



**Office of Inspector General**  
**Report of Audit**

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**INFORMATION TECHNOLOGY**

**User Satisfaction of  
the Grants Information  
and Control System**

**E1NMF6-15-3044-7100237**

**June 24, 1997**

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**Inspector General Division(s)  
Conducting the Audit**

**ADP Audits and Assistance Staff  
Washington, DC**

**Region(s) covered**

**Headquarters**

**Program Office(s) Involved**

**Grants Administration Division**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

JUN 24 1997

OFFICE OF  
THE INSPECTOR GENERAL

MEMORANDUM

SUBJECT: Report of Audit - User Satisfaction of the  
Grants Information and Control System  
Audit Report No. E1NMF6-15-3044-7100237

FROM: Patricia H. Hill, Director *Patricia H. Hill*  
ADP Audits and Assistance Staff (2421)

TO: Gary Katz, Director  
Grants Administration Division (3903F)

Attached is our final report entitled "User Satisfaction of the Grants Information and Control System." The objectives of this audit were to: (1) assess user satisfaction with the integrity of the Grants Information Control System's (GICS) data and system functionality; and (2) test the accuracy, completeness, consistency, and timeliness of the information contained in GICS. This is the first report of a two phase audit and will address the first objective. The second phase will be a data integrity review.

This audit report describes problems and recommended corrective actions the Office of Inspector General (OIG) has identified. The report represents the opinion of the OIG. Final determinations on the matters in the report will be made by EPA managers in accordance with established EPA audit resolution procedures. Accordingly, the findings described in this report do not necessarily represent the final EPA position.

In accordance with EPA Order 2750, you, as the action official, are required to provide this office a written response to the audit report within 90 days of the final report date. For corrective actions planned but not completed by your response date, reference to specific milestone dates will assist this office in deciding whether to close this report. In addition, please track all action plans and milestone dates in the Management Audit Tracking System.

We appreciate your positive response to the recommendations presented in the report and the many actions you and your staff have initiated to improve the Grants Information and Control System.

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We have no objection to the further release of this report to the public. Should you or your staff have any questions about this report, please contact Patricia Hill, Director, ADP Audits and Assistance Staff on (202) 260-3615.

Attachment

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# EXECUTIVE SUMMARY

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## PURPOSE

The objectives of this audit are to: (1) assess user satisfaction with the integrity of the Grants Information Control System's (GICS) data and system functionality; and (2) test the accuracy, completeness, consistency, and timeliness of the information contained in GICS. This is the first report of a two phase audit and will address the first objective. The second phase will be a data integrity review.

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## RESULTS IN BRIEF

Our audit included a survey on the accuracy of data and user satisfaction with GICS. The survey was sent to all (326) EPA employees with GICS accounts. We received 198 responses, however, 42 individuals responded that they are not current GICS users. The survey was sent to 265 Regional users and 61 Headquarters users. One hundred thirty-four (50.57%) Regional users and 23 (37.70%) Headquarters users responded. Overall, over 81 percent considered GICS data to be very or somewhat important in relation to the work of their division/department/office. Over 62 percent of the respondents use GICS data on a daily basis, and over 63 percent of respondents describe GICS data as always or almost always useful. A majority of the respondents use GICS for staying abreast of grants, progress reports, and reporting milestones. Results of the survey's objective questions are in Appendix II, page 15. Chapter 2 of this report addresses the users' comments to the survey's open-ended questions.

GICS users generally agreed the system is a good national database because it stores a lot of information; however, many users noted deficiencies with the way data is entered into the system, the lack of a grantee table, the intensive coding within GICS, and difficulty in reporting. Specifically: (1) Regional and Headquarters users enter the same types of grant information using different data entry screens; (2) grant specialists or administrative assistants are required to type in general information (i.e., grantee name, address, employer identification number, etc.) each time a grant is established; (3) some data elements have an inordinate number of legitimate codes associated with them; and (4) some of the listed reports within the GICS reporting system contain incomplete data. As a result of these weaknesses, users cannot rely on the integrity of data in reports produced by the system.

These weaknesses were caused by the lack of policies over a consistent method to enter data, lack of management oversight, and insufficient edits. Currently, there is no formal policy governing how data should be entered. Also, policies are needed to clarify codes and to specify the consistent use of codes within GICS. Furthermore, management should take a more active role in the operation of GICS. Finally, GICS does not have adequate edit checks.

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## RECOMMENDATIONS

The report includes seven recommendations to improve the electronic grants process. The recommendations include the development of policies over consistent data entry of grants information; combining and clarifying data elements and codes, as appropriate; and following proper system development life-cycle procedures.

In a memorandum dated June 20, 1997, the Director for the Grants Administration Division responded to our draft report (see Appendix I). In summary, the Agency substantially agreed with the recommendations with the exception of Recommendation 5. Recommendation 5 called for the analysis of the costs and benefits of developing and implementing a grantee table. We modified Recommendation 5 in response to GAD's comments to recommend the inclusion of a grantee table in the proposed Integrated Grants Management System (IGMS). However, if IGMS is not implemented, we recommend analyzing the costs and benefits of developing a grantee table in GICS or in any other system used to manage grants.

With respect to Recommendations 1 - 3, GAD is chartering a workgroup comprised of Headquarters and Regional grants office personnel to identify policy, data element, code and process requirement options and raise them to management for a national decision. These decisions will impact future practices, and will be documented, along with Recommendations 4 - 6, in the requirements analysis for IGMS.

Consistent with Recommendation 7, GAD is following system development life cycle procedures for the development of IGMS.

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# CHAPTER 1

## Introduction

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### Purpose

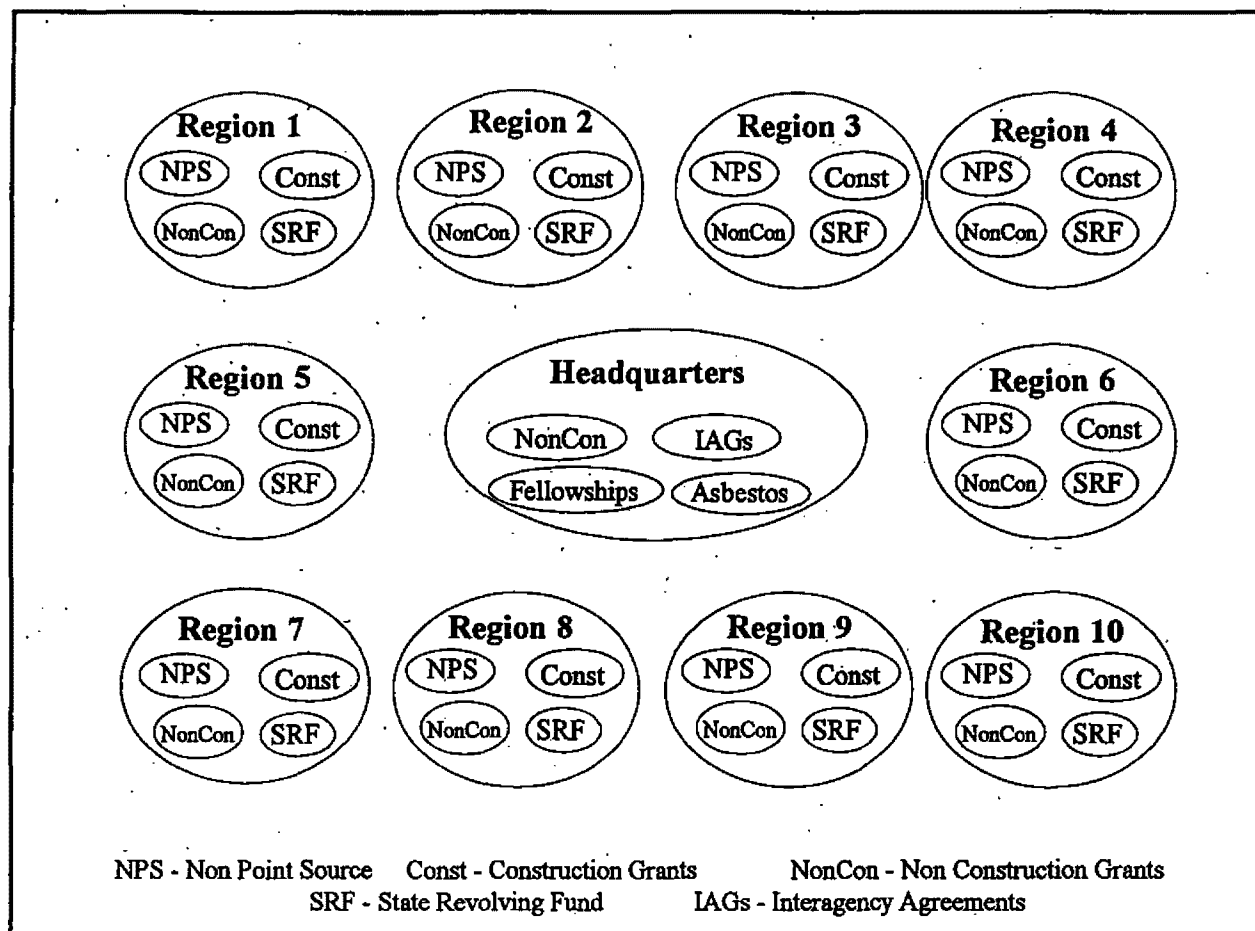
The objectives of this audit are to: (1) assess user satisfaction with the integrity of the Grants Information Control System's (GICS) data and system functionality; and (2) test the accuracy, completeness, consistency, and timeliness of the information contained in GICS. This is the first report of a two phase audit and will address the first objective. The second phase will be a data integrity review.

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### Background

The Grants Administration Division (GAD) is responsible for the administrative management of all of the Environmental Protection Agency's (EPA) assistance programs (e.g., grants, cooperative agreements, and interagency agreements) and is the national program manager for GICS. GICS is EPA's official information management system containing administrative, project and financial information on EPA's assistance programs. As National Program Manager, GAD's role is to develop a well-coordinated and focused approach to automation that successfully supports the Agency's grants management system. GICS supports two major client organizations: the GAD for all non-construction grant programs and the Municipal Construction Division of the Office of Water (OW) for the construction grant and state revolving fund programs.

GICS was created in 1972 to track EPA Research and Demonstration grants and has expanded to administratively track all EPA grant programs, interagency agreements, and fellowships. In 1985, a modernization effort began to convert GICS to a state-of-the-art database management system. GICS currently supports on-line updating and editing, and ad hoc standardized reporting. GICS is an ADABAS database residing on EPA's IBM Mainframe in Research Triangle Park, North Carolina. It is accessed nationwide by means of the telecommunications network maintained by the Enterprise Technology Services Division. It consists of 11 distinct databases: 10 Regional GICS databases and a single database for Headquarters. The GICS System can best be illustrated by Figure 1, on the next page.



Each Region has four subsystems: Non Point Source, State Revolving Fund, Construction, and Non-Construction. In addition, Headquarters has four subsystems: Non-Construction grants, Interagency Agreements, Fellowships, and Asbestos. Each subsystem has a core group of national data elements common throughout all databases, as well as their own Regional-specific data elements. These numerous GICS subsystems evolved in response to user needs.

Assistance data is input through direct on-line data entry screens, from users all over the country including Headquarters, Regional Grants Management Offices, Regional Program Offices, and various State governmental agencies. Grant Management Offices primarily use the data to create award agreements. Program Offices retrieve project level data from GICS and store project level

data in their own unique subsystems that share administrative data with the grants management subsystems. GICS represents the primary management information system for the Grants Management Offices and selected program offices. However, although State offices input project level data, they do not generally use the system as their primary management system.

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## CHAPTER 2

### Users Are Dissatisfied with the Grants Information and Control System

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GICS users generally agreed the system is a good national database because it stores a lot of information; however, many users noted deficiencies with the way data is entered into the system, the lack of a grantee table, the intensive coding within GICS, and difficulty in reporting. As a result of these weaknesses, users cannot rely on the integrity of data in reports produced by the system. These weaknesses were caused by the lack of policies over a consistent method to enter data, lack of management oversight, and insufficient system edits.

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#### Data Entry Inconsistencies in Regions and Headquarters

Regional and Headquarters users enter the same types of grant information using different data entry screens. The Regional grants databases have eight standard data entry screens under the project add/change menu. However, users in Region 5 have two additional screens, while users in Region 7 have four additional screens, and users in Region 9 have one additional screen. Furthermore, there are 12 screens for Headquarters users, only three of which match the standard Regional screens.

In addition, the data elements required to establish a grant differ between Headquarters and Regions. Users of the Headquarters system are required to enter eight data elements to establish an assistance agreement, whereas Regional users are required to enter nine data elements. The following lists the required elements:

#### Headquarters

Applicant County  
Application Received Date

Employer ID Number  
Long Description  
Name  
Program  
Specialist  
State

#### Regions

Action Code/Date  
Applicant County  
Application Received Date  
City

Name  
Program

State  
Street  
Zip Code

In order to accurately track, analyze, and report on assistance agreements, managers need consistent information available to them. Without a requirement for the same data elements between Regions and Headquarters, important information may not be getting stored within GICS. Achieving consistent information between Regions and Headquarters currently depends on whether the person entering the data enters information for the non-required data elements. However, the system neither alerts users that a non-required data entry field was left blank nor prevents the user from continuing processing. Without consistent data, the tracking, analyzing, and reporting of grants may be incomplete because the system may not include all pertinent information.

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### **GICS Does Not Utilize a Grantee Table**

Grant specialists or administrative assistants are required to type in general information (i.e., grantee name, address, employer identification number, etc.) each time a grant is established. The field length for the grantee name is limited to 38 characters, therefore many of the grantee names need to be abbreviated. As a result, many grantees are listed in the system using several different abbreviated names. GICS treats "Univ" differently than "Univ.", and grantee names which start "The Grantee Name" are treated differently than "Grantee Name." For example, "The Ohio State University Research Foundation" is listed 24 different ways using various abbreviations. The list below shows 5 of the 24 variations:

OHIO STATE UNIV RESEARCH FDN.  
OHIO STATE UNIV. RESEARCH FDN.  
OHIO STATE UNIV. RESEARCH FOUND.  
THE OHIO STATE UNIV. OF RESEARCH FDN.  
OHIO STATE UNIV. NATL REG. RES. INST.

Compounding the abbreviation problem is the fact that grant specialists now enter data using both upper and lowercase letters. However, Natural<sup>1</sup>, which is used for generating GICS reports, is a case sensitive language. Therefore, "Univ" is treated differently than "UNIV" when creating reports.

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<sup>1</sup> Natural is a programming language tailored for use with ADABAS, EPA's standard data base management system.

Furthermore, some grantees are listed with multiple employer identification numbers. For example, three employer identification numbers are listed for "The Ohio State University Research Foundation":

316015919  
316401599  
316401500A1

In another example, one employer identification number (636000619) was associated with six distinctly different grantee names:

ALABAMA DEPARTMENT OF ENVIR. MGMT.  
ALABAMA DEPARTMENT OF PUBLIC HEALTH  
ALABAMA DEPT. OF ECON. & COMM. AFFAIRS  
ALABAMA DEPT. OF EMERGENCY MANAGEMENT  
SOUTHERN ENVIR. ENFORCEMENT NETWORK  
STATE OF ALABAMA

A table that includes general information about a grantee (e.g., grantee name, address, and employer identification number, etc.) would eliminate the need to re-enter data every time a grant is initiated. In addition, a grantee table would eliminate the inconsistencies related to abbreviations and misspellings of grantee names, and errors in employer identification numbers.

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#### **GICS Is Code Intensive**

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Some data elements have an inordinate number of legitimate codes associated with them. For example, the data element "action code" has 41 different, legitimate entries. However, many grant specialists stated they do not use the action codes, or only use a few codes, because the number of codes is confusing. In addition, when some entries are made in the action code data element, the user is instructed to enter another code in a different data element. For example, if the code "F" is entered as the action code, then one of five codes needs to be entered in the data element "record-type".

Also, within a data element the same code can have different meanings. For example, the definition for the data element "Region" has different meanings based on who administers the assistance program.

<b>Program Administrator</b>	<b>Definition for "Region"</b>
Headquarters	The EPA Region in which the headquarters of the recipient is located.
Regions	The number of the EPA Region which is administering the assistance program.
Recipients in foreign countries	"00"
State Revolving Fund projects administered by a State	The number of the EPA Region in which the State is located.

In another example, the data element "Amount Requested" has different meanings based on the type of assistance program being administered.

<b>Assistance Program</b>	<b>"Amount Requested"</b>
Wastewater Treatment Construction	The total pre-award amount of a request for EPA funds to be used to carry out a proposed project within a specified budget period established in the award document
Assistance Adjustment Notice for Research, Demonstration and Training Grants and Fellowships	The amount of the balance of unobligated Federal funds being withdrawn from the approved award amount.

Extensive or confusing coding results in codes not being used, or used inappropriately, because the user needs to guess at which code is appropriate for a particular grant. Therefore, information may not be available, or may be incorrect, for tracking, analyzing and reporting purposes.

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### **Reporting In GICS Is Difficult**

Many users identified problems with the GICS report generator. GICS utilizes a program called Report Writer to process reports. In addition to standard reports, the Report Writer allows the user to create custom reports. Each Region has a menu listing the reports



regularly used by that Region or Headquarters office. However, some of the listed reports contain incomplete data. For example, in many cases the report entitled "Active Projects Grouped By Consulting Engineer" does not contain important information relating to the engineer, such as consultant number, the consultant's name or phone number. In addition, these reports do not include summary information, such as totals (e.g., funds awarded, outstanding grants, etc.). Users who generate customized reports described Report Writer as difficult and a process of trial and error. For example, users cannot be guaranteed that all pertinent data will be captured should they want to query the system for all grants pertaining to a particular grantee but are unable to guess all of the abbreviations and iterations used during data entry. In the case of "The Ohio State University Research Foundation," the user would need to know and include all 24 abbreviated iterations of the grantee name. Also, if a user wants to query the system based on the employer identification number for "The Ohio State University Research Foundation," they must include all three employer identification numbers to ensure all information is obtained.

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### **Questionable Integrity of GICS Reports**

As a result of the weaknesses previously discussed, users cannot rely on the integrity of data in GICS reports. When selecting criteria for a report, users need to include all iterations of grantee names, including all abbreviation and punctuation differences in names, to ensure they are included in the report. Furthermore, extensive and confusing codes result in codes not being used or being used inappropriately. When users create a report based on codes as the selection criteria, they cannot be certain the information is complete and accurate. Therefore, it is difficult to ensure all information for a particular grantee is captured for reporting purposes. In addition, resources are wasted because reports often need to be re-run due to trial and error attempts to capture complete information. Finally, many GICS users maintain separate tracking systems (i.e., manual files, personal spreadsheets) for grants information because they do not rely on the accuracy of the data within GICS. Maintaining separate tracking systems results in duplicate data entry and wasted resources.

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### **Data Entry Policy and Greater Management Oversight Needed**

The previously discussed weaknesses were caused by the lack of policies over a consistent method to enter data, lack of management oversight, and insufficient edits. Currently, there is no formal policy governing how data should be entered. With the absence of

a grantee table, policies should address the consistent use of abbreviations (e.g., use the first three letters of a word for all abbreviations) or prohibit the use of any abbreviations. Also, policies are needed to clarify codes and to specify the consistent use of codes within GICS. Furthermore, management should take a more active role in the operation of GICS. One user stated that there is a lack of upper management support and guidance from Headquarters as to what data is required for entry and, therefore, Regions cannot clearly define to the States what data element requirements they must meet. In addition, GAD does not have a supervisory relationship with Regions. Although GAD is the owner of GICS and its data, Regional users stated they report to the Regional Administrator, not GAD. This is evident in the fact that the screens are not standardized between Regions and Headquarters. Different Regions requested different changes to the system; rather than trying to consolidate these changes, GAD and the Enterprise Services Division made changes to the Regional screens on a Region by Region basis. This type of decentralized approach contributed to the inconsistencies previously discussed. Finally, GICS does not have adequate edit checks. It is difficult, if not impossible, to ensure all iterations of a grantee name are included in a report because there is no edit check to ensure grantee names are spelled, abbreviated, or capitalized the same way every time, or the employer identification number is correct. In addition, there are no edits which ensure consistent information is entered between Headquarters and Regions.

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### **Integrated Grants Management System**

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GAD is currently working with the Technology, Planning, and Management Corporation (TPMC) as part of the Information Technology Architecture Support (ITAS) contract to determine if a new Integrated Grants Management System should be developed. GAD and TPMC are developing a feasibility study and needs analysis. The feasibility study will analyze the grant application, award, and post award management processes to identify opportunities for streamlining these processes and eliminating unnecessary review layers. In addition, the study will analyze the current technical environment and develop specific recommendations on the optimal technical solutions for improving the Agency's grants information system. Finally, if a new integrated grants management system is recommended, GAD plans on developing and implementing the system in "modules" so that incremental benefits may be achieved based on funding levels. To assist GAD in this task, we have included a description of the

system development lifecycle (SDLC) processes and phases as Appendix III.

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## Recommendations

We recommend the Director of the Grants Administration Division:

1. Develop, issue and monitor policies governing the consistent data entry of grants information. Specifically, these policies should address:
  - a. the use of abbreviations;
  - b. the clarification and consistent use of codes; and
  - c. standardized data elements required to establish a grant.
2. Review the GICS data elements and codes to determine if they are necessary and clearly defined. Based on this review:
  - a. combine related data elements and codes, if appropriate;
  - b. clarify the definitions and use of codes; and
  - c. eliminate unnecessary data element and codes.
3. Take an active role in clarifying and standardizing the electronic grants process to ensure it is consistent between Headquarters and Regions.
4. Require that reports from the Integrated Grants Management System include summary information, such as totals (e.g., funds awarded, outstanding grants, etc.) and meet user needs.
5. Include a grantee table that would include general information about the grantee (e.g., grantee name, address, employer identification number, etc.) in the Integrated Grants Management System. If the Integrated Grants Management System is not implemented, analyze the costs and benefits of developing and implementing a grantee table in the Grants Information and Control System or in any other system used to manage grants.
6. Include adequate edit checks in the Integrated Grants Management System in order to facilitate consistent data entry.

7. Follow appropriate system development life-cycle procedures, as outlined in Appendix III of this report, during the development of the Integrated Grants Management System.

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**Agency Comments and  
OIG Evaluation**

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In a memorandum dated June 20, 1997, the Director for the Grants Administration Division responded to our draft report (see Appendix I). In summary, the Agency substantially agreed with the recommendations with the exception of Recommendation 5. Recommendation 5 called for the analysis of the costs and benefits of developing and implementing a grantee table. We modified Recommendation 5 in response to GAD's comments to recommend the inclusion of a grantee table in the proposed IGMS. However, if IGMS is not implemented, we recommend analyzing the costs and benefits of developing a grantee table in GICS or in any other system used to manage grants.

With respect to Recommendations 1 - 3, GAD is chartering a workgroup comprised of Headquarters and Regional grants office personnel to identify policy, data element, code and process requirement options and raise them to management for a national decision. These decisions will impact future practices, and will be documented, along with Recommendations 4 - 6, in the requirements analysis for IGMS.

Consistent with Recommendation 7, GAD is following system development life cycle procedures for the development of IGMS.

# APPENDIX I

## Grants Administration Division's Response to Draft Report



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

JUN 20 1997

OFFICE OF  
ADMINISTRATION  
AND RESOURCES  
MANAGEMENT

### MEMORANDUM

SUBJECT: Draft Report: User Satisfaction of the Grants Information and Control System  
Report No. EINMF6-15-3044

FROM: Gary M. Katz, Director  
Grants Administration Division (3903F)

TO: Patricia H. Hill, Director  
ADP Audits and Assistance Staff (2421)

We have reviewed the "Draft Report: User Satisfaction of the Grants Information and Control System," and agree with its findings. Many of the weaknesses identified in this user survey were also identified in an FY96 survey of grants project officers and grants specialists and documented in the business case analysis for the replacement system for GICS, titled "Business Process Analysis: Identification of Problem Areas" (March 1997).

In addition, we are substantially in agreement with the recommendations identified in the report, with the exception of Recommendation 5. That recommendation calls for the analysis of the costs and benefits of developing and implementing a grantee table. We believe such an analysis is superfluous since your study and our own clearly document the need for a grantee table. Such a table not only significantly increases the integrity and consistency of the data, but also reduces repetitive data entry for frequent applicants. We suggest instead that you recommend a grantee table be included in the IGMS design.

With respect to the first three recommendations, we are chartering a workgroup comprised of Headquarters and Regional grants office personnel to identify policy, data element, code and process requirement options and raise them to management for national decision by August 30, 1997. These decisions will govern future practice under the current GICS and will be documented, as appropriate, along with Recommendations 4 - 6, in the requirements analysis for IGMS due September 30, 1997.

Consistent with Recommendation 7, we are following system life cycle procedures. The Needs Survey and Feasibility Study are complete, and a Security Plan/Risk Analysis has been drafted for Phase one of the system.

We appreciate this opportunity to comment on the Draft Report and look forward to the final document. If you have any further questions, you may call me at 260-5240, or have a member of your staff call Kathie Herrin on 260-5884.

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## APPENDIX II

### Summary of Objective Survey Questions

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326		Surveys mailed
156	47.85%	Surveys Received and Answered
3	0.92%	Surveys Returned To Sender
34	10.43%	Respondent no longer uses GICS
7	2.15%	Respondent never used GICS
1	0.31%	Respondent plans to use GICS in the future
125	38.34%	Outstanding Surveys

The following is based on the 156 surveys received and answered.

Employee location:

23	14.65%	Headquarters
134	85.35%	Region

#### GENERAL INFORMATION

A.1. What subsystems of GICS do you or your office work in?

12.85%	HAGDS
38.96%	RAGDS
28.51%	IAMS
3.61%	FADS
6.83%	Other
9.24%	No response

A.2. In relation to the work of your division/department/office, GICS data is:

71.15%	Very Important
10.90%	Somewhat Important
8.33%	Important
6.41%	Somewhat unimportant
1.92%	Unimportant
1.28%	No response

A.3. How often do you or your office use GICS data?

62.82%	Daily
12.18%	Weekly
9.62%	Monthly
6.41%	Quarterly
1.92%	Semi-annually
2.56%	Annually
3.21%	Other
1.28%	No response

A.4. Which of the following best describes the usefulness of GICS data?

41.67%	Always useful
22.44%	Almost always useful
17.31%	Frequently useful
16.03%	Sometimes useful
0.00%	Never useful
2.56%	No response

A.5. How do you or you office use GICS data?

34.51%	Stay abreast of grants
22.28%	Progress reports
17.12%	Report milestones
7.88%	Report to Congress
17.66%	Other
0.54%	No response

ACCURACY OF GICS DATA

B.1 Generally, which of the following best describes the accuracy of GICS data reported?

17.95%	Always accurate
44.87%	Almost always accurate
16.67%	Frequently accurate
8.97%	Sometimes accurate
0.00%	Never accurate
11.54%	No response



B.2 Explain/provide examples of inaccurate GICS data elements.

44.23%	Examples provided
37.82%	No examples provided
17.95%	Question skipped due to accurate data

B.3 In your opinion, which of the following best describes why GICS data is inaccurate?

5.90%	Delayed data base update
11.52%	Delayed data entry
3.93%	Delayed document processing
16.57%	Data input errors
8.99%	Data/Grants not in system
3.37%	Data field not in system
12.08%	Insufficient controls over data quality
7.58%	Insufficient definition of data elements
8.43%	Incomplete data
3.37%	Unknown
5.06%	Other
7.87%	Question skipped due to accurate data
5.34%	No response

B.4 Which of the following best describes the action you take to achieve accuracy of GICS data?

24.29%	Identify errors and request new run
24.76%	Reconcile with manual records
8.57%	Reconcile with automated records from another system
11.43%	No action, use report as best as possible
8.57%	Other
13.33%	Question skipped due to accurate data
9.05%	No response

**B.5 How does inaccurate GICS data effect the performance of your job tasks?**

7.50%	Inaccurate reports to Congress
6.07%	Inaccurate data transferred to IFMS
3.57%	Over-obligation of grant dollars
4.29%	Under-obligation of grant dollars
13.21%	Grants not accounted for
12.86%	Grant dollars not accounted for
16.79%	Grants not closed out timely
15.36%	Other
10.00%	Question skipped due to accurate data
10.36%	No response

**B.6 How would you improve the accuracy of GICS data?**

14.87%	Include more edit checks
12.31%	Create a standard data entry sheet
13.85%	Modify data entry sheet to match fields in system
21.54%	Other
14.36%	Question skipped due to accurate data
23.08%	No response

**SYSTEM FUNCTIONALITY**

**C.1 Which of the following best describes your general experience with the system response time?**

16.03%	Very fast
37.18%	Fast
28.85%	Moderate
7.69%	Slow
0.00%	Delayed
10.26%	No response

C.2 Generally, how would you describe the system's operational availability record over the past six months?

12.74%	Always available
34.39%	Available, except for preventive maintenance
35.03%	Some intermittent down-time
4.46%	Frequent down-time
0.64%	Extensive down-time
0.00%	Not available
12.74%	No response

C.3 Is the system easy to learn?

5.77%	Extremely easy
9.62%	Very easy
46.79%	Easy
21.15%	Difficult
8.33%	Very difficult
8.33%	No response

C.4 Is the system easy to use?

7.05%	Extremely easy
8.97%	Very easy
48.08%	Easy
21.79%	Difficult
5.77%	Very difficult
8.33%	No response

C.5 Does the screen layout facilitate data entry?

57.69%	Yes
24.36%	No
17.95%	No response

C.6 Did you receive adequate training to effectively use the system?

50.97%	Yes
37.42%	No
11.61	
11.61%	No response

C.7 GICS data is:

14.10%	Very easy to understand
35.90%	Somewhat easy to understand
29.49%	Neither easy nor difficult to understand
8.97%	Somewhat difficult to understand
2.56%	Very difficult to understand
8.97%	No response

C.8 Does the data within GICS duplicate any other information received?

54.84%	No
22.58%	Yes
22.58%	No response

# APPENDIX III

## System Development Lifecycle Process

The SDLC can be separated into six major phases--initiation, definition, system design, programming and training, evaluation and acceptance, and installation and operation. Each of these phases encompasses several steps which result in the production of key SDLC documentation. Each phase must be completed before the next can be started. At the completion of each phase, all previous work is reviewed, and a "go/no go" decision is made. This progression provides a structured approach to the development process. Figure 2 provides a graphical depiction of the SDLC phases and the flow of documents.

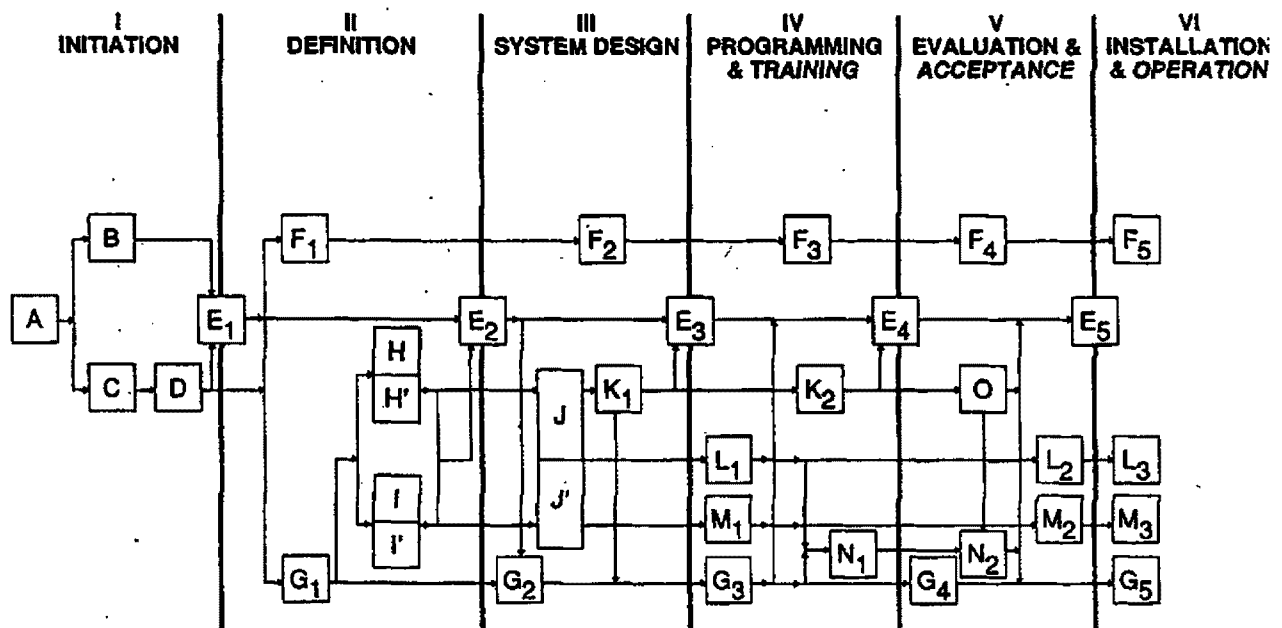


Figure 2: SDLC Process and Documentation Flow

### DOCUMENTATION REQUIREMENTS CODES

- |  |   |
|--|---|
| A. Needs Statement   | I. Data Requirements Document                                   |
| B. Feasibility Study   | I'. Data Sensitivity/Criticality Description                    |
| C. Risk Analysis   | J. System/Subsystem, Program & Data Base Specifications         |
| D. Cost/Benefit Analysis   | J'. Security and Internal Control Related Specifications        |
| E. System Decision Paper   | K. Validation, Verification and Testing Plan and Specifications |
| F. Audit Plan  | L. User Manual  |
| G. Project Plan  | M. Operations/Maintenance Manual                                |
| H. Functional Requirements Document                                | N. Installation & Conversion Plan                               |
| H'. Functional Security and Internal Control Requirements Document | O. Test Analysis & Security Evaluation Report                   |

Note: Document subscripts refer to successive iterations of that document.

A description of each phase follows.

### **Phase 1: Initiation**

The Initiation Phase begins with the recognition of a problem and the identification of a need. During this phase, the need is validated, alternative functional concepts to satisfy the need are explored, and a functional recommendation is developed. If the project is approved by management, it continues through the remaining phases of systems development. The decision to pursue a solution must be based upon a clear understanding of the problem, a preliminary investigation of alternative solutions, and a comparison of the expected benefits versus costs. Common documents produced during this phase include:

- **Needs Statement** - A Needs Statement should describe the deficiencies in existing capabilities, new or changed program requirements, or opportunities for increased economy and efficiency. It should justify the exploration of alternative solutions.
- **Feasibility Study** - The purpose of the Feasibility Study is to provide: (1) an analysis of the objectives, requirements and system concepts; (2) an evaluation of alternative approaches for reasonably achieving the objectives; and (3) identification of a proposed approach.
- **Risk Analysis** - The purpose of the Risk Analysis is to identify internal control and security vulnerabilities of a system. In addition, the Risk Analysis should provide managers, designers, systems security specialists and auditors with recommended safeguards to be included during development.
- **Cost/Benefit Analysis** - The Cost/Benefit Analysis document provides managers, users, designers, systems security specialists and auditors with adequate cost and benefit information. It should include the impact of security, privacy and internal control requirements of the information, as well as evaluate alternative approaches to meeting mission deficiencies.
- **System Decision Paper** - The System Decision Paper provides the information and framework critical to management's decision-making process during the SDLC.

### **Phase 2: Definition**

In this phase, the functional requirements are defined, and detailed planning for the development of an operable system begins. The functional requirements and processes to be automated are documented and approved by senior management before the development effort is started. The requirements identification and analysis of potential risk should be an iterative process. It is critical that specific internal control and

security requirements are identified during this process. Requirements may be, and commonly are, modified in later phases as a better understanding of the problem is gained. The documents produced during this phase include:

- **Audit Plan** - The objective is to assess the adequacy of internal ADP controls and provide the "reasonable assurances" to management that the system will comply with GAO's Government Auditing Standards (Yellow Book).
- **Project Plan** - The Project Plan specifies the strategy for managing the development project. It defines the goals and activities for all subsequent phases, and includes resource estimates and milestones. The Project Plan should describe the unique SDLC methodology to be used during the life of the particular project and include the methods for design, documentation, problem reporting, and change control.
- **Functional Requirements Document** - The Functional Requirements Document provides a basis for the mutual understanding between users and designers of the system. It should include the requirements, operating environment, and development plan.
- **Functional Security and Internal Control Requirements Document** - The purpose of this document is to focus the attention of the user and system designer on the security/internal control needs of the system. The basis for this document is the vulnerabilities identified during the Risks Analysis and established internal control standards.
- **Data Requirements Document** - The purpose of this document is to provide a data description and technical information about data collection requirements.
- **Data Sensitivity/Criticality Description** - This document provides a preliminary determination of data sensitivity and a general statement of the nature and magnitude of potential threats for use in the formal Risk Analysis.

### **Phase 3: System Design**

The objective of this phase is to develop detailed design specifications which describe the physical solution to the system requirements developed during Phase 2. The solution provides a specific high-level definition including information flows, logical processing steps, as well as all major interfaces and their inputs and outputs. During this phase management should define and approve internal control and security specifications prior to acquiring or starting formal development of the applications. The validation, verification, and testing (VV&T) goals are also identified during this phase, and a plan for achieving these goals is developed. The Project Plan (schedules, budgets, deliverables, etc.) and Risk

Analysis are reviewed and revised as required. The Initiation and Definition Phases are designed to clarify and document user needs and requirements, whereas the System Design Phase takes those requirements and converts them into specifications for a computerized system. Common documents produced during this phase include:

- **System/Subsystem, Program and Data Base Specifications** - The purpose of this document is to specify the requirements, operating environment, design characteristics, and program specifications. Also, the physical and logical characteristics of a particular data base should be specified.
- **Security and Internal Control Related Specifications** - The purpose of this is to document the security and internal control specifications needed to meet functional security and internal control requirements.
- **VV&T Plan and Specifications** - The purpose of the VV&T Plan establishes the plan for evaluating the quality and correctness of the software. The VV&T Plan includes plans for the testing of software, including detailed program specifications, descriptions, internal controls and security specifications, and procedures for all tests, as well as test data reduction and evaluation criteria.

#### **Phase 4: Programing and Training**

During this phase, programs will be developed and tested. Programming is the process of implementing the detailed design specifications into code. The process of converting specifications to executable code is primarily dependent upon the completeness and specificity of the program design. If the program is well defined, the process of programming is not technically complex. Completed code will then undergo unit testing. Training is critical to the success of the system, and therefore, attention needs to be paid to the proper development and use of training materials. The success of the system will be directly attributable to how well the users are trained. For those parts of the system which they do not understand well, the probability exists that the users will not use those features, or use them incorrectly. Common documents produced during this phase include:

- **User Manual** - The purpose of the User Manual is to sufficiently describe the functions performed by the software in non-ADP terminology, so that users can determine its applicability, as well as when and how to use it.
- **Operations/Maintenance Manual** - Two separate manuals may be necessary. The purpose of the Operations Manual is to provide computer operations personnel with a description of the software and the operational environment so the software can run. The Program Maintenance Manual provides the maintenance programmer with the



information and source code necessary to understand the programs, their operating environment, and their maintenance procedures and security requirements.

- **Installation and Conversion Plan - The Implementation and Conversion Procedures** are a tool for directing the installation or implementation of a system at locations other than the test site. This tool is used after testing has been completed.

### **Phase 5: Evaluation and Acceptance Phase**

The objective of this phase is to ensure the system is acceptable to the users, prior to placing it into a production environment. Generally, three types of program testing are performed during this phase: (1) unit testing which validates the testing of the unit; (2) integration testing which validates the interfaces between the units and the operating environment; and (3) system testing which validates the interaction between the application system and the user area. The results of these tests will provide user management with the information necessary to make a decision on acceptance, modification, or rejection of the system. Also, the system should be field tested in one or more representative operational sites. For particularly sensitive systems, disaster recovery and continuity of operations plans should be fully documented and operationally tested as well. If designated a "sensitive" system, it should be certified for technical adequacy in meeting its security requirements by an appropriate authority, prior to accreditation and installation. Before certification, all VV&T test results should be documented and a comparison of actual and expected results made. A common document produced during this phase is the:

- **Test Analysis and Security Evaluation Report - The purpose of this Report is to:**  
(1) document the test analysis results and findings; (2) present the demonstrated system capabilities and deficiencies, (including the Security Evaluation Report needed for certification of the system); and (3) provide a basis for preparing a statement of system/software readiness for implementation.

### **Phase 6: Installation and Operation**

The purpose of this final SDLC phase is to: (1) implement the approved operational plan, including extension/installation at other sites; (2) continue approved operations; (3) budget adequately; and (4) control all changes and maintain/modify the system during its remaining life. Problem reporting, change requests, and a formal system of controls must be in place whereby unforeseen problems or changing user requirements can be addressed. At a minimum, such a system should provide for: (1) formal, documented change requests and approvals; (2) thorough testing; (3) VV&T and recertification; and (4) user acceptance.

In addition, periodic performance measurement and evaluation activities are performed to ensure the system continues to meet its requirements in a cost-effective manner in the context of a changing system

environment. These reviews should be of the entire system (both manual and automated processes), and they should ensure the system continues to: (1) meet user requirements; (2) maintain the necessary internal controls and security mechanisms to consistently produce reliable results; and (3) operate in accordance with Agency and Federal standards, and approved design specifications.

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# APPENDIX IV

## Report Distribution

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