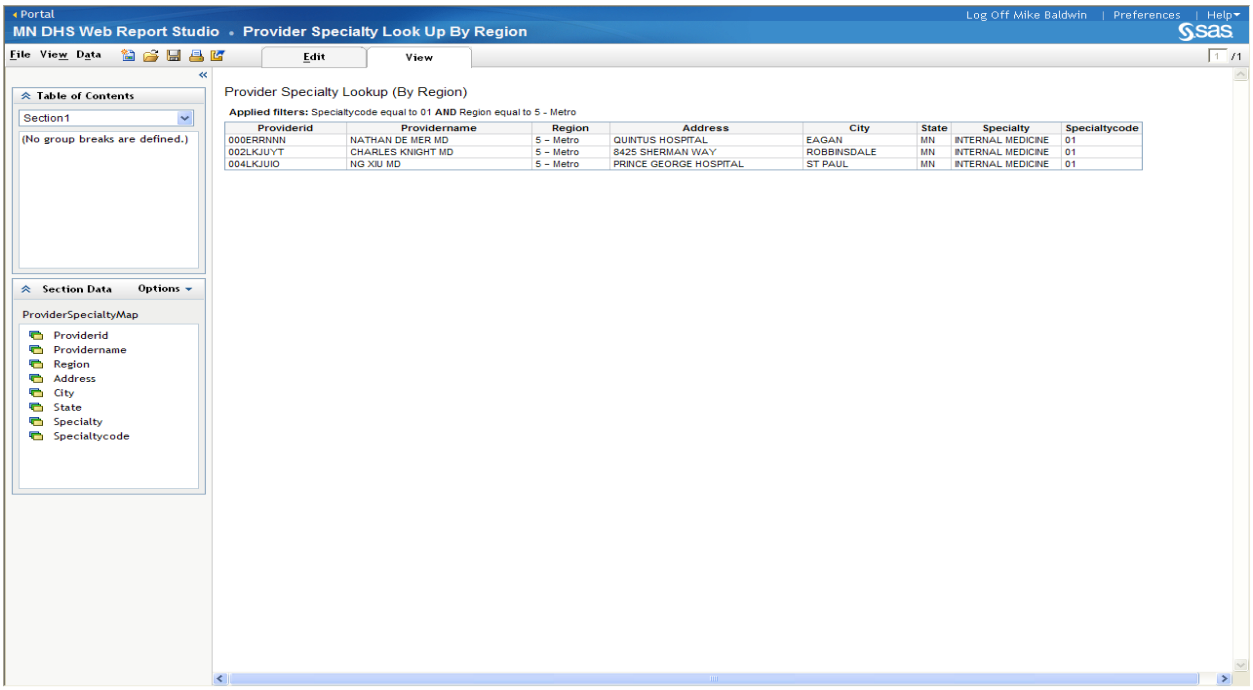


Figure 9: MN DHS Example Project Three Deliverable

As different requests for information are received the Help Desk staff person simply modifies the values he is prompted to enter. Let's say he now has a request to see Radiologists regardless of their regional location; he modifies the prompted input values as shown in Figure 10:

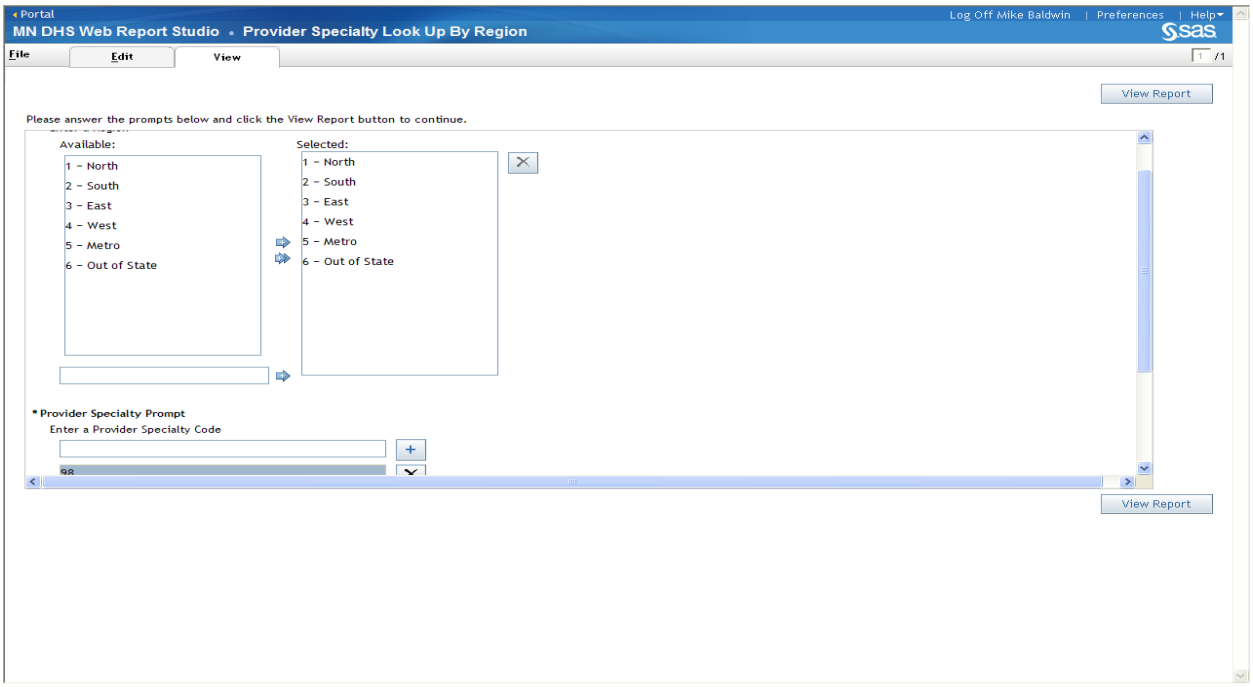
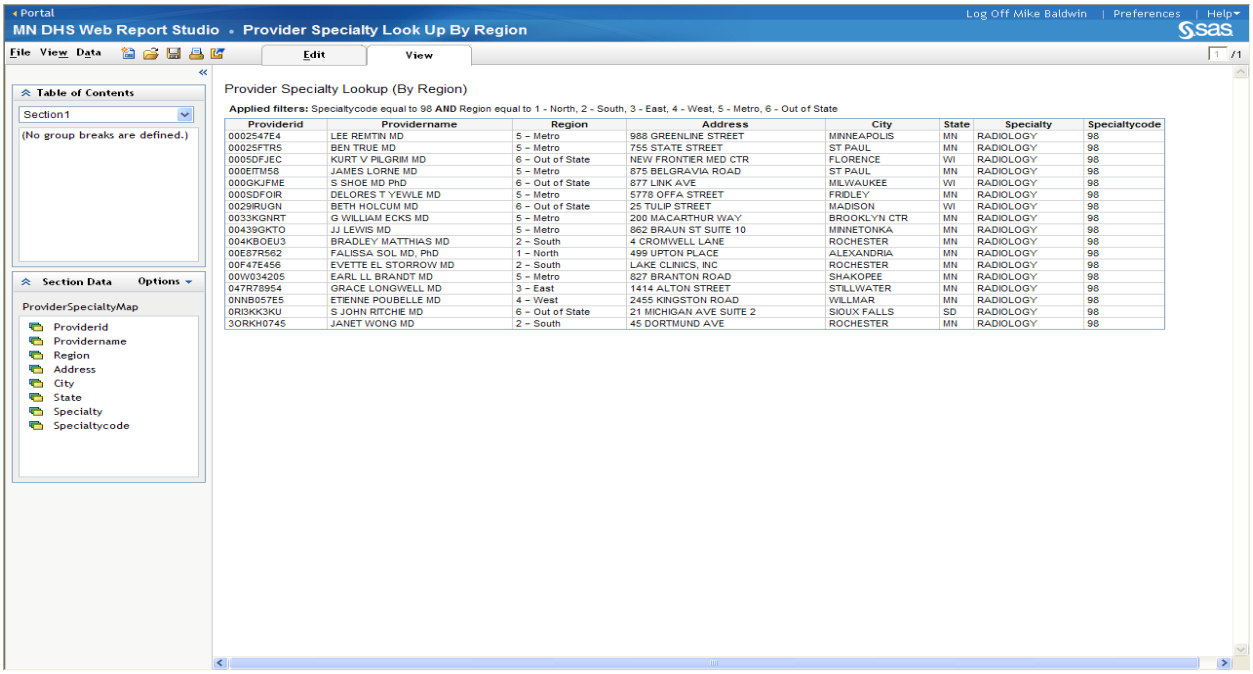


Figure 10: MN DHS Example Project Three Process (2)

And the deliverable is a SAS report as shown in Figure 11:



Providerid	Providername	Region	Address	City	State	Specialty	Specialtycode
0002547E4	LEE REMTIN MD	5 – Metro	988 GREENLINE STREET	MINNEAPOLIS	MN	RADIOLOGY	98
00025FTR5	BEN TRUE MD	5 – Metro	755 STATE STREET	ST PAUL	MN	RADIOLOGY	98
0005DFJEC	KURT V PILGRIM MD	6 – Out of State	NEW FRONTIER MED CTR	FLORENCE	WI	RADIOLOGY	98
000EITM58	JAMES LORNE MD	5 – Metro	875 BELGRAVIA ROAD	ST PAUL	MN	RADIOLOGY	98
000GKJFME	S SHOE MD PhD	6 – Out of State	877 LINK AVE	MILWAUKEE	WI	RADIOLOGY	98
000SDFOIR	DELORES T YEWLE MD	5 – Metro	5778 OFFA STREET	FRIDLEY	MN	RADIOLOGY	98
0029RUGN	BETH HOLCUM MD	6 – Out of State	25 TULIP STREET	MADISON	WI	RADIOLOGY	98
0033KGNRT	G WILLIAM ECKS MD	5 – Metro	200 MACARTHUR WAY	BROOKLYN CTR	MN	RADIOLOGY	98
00439GKTO	JJ LEWIS MD	5 – Metro	862 BRAUN ST SUITE 10	MINNETONKA	MN	RADIOLOGY	98
004KBOEU3	BRADLEY MATTHIAS MD	2 – South	4 CROMWELL LANE	ROCHESTER	MN	RADIOLOGY	98
00E87R562	FALISSA SOL MD, PhD	1 – North	499 UPTON PLACE	ALEXANDRIA	MN	RADIOLOGY	98
00F47E456	EVETTE EL STORROW MD	2 – South	LAKE CLINICS, INC	ROCHESTER	MN	RADIOLOGY	98
00W034205	EARL LL BRANDT MD	5 – Metro	827 BRANTON ROAD	SHAKOPEE	MN	RADIOLOGY	98
047R78954	GRACE LONGWELL MD	3 – East	1414 ALTON STREET	STILLWATER	MN	RADIOLOGY	98
0NNB057E5	ETIENNE POUBELLE MD	4 – West	2455 KINGSTON ROAD	WILLMAR	MN	RADIOLOGY	98
0RI3KK3KU	S JOHN RITCHIE MD	6 – Out of State	21 MICHIGAN AVE SUITE 2	SIOUX FALLS	SD	RADIOLOGY	98
3ORKH0745	JANET WONG MD	2 – South	45 DORTMUND AVE	ROCHESTER	MN	RADIOLOGY	98

Figure 11: MN DHS Example Project Three Deliverable (2)

CONCLUSION

While there are many ways to accomplish reporting and analysis tasks, the SAS Enterprise Business Intelligence Platform offers an integrated, flexible, and robust enterprise solution that helps immensely in the Minnesota Department of Human Services' endeavor to manage its health care information.

ACKNOWLEDGEMENTS

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