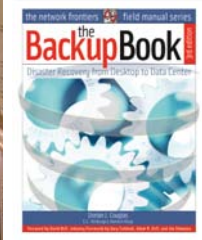


Contains material from the Award Winning book 'The Backup Book' by Dorian J. Coughas



# A Short Guide To Successful Tape Backup

The essentials of protecting your data



COMPUTER  
VIRUSES



CUSTOMER  
PRIVACY



DISASTER  
RECOVERY



COMPLIANCE



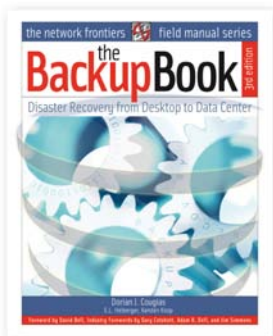
# It seems as if a day doesn't go by that some new threat or issue arises that companies have to address to protect and manage their business critical information.

Many small and medium sized business, as well as remote offices and branch locations of larger corporations, find the same challenges affecting their businesses as large companies. Compounding the problem is the fact that many organizations do not have sufficient resources – either in personnel, time, or financial – to fully plan for the direct and indirect impacts that these issues can have on their activities. This lack of advance planning often translates into heightened risk of unprotected data – arguably the most important asset in your organization.

That's why Hewlett Packard is pleased to bring you this guide on how to implement a "quick start" backup strategy that may help to protect your business.

## Topics reviewed in this guide include:

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As much of the content is taken from Dorian J. Cougias' award winning book "The Backup Book," readers should find that the information is both easy to read and understand and should be considered a "must read" for anyone responsible for performing the backup function in your organization.

- Planning for the "What If(s)"
- The Three Basic Types of Protection
- Data Backup & Archival Technologies
- Why Tape?
- Implementing A Basic Tape Backup & Archival Plan
- Tape Media Durability & Shelf Life
- Why Use HP Media





PLANNING FOR THE "WHAT IF(S)"

# What if an auditor asked you to quickly locate a critical customer file dating back to last year... could you? How about one that was made two years ago? Five years ago? Seven?

What if your biggest customer asked you to immediately share with them your data protection policies that safeguard their data?

What if a lawyer asked you to present all e-mails in your firm written over the past three years related to a specific topic or from a specific person?

What if a fire, flood, or computer virus destroyed all of your company data. . . how quickly, if at all, would you be able to recover?

Unlikely scenarios? Not in today's world.

These are real world scenarios that affect many businesses each and every day. The bottom line is that most organizations recognize the importance of planning for these events ahead of time and have put into place comprehensive backup, disaster recovery, and data archival plans that protect their data and allow them to quickly access information whenever needed.

## The Three Basic Types of Protection

A comprehensive backup and disaster recovery plan is a blend of protecting both data and hardware. Data and hardware protection falls into three basic categories:

(1) Archived backup (2) Duplication or mirroring (3) Fault tolerance

The second and third categories are very important areas that all companies should consider as part of a comprehensive backup, disaster recovery, and archival strategy, especially as the network infrastructure increases in size and complexity. The scope of this document, however, focuses in on the first category – archived backup - to ensure that if all else fails, your organization has at least one copy of your data which dates from a recent point in time.\*

### Archived Backups



- Data is backed up to tapes daily, with tapes then moving offsite for added protection

Point in time restore

### Duplication



- Data is duplicated or replicated to a completely different system in a completely different building

Quick Recovery

### Mirroring



- Dual mirrored systems placed in different buildings

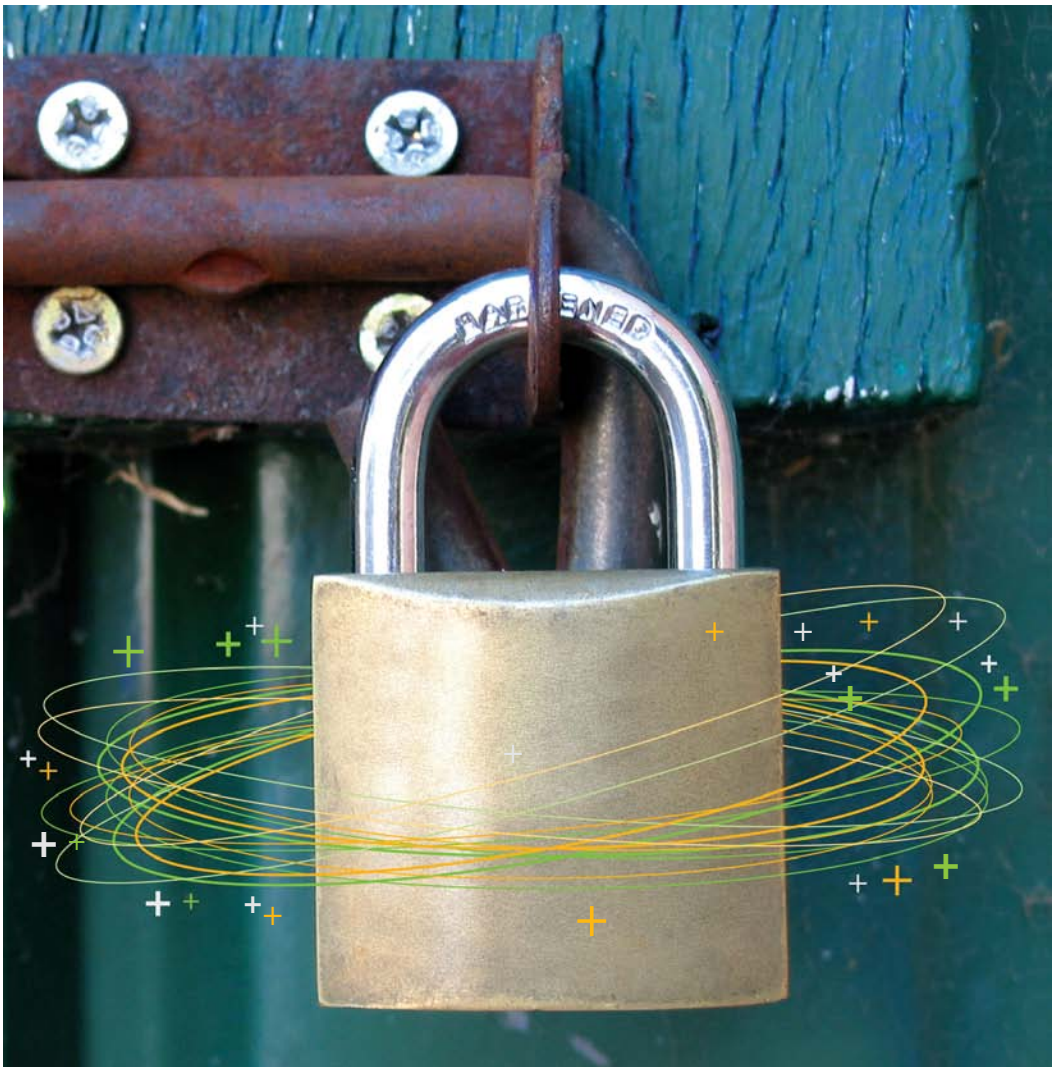
### Fault Tolerance



- Redundant hard drives
- Redundant Ethernet cards

Continuous Operation

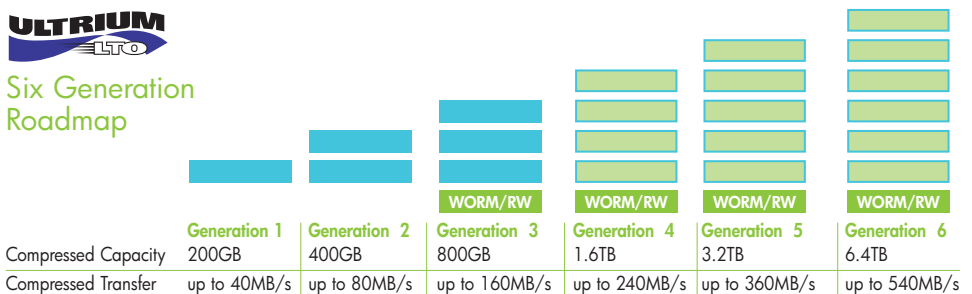
\* Note: Readers interested in reading about fault tolerance, mirroring and duplication are encouraged to seek their own expert advice or visit [www.hp.com/go/storage](http://www.hp.com/go/storage) for more detailed information.



## DATA BACKUP AND ARCHIVAL TECHNOLOGIES



### Six Generation Roadmap



# Numerous storage technologies exist to allow you to execute a good storage, backup and archival plan. In fact, many organizations utilize many, if not all of them together in different ways to complement their comprehensive storage needs.

However, because an in-depth discussion of each of these technologies is beyond the scope of this booklet, we are going to focus on the most widely used backup & archival method in use today – backup to tape.

- Disk Technologies:** Disk, Disk Arrays
- Tape Technologies:** Digital Data Storage (DDS/DAT)  
Digital Linear Tape (DLT/SDLT)  
Linear Tape Open (LTO / Ultrium)
- 
- Optical Technologies:** CD/DVD  
Magneto-Optical (MO)  
Ultra High Density Optical (UDO)



## Why Tape?

Many companies prefer to backup and archive their data on tape. Backing up and archiving data to tape has many advantages over other technologies, including:

- Cost effectiveness – backing up to tape is the least expensive way to backup data per gigabyte (GB)
- Speed & Capacity – storage manufacturers are continuing to invest heavily in improving the speed and capacity of each new generation of tape backup products. Ultrium 3 tape drives and media can now store up to 800 GB of data per cartridge at 160 MB/sec!
- Mobility & Storage – data that is backed up to tape can be easily moved to an offsite location for safe data storage
- Shelf Life – media that is properly used and stored can last up to 30 years or more
- Longevity - Tape has a long, defined future incorporating major R&D & technology enhancements

DDS/DAT Roadmap Stretches to 2010 – With over 15 million drives shipped, DDS/DAT is by far the worlds most popular tape storage format. And in August 2004, HP announced that they will continue to develop the technology through 2010.

Ultrium Roadmap Stretches to 2012 – Ultrium products provide customers with enormous capacity and performance. The third generation of Ultrium products, LTO-3, has set a new benchmark in capacity and performance by doubling compressed capacity to 800GB per cartridge and increasing transfer rates to 160MB/sec. The roadmap for HP Ultrium tape currently extends to 2012.

# Implementing a Basic Tape Backup & Archival Plan

The following section illustrates how you may choose to set-up a simple, easy to understand data backup and archival program for your organization. The basic storage backup concepts discussed in the first half of the section are followed in the second half by a general guide on how some users have developed and implemented their own tape backup strategy tailored to their own needs.

## Step 1: Understand Common Tape Backup Terms

Having a good understanding of some basic storage concepts and terms provides a good background as you begin to develop your own backup strategy for your organization.

### Data Backup

The process of backing up any given file or piece of data involves:

- Making a copy of the source information; and
- Transferring the copy of that information in a secure manner to the destination (tape drive); and
- Storing that copy in a format that the backup software creates (to maintain and track the information's history and versions for recovery purposes);
- Which is usually in a compressed format, to save space on the destination's media; and
- If the files are no longer in "native" file format, for retrieval purposes, the backup software creates a catalog of the files that have been backed up;
- So that the same backup software can be used to restore the data to any backed-up point in time

**'Source' vs. 'Destination'** The backup "source" is the site of the information that you want to back-up. The backup "destination" is the site to where you want to copy the source data. The source of a backup can be the contents of a hard disk drive, a partition of a drive, a client computer's volumes, a network volume, the contents of a CD/DVD, or even a combination of multiple sources. For the purposes of this document, the "destination" would be the tape drive that you are using to copy the information to.



**Media  
Tape Set**

Backup software copies files from a designated “source” and stores them on a designated “destination” called a backup set. It is called a backup set because the set contains not only the data being backed up, but also a catalog, or index, of what has been backed up. The term set is also used to refer to the individual members, or pieces of tape media, that comprise the backup set.

**Catalog**

When you’re backing up files that change on a regular basis, the backup software has to know which files have already been backed up, and where those backed-up files are located within the different pieces of media in the backup set. How does it know? The backup software creates a catalog of what is backed up and where it resides. Different backup software applications call the catalog by different names: catalog file, the storage management database, the share resource library, or just library. The catalog holds the master list of all the files that have been backed up to date, where they came from, and where they’re located in the back-up media. The catalog is very important. Why? Because it’s used to track all known information about any given file, such as:

- Its name, to include its file name extension
- Creation, modification date, archive bit setting
- Size

Each file also sorts metadata, such as the names of each of the source computers associated with the file, the location of the file on each of those source computers, and the date that the file was backed up – based on each of the source computers. Without the catalog, the backup software can’t create any more backups to or restore any data from the backup set.

UNDERSTAND  
THE TWO BASIC TYPES  
OF TAPE BACKUP

FULL BACKUP  
TO TAPE



INCREMENTAL  
+ BACKUPS TO TAPE



## Step 2: Understand The Two Basic Types of Tape Backup

Organizations protect their data in two very different ways depending on the type of tape backup they perform. The two most common types of tape backup include “Full backups to tape” and “Incremental backups to tape.”

### Full Backup to Tape:

Full Backups to Tape (also known as “Recycle backups”) copy everything from the source to the destination (tape drive). Every time a full backup is performed, the tape set is erased and retentioned, the catalog is emptied, and the backup begins at the very beginning of the tape set. The full backup process doesn’t really examine the contents of the computer – it simply begins copying everything from the source to the destination tape set. Restoring from a full backup is the fastest way possible to restore, because most of the files that are being restored to any one computer are stored on the tape in linear, contiguous fashion. However, there is no “history” with a full backup – whatever was last backed up is what can be restored.

### Incremental Backups to Tape

Incremental backups to tape (also know as “normal backups”) is different than a full backup. Unlike full backups, incremental backups don’t back up every file every time – they back up only those files that have changed. For example, every time you back up to tape in a normal backup, you copy the original source data onto that tape. Backing up a second time without erasing the tape creates a second, dated copy of the original files. You now have a historical record – day one’s files and day two’s files. You can restore either day one’s files or day two’s files, depending upon your needs. This type is different than a full backup in that it has a dated history of files instead of an exact replica. Restoring from an incremental backup is great if you need individual files back (point in time or snapshot restoration). However, if you need to restore all the files on a computer, this type of backup makes restoration much slower than a full backup.

What’s an “Archived Backup?” An archived backup is simply taking the “snapshot” of data created by an incremental backup and then taking that tape and putting it in a safe place – normally a protected, offsite location.

Archived Backups



Point in time restore

# KNOW WHAT TO BACKUP



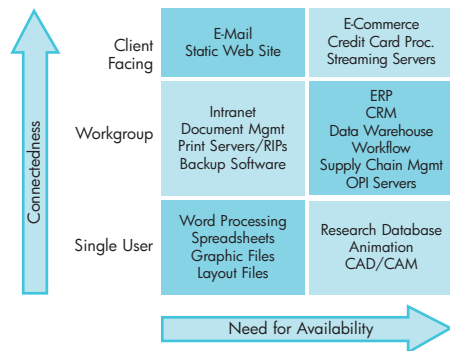
### Step 3: Know What To Backup

Think of all the information and systems that are part of your organization. If your organization is like a lot of other firms, you will find that some of the information you have is more important than other.

In some instances you might be required to keep customer data backed up on a daily basis... other pieces of data may require periodic backup at first but then after a period of time the data becomes much less important therefore reducing the need for frequent backups. Some data needs to be easily accessible via online disk systems whereas other data can be stored either offline or off site.

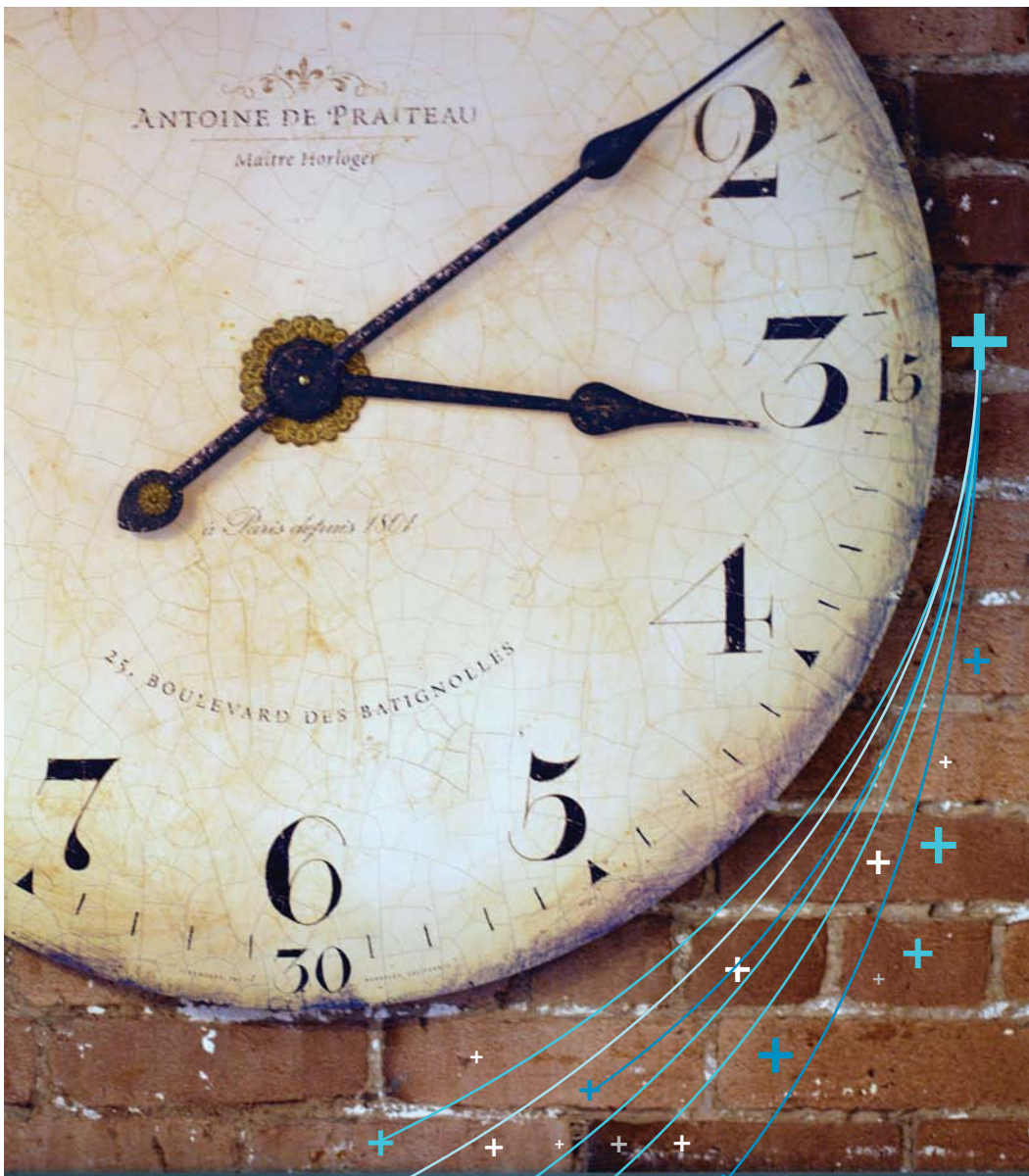
The fact of the matter is that every organization is different. What is consistent, however, is the fact that all organizations need to determine what information is required to run their business, determine the data's overall value to the company, determine the type of storage medium best utilized to store the information on, determine what information they are required to keep, and finally, document the policies and procedures to get rid of data that is either no longer valuable or needed.

If you are struggling with this step, this matrix may help. The matrix describes a simple model that many companies have used to help identify, categorize, and prioritize their data. Once categorized appropriately, Storage Administrators can more easily assign "values" to their data, making it easier for them to determine the best means to store, backup, archive, and eventually delete their data (if needed).



For example, think through the organization(s) you work with. How much of what you need to backup is in the single-user, low-need-for-availability category, and how much is in the client-facing, high need-for-availability category? What you have, and how connected your group to be backed up is, will play a major part in determining the nature of your backup plan.

As a guide, the greater the number of people who would be affected by the loss of a piece of data, or the greater the cost of having to recreate it, the higher up the backup priority list it should be.



DEVELOP AND IMPLEMENT  
A TAPE MEDIA ROTATION STRATEGY

#### Step 4: Develop and Implement A Tape Media Rotation Strategy

There are dozens of tape rotation strategies that you can employ at your company and picking the right one will depend on your individual needs and preferences.

If you are still unsure of which strategy to use after evaluating all of your options, Hewlett Packard suggests their customers evaluate the “Grandfather, Father, Son” tape rotation strategy depicted below. This strategy often allows customers to protect their data while keeping things simple as it encourages users to backup their data on a daily, weekly, monthly, quarterly, and annual basis.

‘Grandfather, Father, Son’ Tape Rotation Strategy (Month 1)

Monday	Tuesday	Wednesday	Thursday	Friday
Monday Tape <sup>1</sup>	Tuesday Tape <sup>1</sup>	Wednesday Tape <sup>1</sup>	Thursday Tape <sup>1</sup>	Week 1 Tape <sup>2</sup>
Monday Tape <sup>1</sup>	Tuesday Tape <sup>1</sup>	Wednesday Tape <sup>1</sup>	Thursday Tape <sup>1</sup>	Week 2 Tape <sup>2</sup>
Monday Tape <sup>1</sup>	Tuesday Tape <sup>1</sup>	Wednesday Tape <sup>1</sup>	Thursday Tape <sup>1</sup>	Week 3 Tape <sup>2</sup>
Monday Tape <sup>1</sup>	Tuesday Tape <sup>1</sup>	Wednesday Tape <sup>1</sup>	Thursday Tape <sup>1</sup>	Week 4 Tape <sup>2</sup>
Monday Tape <sup>1</sup>	Tuesday Tape <sup>1</sup>	Month Tape <sup>3</sup>		
				Quarter Tape <sup>4</sup>
				Annual Tape <sup>5</sup>

**Strategy:**

1. Back up data on a different tape set every working day. The same Monday tape is used every Monday and Tuesday tape every Tuesday, etc.
2. On the fifth day, use a weekly tape set. Weekly tape sets are then stored for the entire month, until a monthly backup is performed in the last week of the month.
3. The monthly backups are stored until the next year.
4. Quarterly backups are performed at the end of every 3 months and are kept until the next year.
5. One annual backup is performed at the end of every year and is kept as long as needed.

#### Tape Media Durability, Shelf Life, Usage & Handling

Although today’s tape media products can last up to thirty years or more if used and archived properly, large duty cycles can accelerate tape degradation much more quickly. And unfortunately, there are no hard or fast rules as to how long it takes to wear out a tape. Some media vendors quote a figure of 1 million passes, while others stick to the number of full back ups. Both metrics are hard to judge.

If you are following a well known backup routine like "Grandfather, Father, Son", the system will instruct you to replace those tapes long before wear and tear becomes an issue. And using the same backup tapes over and over again will probably cause you more issues than simply buying more backup media on a regular basis.

WHY USE HP MEDIA?



Investment



The price of storage media is small in comparison to your need to save and store critical information reliably. This is the ultimate measure of cost, not cost per tape or cost per gigabyte.

One of the ironies of backup is that while the media may be low cost today, there is no way of quantifying the potential value of the data in the future. In other words, an inexpensive tape could one day be the home for some of your most precious company information.

When a critical database has to be restored, a 25% or even a 50% recovery is not what you need. That tape might be worth its weight in gold in the future.

For over 20 years HP has been a leader in data storage products, technologies and services. With this experience, HP has developed a quality control program that tests HP media to extremes. HP tape media cartridges must pass an exhaustive battery of tests that mimic real-use situations. This testing program, incorporating some 170,000 tests in excess of 400,000 test hours in 2005, is designed to ensure that HP media will always offer maximum reliability even in the most extreme conditions.

By purchasing HP data cartridges, you can be certain that you are receiving the most exhaustively tested product in the industry. HP tests its media to extremes so that you don't have to. And while no one can predict the future, or offer a certain guarantee, the scale and breadth of our testing gives us more confidence that your data will be safe on HP storage media tapes.



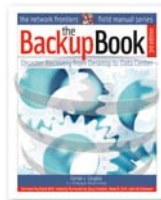
Dorian J. Cougias is the founder and CEO of Network Frontiers, a company that focuses on disaster recovery, security, compliance and IT infrastructure consulting, training, and books. Over the last twelve years, Dorian has overseen the launch of Network Frontiers, has served as CIO of two of the leading advertising agencies in the world, and has written extensively. He is an Adjunct Professor of Technology teaching courses in security and disaster recovery at the University of Delaware, College of Human Services, Education, and Public Policy.



#### THE COMPLIANCE BOOK

Network Frontiers has reviewed hundreds of international and domestic standards and regulations to bring you one source for compliance information.

Thousands of control objectives have been consolidated into twelve realms so that IT tasks only need to be addressed once to satisfy multiple regulations. The Compliance Book is the cornerstone of unified compliance.



#### THE BACKUP BOOK

The Backup Book combines what can go wrong and how that applies to the various backup methods, couples that information with recovery and business continuity tactics, and then works through multiple real-world disaster recovery scenarios.



For more information: [www.netfrontiers.com](http://www.netfrontiers.com)



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