

# ON TIME AND UNDER BUDGET: GUIDELINES FOR SUCCESS USING THE SAS® SYSTEM WITH TRADITIONAL STRUCTURED TECHNIQUES

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## ABSTRACT

A few years ago, Community Care Network, a provider of services to the health care industry, faced a major crisis. One of the services they provided for trading partners was becoming difficult to deliver on time. Initially, the service was provided on an adhoc basis, which sufficed while the subscribers were few. As business increased, CCN staff were finding it difficult to meet schedule expectations and were in jeopardy of losing their business.

The Information Services group recommended developing a system that would provide CCN with a uniform approach to providing the trading partners with a quality product in a reasonable time period. Because of the complexity of the process it was almost mandatory that a traditional structured approach be used in all phases of the project. The SAS System was chosen over C and other alternatives as the development environment.

The final product was a bug free system that was produced on time and under budget, normally more of an exception than a rule. In reviewing the various stages of the EDIP (External Data Improvement Project) project we will point out what we believe were the critical factors contributing to it's successful implementation.

## INTRODUCTION

As additional incentive for potential trading partners to contract with Community Care Network (CCN) for claims processing and PPO services, CCN offered to provide them with various paid claims analysis and reporting services at no additional cost. By providing this service, they were also gaining access to hundreds of thousands of paid claims records from across the country and could use the information internally to identify potential customers and provide their trading partners with channeling information to show where additional savings could be achieved by encouraging more of their employees to use CCN PPOs. This data is also used to prepare profiles on professional providers as an auditing tool and for numerous other internal purposes. This meant that many users within CCN required access to portions of this information at various times.

There were over 50 trading partners using this service at the time this project was initiated. Each one would send data, primarily in tape format, either monthly or quarterly for each one of the companies they were contracted with. Since this service was not a "revenue generating" aspect of CCN's primary business, limited resources were made available to prepare the data for access. This function was initially provided on an adhoc basis using the SAS System, by non Information Services personnel. A new set of programs were developed, without the benefit of standards, for each new trading partner that came onboard, even though much of the processing was the same after the data had been entered into the system. These programs were written by several different people over time and were difficult, if not impossible to maintain.

As the number of trading partners using this service grew it became increasingly more difficult to provide accurate analysis and reporting to the trading partners on a timely basis. Also, analysis of data across different trading partners was extremely difficult because of the lack of standards for naming conventions and data typing. Internal clients, as well as external trading partners, were becoming increasingly dissatisfied. In 1994 the bubble finally burst and it was

apparent that something had to be done to reduce the cost and improve the quality and timeliness of processing the external paid claims data. Information Services staff were assigned to evaluate the application and recommend alternatives to resolve the problem. Because of the size and complexity of the requirements they recommended that a project team be formed to prepare a formal requirements analysis and design specifications using traditional structured techniques, exactly what the users had tried to avoid for so long. They were finally convinced, however, that this was the only viable solution.

## REQUIREMENTS ANALYSIS

The requirements phase consisted of traditional structured techniques based on a foundation of client centered requirements analysis. Numerous JAD (Joint Application Development) meetings were conducted over several months with all interested parties to clearly define the problem and jointly compile the business requirements.

Since so many organization at CCN need to access and analyze the data and prepare reports for both in-house personnel and the respective trading partners at various stages of transformation, the final requirements specification called for a multi-stage process to be implemented. The data, in all it's various stages, needed to be available indefinitely, however, older data could be archived if a short retrieval period could be achieved.

## DESIGN SPECIFICATIONS

Preliminary detailed design reviews were conducted and remaining design issues were resolved. A final design walk-through was conducted, final specifications were agreed upon, sign-off was obtained, and the design was frozen.

A multi-stage process was defined that would setup and submit batch jobs for each stage of the process and be controlled through an on-line system. A diagram of the design is presented in the appendix. The following summarizes the various stages:

### INITIAL STAGE

The data is read in, as is, from the input media and the INITIAL SAS data set is created.

### MODIFIED STAGE

The INITIAL data set is read and recodings and other transformations defined by the trading partner are applied to create the MODIFIED SAS data set.

### NORMALIZATION STAGE

The MODIFIED data set is read and CCN specific re-codings and other data transformations are applied to create the NORMALIZED SAS data set. This is a CCN standardized format that provides uniform reporting and analysis between trading partners. This also

allows the programs in the remaining EDIP system stages to access data in the same format, so that all programs designed after this stage need only be developed once.

### **SUBSET STAGE**

Separates the data based on source criteria (hospital, doctor, etc.) for parallel processing through other stages unique to these sources. It also puts records that will not be used in later stages into an archive data set.

### **CCN INDICATING STAGE**

Determines whether or not a facility (hospital) or professional (physician) is contracted with CCN, and creates new data sets from the PROFESSIONAL PROVIDER and FACILITY data sets, which include the CCN indicating flag. Although simple on the surface, this was one of the most difficult stages because of the complex logic required to derive this information which required retrieving and manipulating data from several other sources.

### **PREP FOR PATTERNS AND POST PATTERNS STAGE**

The data for professional providers are run through a proprietary software package. These stages create an ASCII interface file, perform the analysis and re-merge the analysis results back into the PROFESSIONAL PROVIDER data set.

### **PREP FOR OUTLIER ANALYSIS STAGE**

An ASCII file is created for the Outlier Analysis software package to analyze and generate reports.

### **PREP FOR GROUPEE AND POST GROUPEE STAGES**

The data are run through a proprietary software package. These stages create an ASCII interface file, perform the analysis and re-merge the results.

## **DEVELOPMENT PHASE**

The development approach consisted of traditional structured techniques. Formal change control procedures were established requiring a cost-benefit analysis before any changes would even be considered. Requests for changes that were not covered in the initial scope of the project were postponed to future phases.

CCN relied mostly on contract programmers for development coding, documentation, and unit testing. CCN supplied a multi-person project management team to direct the contract programmers and enforce structured coding and documentation standards. This project management team consisted of an overall project manager, a technical lead, a documentation lead, and a budget and schedule coordinator. Weekly project status and review meetings were conducted. Resources were reallocated as needed.

The SAS System was chosen over C and other alternative development environments for several reasons: 1) the majority of in-house databases that would need to be interfaced to were SAS data sets, 2) most of the CCN personnel that would be working on the system after implementation were well versed in the use of SAS software, and 3) a system produced with the SAS systems RAD (Rapid Applications Development) capabilities could be developed faster and be more maintainable compared to the C language.

Once the design was finalized and the SAS system was chosen as the development environment, final schedule and budget was submitted and approved. The CCN management team was identified and the contract programming team was interviewed and hired. The programming modules were ranked based on their complexity and development tasks were assigned to contractors based on their skill levels. Phase 1 development was restricted to final design specifications. The budget and schedule did not allow for any creative interpretation by the contract programmers.

Reusable code shells were developed for the Initial, Modified, and Normalized stages. These shells were then used to develop the actual trading partner specific programs required to normalize their data.

Simultaneously, all programs down stream from the Normalized stage were built. These modules would be generic and used to process all trading partner data.

## **TESTING**

Contractors developed unit test plans for their program modules. These test plans were reviewed in advance of testing by CCN staff and revised as needed. Code walk-throughs were conducted and test plan results were reviewed prior to integration testing.

CCN project management developed integration test plans and conducted thorough integration testing.

The completed system was tested in parallel for a few months and discrepancies were analyzed to determine if the differences were due to errors in the new system or inherent problems with the existing programs.

Acceptance testing was conducted by the client, with guidance from the development team. Formal sign-off on the results was obtained prior to implementation.

## **DOCUMENTATION**

Contract programmers produced the project documentation according to established CCN guidelines. The CCN documentation lead collected and monitored all project documentation including test plans.

## **RESULTS**

The result was a fully functional, documented, bug free system that fulfilled all planned requirements. Extensive planning and monitoring ensured that the system was delivered on time and under budget.

## **GUIDELINES FOR SUCCESS**

1. It was imperative that the project had solid management support and an approved budget.
2. The trading partners chosen for initial implementation were the ones with the highest viability, that could provide the most benefit and be quickly implemented. Other important factors that were considered were the quality of the trading partner's data and file documentation, the

format and quantity of data, and their willingness to cooperate during development and implementation.

3. A reasonable scope statement and project plan were developed so that realistic expectations could be achieved.
4. The use of traditional structured techniques based on a foundation of client centered requirements analysis.
5. The creation of detailed design specification approved by the clients.
6. The implementation of formal change control requiring appropriate levels of approval.
7. The use of a modular development approach, following rigid coding standards
8. The requirement for extensive structured unit, integration and parallel testing reduced implementation surprises.
9. The use of a multi-person project management team allowed the Project Manager to follow a hands-on approach and insure that schedules were being met, without sacrificing quality.
10. Client acceptance testing and final client sign-off insured the clients received the product they requested.

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## CONCLUSION

Many organizations think of the SAS System as an end user tool for adhoc reporting and analysis or for the development of small, departmentalized systems and never consider using it for "serious" development of large company wide systems. But as this project, and numerous other projects we have been involved with over the years, have demonstrated, the SAS System, used in conjunction with traditional structured techniques, can yield systems as functional and stable as those produced with traditional languages and can be produced in less time.

## ACKNOWLEDGMENTS

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