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Final Contract Report

for

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Prepared for

GEORGE C. MARSHALL SPACE FLIGHT CENTER

Marshall Space Flight Center, Alabama 35812

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Final Report

The original goal of this effort was to allow free interchange of images between the HGS and other analytical tools available to NASA. Originally conceived as a collection of individual computer programs that could individually convert any format image to any other format and transfer images via several routes, NASA elected to adopt a Common Data Format (CDF) to store images. This allowed the storage of all images in one format on the NASA EADS. Most of the individual programs were then combined and placed in a user-friendly menu-driven system that allows free interchange of image formats within EADS (Sun Workstation), HGS, and Omnicon systems. Additional software and hardware was supplied that allows physical transfer of the formatted images throughout these systems and to external systems.

Methodology is as follows:

- Digitized images may be characterized as two-dimensional arrays of pixel values. Fundamentally, these may be manipulated to transform them from one format to another via simple array manipulation. In practice, different designers at both computer operating system level and application levels have seen fit to "invent" diverse formats for storing these arrays and their array parameters. GSFC had recently adopted CDF as a means to manage their image and graphics information. MSFC personnel reached a consensus that adopting CDF as a standard for storage would be of great benefit. Thus, software was written to interchange images via CDF.

- Because of the commonality introduced by CDF, it became feasible to write this software in a user-friendly menu-driven form. Combined into this package are conversion utilities to inter-change binary and ASCII versions of any file. This allows maximum flexibility in exporting and importing files to and from diverse systems without data corruption.

- The EADS workstation (Sun Workstation) software was programmed in the "C" language as it is most appropriate for a UNIX system and "C" is the language with the most comprehensive set of tools for this system. This software reads and writes files in HGS format.

- The main conversion software was written in FORTRAN 77 as resident on VAX/VMS because the CDF files will be stored here and because of the availability of the CDF programming library here as well.

- A manual to assist with using these utilities has been provided. In this manual are user instructions and source listings for reference in any future expansions of this system to include inter-change with other formats.

The period of performance for this contract was ten (10) months beginning on the start date August 14, 1987. As of July 1988, all tasks have been completed.

Summary of the work follows:

Task 1 (100% Complete) Two (2) DECnet-DOS software packages have been delivered.

Task 2 (100% Complete) Two (2) BLAST communication software packages from the Communications Research Group in Baton Rouge, LA for a Data General Eclipse S/120 and the Space Sciences Lab VAX have been delivered.

Task 3 (100% Complete) The image file formats from the three (3) systems involved have been analyzed. (The new OMNICON format is being analyzed and incorporated even though this has been done already for the old format.)

Task 4 (100% Complete) The software to convert the binary image format produced from the IBM/AT digitizer to an ASCII format acceptable to the VAX system has been written.

Task 5 (100% Complete) The software to convert the ASCII image format transferred from the VAX to an image display on the Sun Workstation (EADS) has been completed.

Task 6 (100% Complete) The software to convert the ASCII image format transferred from the VAX to an image display on the OMNICON Workstation has been completed.

Task 7 (100% Complete) The software to convert the ASCII image format transferred from the VAX to an image display on an IBM PC/XT has been completed.

Task 8 (100% Complete) The performance verification of image transfer between systems has been completed for the VAX, IBM/AT digitizer, IBM PC/XT Workstation, Sun Workstation (EADS), and OMNICON Workstation. DECnet DOS for the two IBM systems has been installed and tested.

Task 9 (100% Complete) A manual that details procedures for image file transfers and conversions has been prepared and two copies delivered.

Assessing the completed tasks, the percentage of work executed as of June 30, 1988 is 100%.

Update

A new OMNICON format has been adopted by NASA and the work on Task 6 was based upon this new format. Only three OMNICON image samples were available for testing software. For this reason we have a concern that this particular software item has not been subjected to adequate testing. Therefore we stand ready, at no additional cost to NASA, to perform any additional work in the future if required to make this software operate properly.