SECTION I: DIGITAL PRESERVATION

Digital Preservation encompasses a broad range of activities designed to extend the usable life of digital files and protect them from media failure, physical loss, and obsolescence. A Trusted Digital Repository (TDR) divides digital preservation activities into those that promote the long-term maintenance of a bit stream and those that provide continued accessibility of its contents. Digital Preservation is a process that requires the use of the best available technology as well as carefully though out administrative policies and procedures. At this point in time, there are no TDRs in Canada and comprehensive digital preservation is beyond the reach of many institutions. However, there are certain strategies that could be put in place until TDRs become a reality.

Digital preservation strategies

Bit stream copying which is also known as "backing up your data". This refers to the process of making an exact duplicate of a digital object. Bit stream copying is not a long-term maintenance technique since it deals only with the question of data loss due to hardware and media failure. This strategy should be combined with remote storage so that the original and the copy are not subject to the same disastrous event.

Refreshing is the process of copying digital information from one long-term storage medium to another of the same type, with no change in the bit stream. i.e. copying a CD-RW to another CD-RW. Modified refreshing is copying to another medium of a similar type that no change is made to the bit pattern. i.e. 100 MB zip disk to a 750 MB zip disk. Refreshing addresses both decay and obsolescence issues due to storage media.

Durable/Persistent Media (e.g. Gold CDs) may reduce the need for refreshing, and help diminish losses from media deterioration, as do careful handling, controlled temperature and humidity, and proper storage. However, durable media has no impact on any other potential source of loss, including catastrophic physical loss, media obsolescence, as well as obsolescence of encoding and formatting schemes.

Technology Preservation is based on preserving the technical environment that runs the system, including operating systems, original application software, media drives, and the like. It is sometimes called the "computer museum" solution. Technology preservation is more of a disaster recovery strategy for use on digital objects that have not been subject to a proper digital preservation strategy. It offers the potential of coping with media obsolescence, assuming the media hasn't decayed beyond readability. It can extend the window of access for obsolete media and file formats, but is ultimately a dead end, since no obsolete technology can be kept functional indefinitely. This is not a strategy that an individual institution can implement. Maintaining obsolete technology in usable form requires a considerable investment in equipment and personnel.

Analog Backups combines the conversion of digital objects into analog form with the use of durable analog media, i.e. creation of silver halide microfilm from digital images. An analog copy of a digital object can, in some respects, preserve its content and protect it from obsolescence, while sacrificing any digital qualities, including accessibility and lossless transferability. Text and monochromatic still images are the most amenable to this kind of transfer. Given the cost and limitations of analog backups, and their relevance to only certain classes of documents, the technique only makes sense for documents whose contents merit the highest level of redundancy and protection from loss.

Migration is the process of copying data, or converting data, from one technology to another, whether hardware or software, preserving the essential characteristics of the data. Migration is a broader and richer concept than "refreshing" for identifying the range of options for digital preservation. The purpose of migration is to preserve the

integrity of digital objects and to retain the ability for clients to retrieve, display, and otherwise use them in the face of constantly changing technology. Migration includes refreshing as a means of digital preservation but differs from it in the sense that it is not always possible to make an exact digital copy or replica of a data base or other information object as hardware and software change and still maintain the compatibility of the object with the new generation of technology.

Replication is a term used to mean multiple things. Bit stream copying is a form of replication. OAIS considers replication to be a form of migration. LOCKSS (Lots of Copies Keeps Stuff Safe) is a consortial form of replication. In each case, the intention is to enhance the longevity of digital documents while maintaining their authenticity and integrity through copying and the use of multiple storage locations.

Emulation combines software and hardware to reproduce in all essential characteristics the performance of another computer of a different design, allowing programs or media designed for a particular environment to operate in a different, usually newer environment. Emulation requires the creation of emulators, programs that translate code and instructions from one computing environment so it can be properly executed in another.

Encapsulation may be seen as a technique of grouping together a digital object and metadata necessary to provide access to that object. Ostensibly, the grouping process lessens the likelihood that any critical component necessary to decode and render a digital object will be lost. Appropriate types of metadata to encapsulate with a digital object include reference, representation, provenance, fixity and context information. Encapsulation is considered a key element of emulation