AEDIS IN AEROSPACE: MAINTENANCE IN SPACE
HUBBLE SPACE TELESCOPE REPAIR AT NASA, GODDARD MARYLAND

ILT was instrumental in the success of man's first construction project in space, the Hubble Space Telescope (HST) Repair Mission. Astronauts successfully performed the repair to the HST lens by adding a new focusing device but when they were trying to close the door to the telescope, it would not close. Reliable and accurate information access was needed to solve this problem.

It was quickly realized that engineering information and pictures were needed to help solve this problem. Mission control was informed that the HST was in need of this information in order to repair the door.

They traced the problem to differences in expansion rates between the metals on the door that were in direct sunlight and others that were in the shade and through the satellite network, the ground staff was able to retrieve engineering data stored in the Hubble engineering archive. This engineering archive was designed and built using InterLinear Technology's Agile Electronic Distributed Information Solution (AEDIS).

AEDIS operates as the Technical Management Information System (TMIS) for all the engineering information associated with the Hubble Space Telescope project. ILT customized AEDIS to connect engineers and scientists around the nation, so that they could have instant access to over 5 Million documents and 100,000 engineering drawings during the HST mission. Since then, AEDIS has been used by Hubble Scientists as a means of exchange for data on Hubble projects. There is no better way to describe the mission critical reliability of AEDIS.

- Access to correct information on demand, worldwide and beyond.
- Satellite communications of up-to-date engineering data where you need it.
- First class support and service

The TMIS system has expanded to support full Internet access and provide remote access to over 2,000 users distributed throughout the World Wide Web..

AEDIS Implementation and Architecture

Their current system had disconnected islands of information that led to a system with limited access. Paper based systems were slow and expensive to maintain. Proprietary hardware and software, and a proprietary data format made the system hard to expand and upgrade. NASA Goddard implemented AEDIS' distributed architecture for the Hubble Space Telescope (HST) Project. The initial challenge was to migrate from a previous generation document management system, which had accumulated many disparate repositories of data (Figure 1) into an integrated system with a unified desktop.

ILT designed a four-host Sun IPC workstation solution. It included the core AEDIS servers, an import-conversion service, large and small format scanners and printers, along with client PC's and workstation displays (Figure 2).

Later this was upgraded to include Sun-Sparc 10's and other Sun workstations to distribute the clients, servers, and work services, thus enabling the system to be scaled to meet the changing needs of the HST community. ILT engineers also designed a simple HTTP gateway extension to

Docudex (a 'fourth' tier) enabling HTML based clients, such as Netscape or Mosaic, to view publicly accessible documents. This was accomplished by using AEDIS Web server technology. The TMIS-X (Technical Management Information System) is presently accessible from the various Hubble universities and research facilities around the country and worldwide and is still on the job providing real time data transmission eight years later, making the fruits of the telescopes labors available worldwide.

Figure 1. Hubble Space Telescope Project Before AEDIS

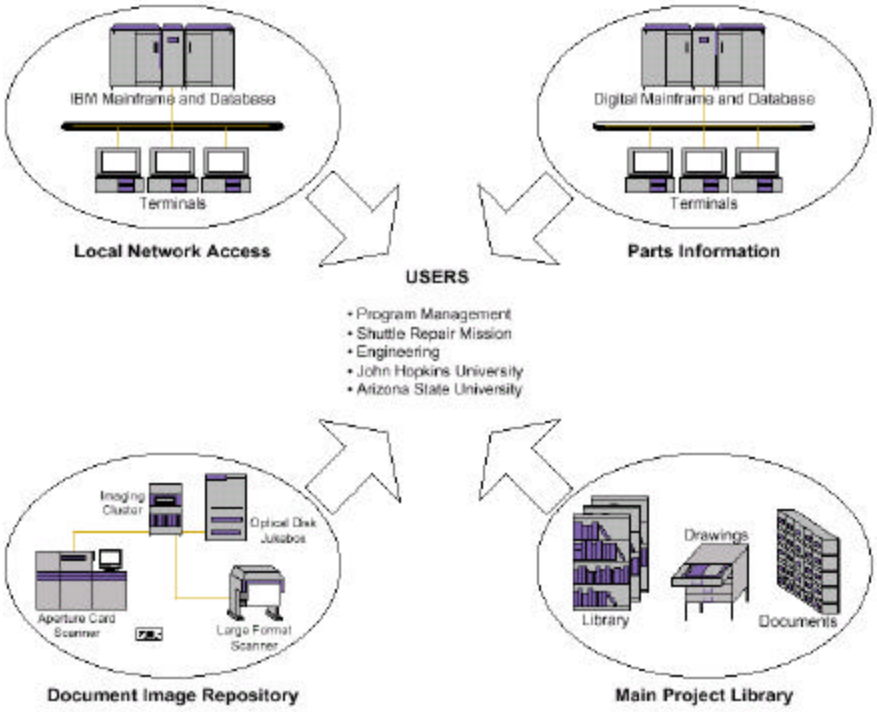

Figure 2. Hubble Space Telescope Migration Path

Images and indexing information were extracted from the existing proprietary database and converted to international standard formats. The distributed architecture of the AEDIS system allows access from remote sites and easy expandability.

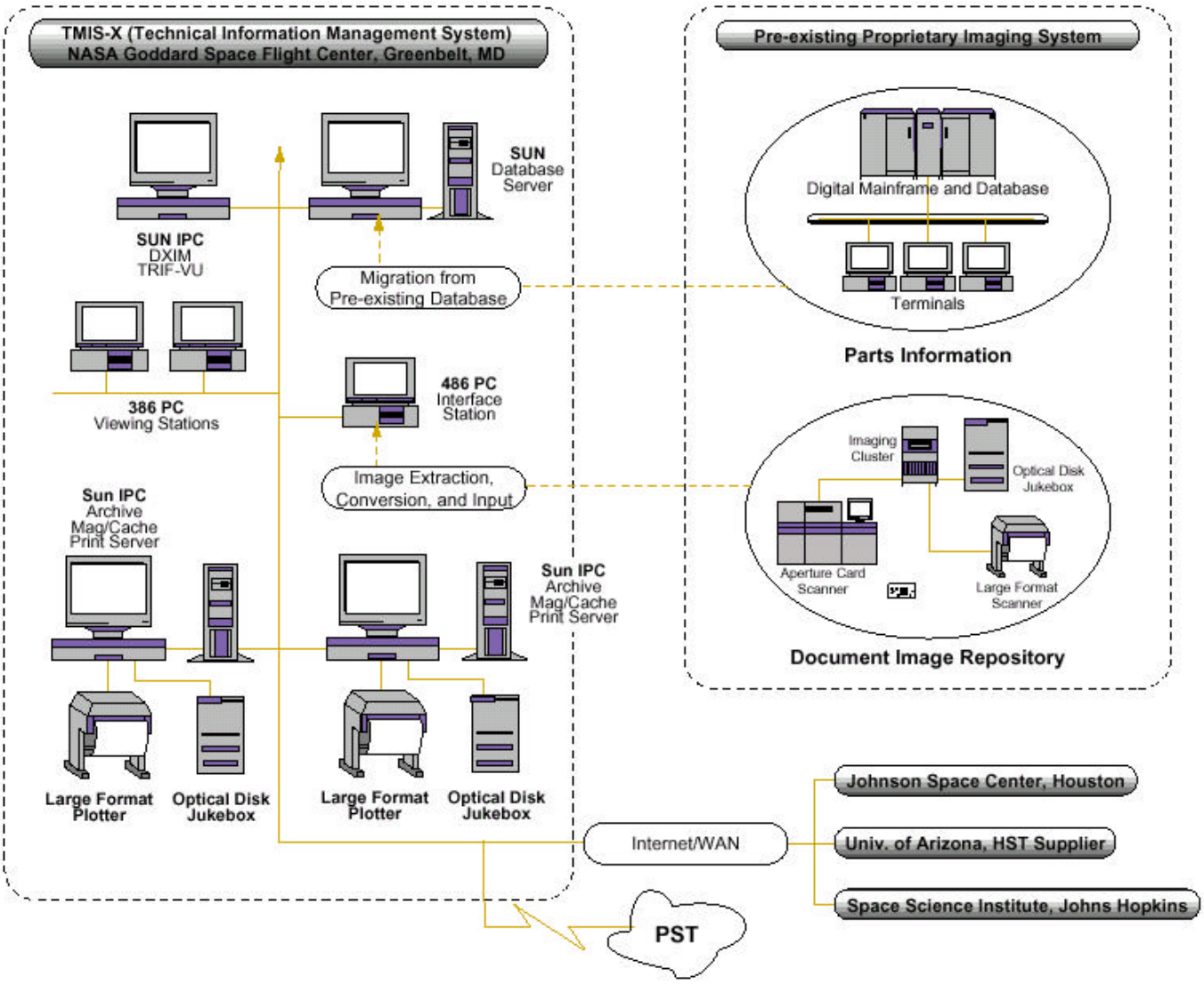

Figure 3. AEDIS support for NASA Hubble Telescope Repair Mission