This is the thirteenth in a series of short articles reviewing the theory and practice of making backups.

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**Software Changes**

Software incompatibilities include the application software and the operating system.

The data may be readable, but will they be usable? Manufacturers provide backward compatibility, but there are limits. For example, MS-Word 2000 can convert files from earlier versions of Word—but only back to version 4 for Windows. Over time, application programs evolve and drop support of the earliest data formats. Database programs, E-mail, spreadsheets—all of today’s and tomorrow’s versions may have trouble interpreting data files correctly.

In any case, all conversion raises the possibility of data loss since new formats are not necessarily supersets of old formats. For example, in 1972, RUNOFF text files on mainframe systems included instructions to pause a daisy-wheel impact printer so the operator could change daisy wheels—but there was no requirement to document the desired daisy wheel. The operator made the choice. What would document conversion do with that instruction?

Even operating systems evolve. Programs intended for Windows 3.11 of the early 1990s do not necessarily function on Windows ME in the year 2000. And the operating systems of yesteryear do not necessarily even run on today’s hardware.

Finally, even hardware eventually becomes impossible to maintain. It would be extremely difficult to retrieve and interpret data from word-processing equipment from even twenty years ago. No one outside museums or hobbyists can read an 800 bpi 9-track ¾-inch magnetic tape from a 1980 HP3000 Series III minicomputer. Over time, even such parameters as electrical power attributes may change, making obsolete equipment difficult to run even if they can be located.

The most robust method developed to date for long-term storage of data is COM (Computer Output to Microfilm). Documents are printed to microfilm, appearing exactly as if they had been printed to paper and then micro-photographed. Storage densities are high, storage costs are low, and in the worst case, the images can be read with a source of light and a simple lens.

In the next article in this series, we'll look at temporarily storing backups onsite.

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