Abstract

Sharing Application Development Between I/S and the SAS User

A method is proposed for sharing Application Development responsibility between Information Systems personnel and the End User community, via SAS®.

This approach is currently being undertaken in Owego, NY, with development of an Equipment/Property Control System for the IBM Federal Systems Division (FSD). The programming software base is CICS/VS (Customer Information Control System/Virtual Storage) under OS/MVS. SAS is the major report processing interface. The system is being installed in two releases. Release 1 was installed June 8, 1984; release 2 is scheduled for June 28, 1985 (see Figure 1).

Introduction

The Equipment/Property Control System is an online, integrated database terminal interactive system used to effectively control property at all IBM FSD locations:

- Owego, NY
- Manassas, VA
- Gaithersburg and Bethesda, MD
- Houston, TX
- Huntsville, AL
- Westlake, CA
- Cape Canaveral, FL.

Two organizations, Property and Metrology Assurance, are the primary Users.

Property consists of both IBM capital and Government equipment, furniture and fixtures, machines, tooling, and test equipment.

The Property organization is responsible for planning, organizing, directing, coordinating, and tracking the life cycle of property from acquisition to disposition.

The Metrology Assurance Organization is responsible for controlling the calibration of certain tools and test equipment based on defined recall frequencies. Common procedures and standards must be adhered to by both organizations across the Division.

Old System Problems

The old method used to control Property was a 12-year-old, sequentially oriented processing system, which involved a weekly and monthly process. The system was initially developed at the Owego location for Owego and Huntsville. The Users would submit add, delete, and change data on formatted
input sheets, which were keypunched daily. Weekly and monthly process runs generated reports and diagnostics. Reports were often very large, and the largest were put on microfiche. Diagnostic reports were distributed by User's initials. There was no location control, and one location could update another location's data. Networking to remote sites was eventually added, but cumbersome to the point where some locations still depended on internal mail for submitting their input sheets and receiving reports.

Old User Problems

Most User problems were a direct result of the inadequacy of the old system. The long delay between updates forced the Users to present data with known errors that had to be explained. This resulted in a lack of confidence from other organizations who did not understand the maintenance limitations. Manually maintained data was kept, to validate system discrepancies until updates could be made, which was often as long as 2 to 3 weeks. Update delays also caused severe problems in utilization of calibratable items with recall frequencies, since reports would show items due for calibration when actually calibration was complete and the items ready for use.

System Justification

Justification for new system development depends on the following:

• Business need
• Return on investment (ROI).

Starting in early 1978, the User organization began working justifying for a new Equipment/Property Control System. The fact that Property is primarily a standalone requirement, with minimum shared dependencies with other FSD internal systems, forced justification based totally on its own ROI. With the never ending backlog of development requests to I/SD, justification was a long, enduring process. In March of 1981, a feasibility study performed by I/SD concluded that development of a new property system was a low priority requirement. Finally, in June, 1982, I/SD committed to completing a General Design Review. The purpose of this review is to assure that the system design meets User's requirements and that there are sufficient savings to justify development costs. The User organization is responsible for providing a requirements specification and justification data for evaluating return on investment.

Kick-Off

The initial step in starting the General Design was to schedule a kick-off meeting for all areas concerned. First-, second-, and third-level management across the division were requested to attend or send a representative. The purpose was to have all requirements, problems, and concerns identified. Each representative was requested to give a short presentation, which was taped for later reference. This meeting set the groundwork for a total development team across the division.

General Design Review

I/SD has the responsibility for providing a system design that optimally satisfies the User's requirements, follows I/S standards, and is consistent with I/S direction.

The goal of the Equipment/Property Control System is to provide FSD locations with a real-time, integrated system that will be the basic tool for recording, analyzing, reporting, and storing the information needed to control property effectively.

A secondary, and perhaps as important, activity, is to strive for a system architectural design that will afford a high level of control and "self-sufficiency" for the User. To accomplish this secondary goal, each functional requirement was evaluated as a User development responsibility vs I/SD applications (see Figure 2).

Figure 2. Responsibilities

ISO - Database for Division
- Real Time Maintenance
- Batch Interface
- Networking Architecture
- SAS Education/Consulting

User - Retrieval/Reporting
- Write All SAS Report Programs
- Peer Training
- User Guides and Procedures
- Maintain SAS Program Library

Information Center
- Initial SAS Training
- Consultation

The User would have responsibility for all reporting. That includes retrievals from the division data base, creation of intermediate data set requirements, merging of data files, and overall control of the report processing environment. SAS was selected as the supporting software for User development.

Parallel development schedules, resources, and responsibilities were committed and signed off at completion of the General Design Review. It was anticipated that as high as 40% of the development activity could be attainable by the User organization.

Information Center Involvement

All locations would share writing the SAS programs for the common division library. This would help assure equal responsibility and self-sufficiency across the division.
Training the division representatives was a big concern. Owego had just formed an Information Center, but its charter was for local training and support only. The use of SAS software was also new, and the Owego Information Center had the only two instructors. None of the User representatives had any prior programming knowledge, which meant the classes would have to start at a very low level. Internal training was preferred, if at all possible.

The Information Center wanted to support the development approach and committed to training one representative from each location. Those representatives were then responsible for training their associates. I/S counterparts at each location also attended to learn SAS and assist in follow-on support.

Special property data bases were created for use in the classes. Sessions were conducted at a pace suitable to all representatives attending. Instructors concentrated specifically on what the representatives would need to meet their reporting requirements. After one week of training, the representatives were able to return to their individual locations and begin the assignment of writing two to three common reports for the division.

Communication

Good communications between I/SD, the User representatives, Information Center, and all levels of management have been maintained at all times.

A User chairperson was assigned to represent the division organization, both Property and Metrology Assurance. All requirements and system acceptance have to be approved by this person. Status meetings are held monthly, and video conference sessions are held when warranted. The lead User analyst is in constant communication with representatives at each location to discuss progress. If schedules get missed at any location, calls are made by upper management to verify why. The lead User analyst, I/SD analyst, and Information Center are in constant communication.

Coordinating User Development

It was collectively determined that a common division library consisting of approximately 25 jobs, or programs, would be sufficient. If additional requirements surfaced, or any User wrote a SAS program that would benefit the division, then the User chairperson should be notified. A sample format was distributed to each representative to write the SAS jobs. Variable information for each location is filled with question marks (?) and comments explaining the necessary data. The name and phone number of the author of each program is always included for assistance. An index is included as a separate PDS member. It briefly describes each job in the library for quick reference and selection. As the SAS jobs get completed, they are copied into the division library for the lead User analyst to test. One initial run is made and if the job fails the JCL and log is returned to the originator to correct. If the job runs correctly, it is then analyzed to determine validity of totals, selection, etc. Coding techniques are constantly reviewed and improvements communicated back to the originating authors.

Common programming practices and format are emphasized and the jobs rejected if not met.

A common division data base is used for testing. The data base was initially created by I/SD and in the new system format. Actual data from the old system was used where possible with simulated data for new elements. This allowed for a smooth transition when the production system first came online.

Standard practices for test and production libraries, used by ISD, have been incorporated by the User. Backup procedures and file protection facilities are installed. When a program successfully completes testing, it is moved to the common production library. Common procedures are also stored in the division library (see Figures 3 and 4). The technical assistant to the User chairperson is the only one with authority to change the production library.

```
/* SEE SAS TECHNICAL REPORT 316 FOR DOCUMENTATION OF */
/* THE FOLLOWING ROUTINE. */
*/
*/ THIS SAS DATA STEP WILL READ A VSAM FILE RANDOMLY BY KEY. */
*/ THE RECORD IS BY MAJOR KEY FOR LOCATION RECORDS */
*/ WHICH IS THE FIRST POSITION OF A 17 BYTE KEY. THIS CODE IS */
*/ USED AS THE SOURCE FOR THE INCLUSION IN SAS APPLICATIONS */
*/
FILE I:LOC:
INPUT LOC $1 IF LOC NE ?ASTRKEY THEN STOP:
  RC = ?OR:
  DROP RC TST:
IF RC = 5 PATH = NOT THE DESIRED RECORD.
  DD:
  IF RC = 8 THEN
    CO:
      IF FBC = 16 THEN /* RECORD NOT FOUND */
        DO:
          PUT 'RECORD NOT FOUND':
        END;
      ELSE
        DO:
          IF LOC = TASTRKEY THEN STOP:
            RC = ?OR:
            DROP RC TST:
          END;
          IF RC = 4 THEN /* END OF DATA SET */
            DD:
              PUT 'END OF DATA SET':
              STOP:
            END:
          END:
        END;
      END:
    END:
*     Figure 3. Read VSAM By Key
*/
DATA HIGHLOSS:
  MASTRKEY='P' ;
  INFILE IN KEY=MASTRKEY GENKEY SKIP ;
  XINCLUDE INCCODE(INCLUDE=NOSOURCE) ;
  INPUT
  LOC $1 RECACODE $20 HIGHLOSS $105 (Trailing $)
  IF (RECACODE = 'A') AND
    (HIGHLOSS = 'C' OR
     HIGHLOSS = 'A') THEN
      INPUT
  IDNO $2-11
  SUD $15-14
  OWN $18-19
  DESC $28-47
  A115 EQUIPVAL PDS $O
  INVDATE $162-167
  OWHNCIFLR $171-172
  ELSE DELETE ;
  OUTPUT ;
*     Figure 4. Typical Data Step (Which Includes Code from Figure 3)
*/
```

Summary

This approach for development of the Equipment/Property Control System is proving very successful. The sharing of responsibilities by all organizations has emphasized the importance of communication and provided a clearer understanding of the total development cycle. It has helped in the definition of firm requirements specifications with fewer changes. The
separation of responsibilities has allowed more time for each group to concentrate on their specific commitments and reduced wasted effort communicating requirements to I/SD that could be done by the User.

As expected, even though the User organization has a large part of the development effort, their costs have been much less than those of I/SD. This is attributed primarily to their use of SAS, thus avoiding the high cost of software development.

The following are several milestones and items to consider with this development approach:

- Separation of responsibilities must be done as much as possible prior to completion of General Design; that is, before the start of actual system development.
- Total commitment to cost, schedules, and resources must be made and signed off by all organizations involved. This must also be done prior to start of development.
- Communication, coordination, and project control are essential. This has been especially important for the Equipment/Property Control System, since development is shared by eight locations across the IBM Federal Systems Division.
- Information Center support or a similar type organization at each location is highly recommended.
- Initiate a good training plan at the beginning of the project and conduct refresher courses as needed. Get management involved in the training sessions as much as possible.
- Plan for changes in key personnel and have sufficiently trained backup.
- Allow for a wide variance in programming aptitude. Remember, this is not a normal prerequisite for most User departments.

Benefits

The benefits of this development approach are being evaluated with some already realized and some anticipated, as follows:

- A much higher level of control and self-sufficiency for the User is being realized. This has reduced I/S dependency during development and is expected to continue even more after system installation.
- Separating requirements that must change as the needs of the business change will increase lifetime expectancy of the system, with full capability to the User.
- A thorough User knowledge of the system is resulting in more efficient use and better understanding in reporting and presentation of data. There also is much more concern for data integrity and protection.
- With a thorough knowledge of the system the User was able to prepare an excellent "User's Guide" prior to integration test and installation of release 1.
- The User is better prepared for future interface requirements with I/SD. It took five years to justify property development. The lack of good communication and knowledge to define requirements was cause for much of this delay.

This approach is testing the feasibility of I/SD doing total system development, apart from the User, based on pre-defined requirements specifications. Separation of requirements applicable to User development must be considered. With proper planning, training, and coordination, this approach will reduce cost, schedules, and resources (see Figure 5).

- Emphasis Towards High Level Control
- Reduction of User Dependency on I/S
- Increased Life Expectancy of System
  (SAS Gives User Flexibility)
- User Gets Total Knowledge of System
  (SAS Training Promotes User Involvement)
- 'Quality Control'
  - I/S Concentrates on Database
  - User Concentrates on Reporting

*Figure 5. Design Benefits for the End User*