Key Digital Library Concepts

Naming and Resolution Systems
Needed to identify information items in a digital library by name instead of by location.

Most information items on the Internet today are referenced by their location, for example, http://www.acme.com/report.html, where www.acme.com is the Internet name for some computer and report.html is the name of a file somewhere on that computer. These references are called URLs (Uniform Resource Locators) and they have been extremely useful and have helped lead to an explosion of use of the Internet, but there is a problem with them that is becoming clearer as time goes on. Locations change over time and when that report.html file, for example, moves to some other computer or to a different location on the same computer, the reference will no longer work. The solution to this problem is to use permanent names, Uniform Resource Names (URNs), instead of transient locations (URLs) for items of lasting value. The Defense Virtual Library project uses Handles, which are a type of URN. Handles are also being used by the Digital Object Identifier (DOI) effort and by the Library of Congress.

The details on the **CNRI Handle System** are available at www.handle.net. The basic concept is very simple: Handles are registered in Handle servers and every Handle in every Handle server is associated with current information, such as location, that allows people who know the Handle to get to the item. This is very similar to everyday information management techniques, such as recording telephone numbers next to peoples' names in telephone directories. If you move to a different town you generally get a new telephone number but you don't change your name. Similarly, we don't want to design digital libraries in which all the items have to be renamed every time they are rearranged.

Digital Objects
The information items in digital libraries.

Digital libraries will consist of all types of information items, e.g., text, graphics, audio, video, software, etc., all of which are generically referred to as digital objects

and are named by URNs. While some digital objects will be no more complicated than a single computer file, many will need to be much more complex. Technical reports, for example, are most usefully thought of and managed as single items but in digital form may really consist of many computer files, e.g., multiple page images (TIFFs). It will also be useful to associate additional information, such as intellectual property rights, with each item. And of course just as ISBNs are printed in books, each digital object should carry its own URN. Using modern programming techniques to wrap all of this up into a single digital object which can be used and managed as a single unit of information, much like a book or a report, is essential to making a smooth transition from physical to digital libraries or to physical/digital hybrid libraries.

Repositories
Collections of digital objects.

Collections of digital objects are frequently referred to as reposi-

tories. The key to developing easy to use, easy to administer, and long-lasting repositories is interoperability, that is, when dealing with two or more different repositories, you should be able to use the same tools and techniques to deposit digital objects, to administer digital objects, and to retrieve digital objects. It must be possible to move a digital object from one repository to another in a simple fashion without changing anything about the digital object and without making end users change what they do to obtain and use the object. CNRI, Cornell University, and other digital library research programs are working on interoperable repository software and techniques.

DTIC's Defense Virtual Library project embodies all of these concepts: using Handles for URNs, wrapping DTIC content into digital objects, and using the repository being developed by CNRI and Cornell University to store and provide access to these digital objects.