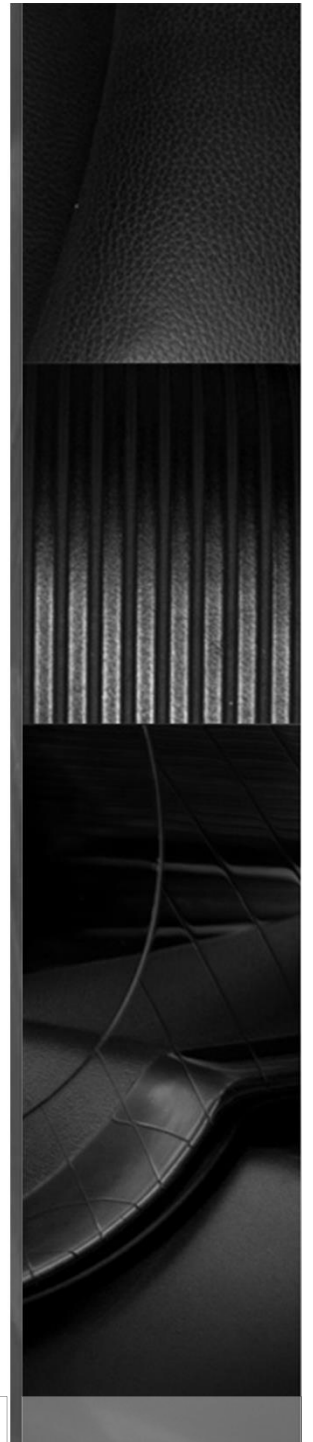


# Bussines Continuity

Foundations of computer networks



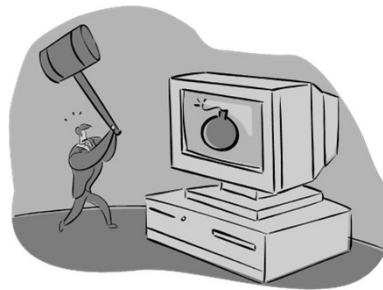
# Bussines Continuity

## AIMS

- Neutralizing the effects of the accident
- Reducing effects of the incident on the business

## SOLUTIONS

- Disaster Recovery (DR) procedures
- High Availability (HA) systems

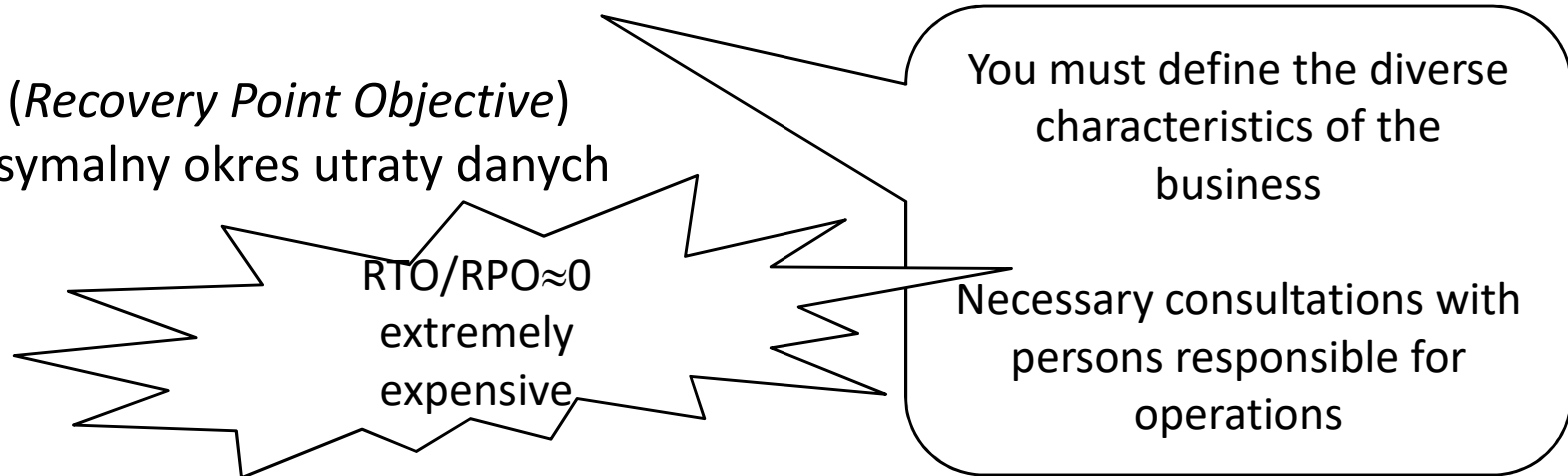




# Disaster recovery (DR) system parameters

- RTO (*Recovery Time Objective*)  
czas odtworzenia danych i ich dostępności

- RPO (*Recovery Point Objective*)  
maksymalny okres utraty danych



- TTO (*Test Time Objective*)  
maksymalny czas zakończenia testu

# Policy of bussines continuity

- Range

- applications,
- services,
- data



Real needs for particular elements and threats

- Risks

- Required parameters RTO and RPO

- Software and hardware solutions

Take into account previously defined elements of the policy

- Operational scenarios

- protective
- emergency

If costs are no acceptable RTO / RPO should be verify

# Risks

- malware infection
- intentional interference of third parties
- theft devices and media
- service errors
- hardware failures
- software failures
- natural disasters



# Backup, archiving, copies

- Backup

Performed to-date copy of the data used to restore them in case of emergency

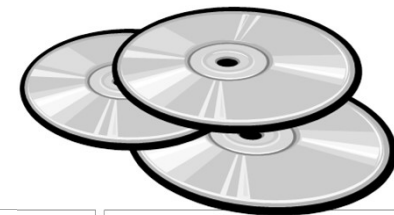
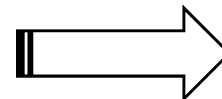
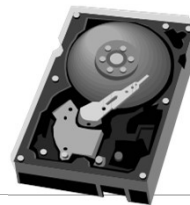
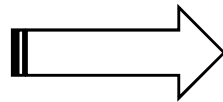
RPO

- Archiving

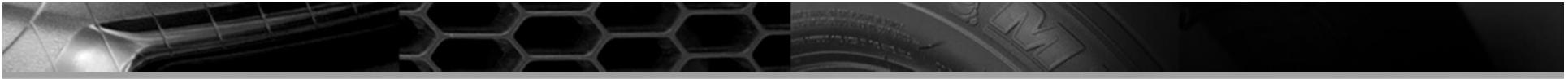
A copy of data that no longer subject to processing, carried on the user's request

- Additional copies

An additional copy of the data taken as part of backup or archiving



--	--	--



# Protected elements

- Data
  - documents
  - data bases
- Configurations
  - logs
  - systems configuration
  - configuration of applications
  - directory services data
- Applications
  - executables and libraries
- Virtual machines
  - snapshots





# Solutions for various architecture

- Klient – server
  - central data storage
  - central backup
- Peer – to – peer
  - replication
  - agent systems
- Bring Your Own Device (BYOD) / teleworking / remote working
  - personal backup
  - backup in cloud







# Central backup

- Magneto-optical media
- Portable hard drives
- Magnetic tapes
- Tape libraries
- Libraries magneto-optical drives



# Magneto-optical media

- HP MO 9,1 GB



# RDX – Removable Disk Cartridges

- HP RDS



# LTO – Linear Tape-Open

- LTO-1  
100/200 GB
- LTO-2  
200/400 GB
- LTO-3  
400/800 GB
- LTO-4  
800/1600 GB
- LTO-5  
1500/3000 GB
- LTO-6  
2,5/6,25 TB



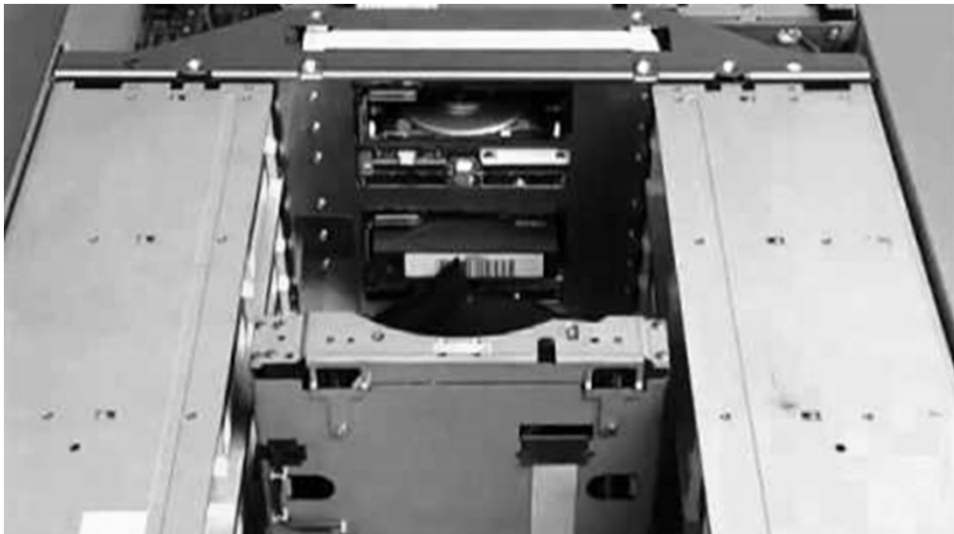
# Other tape systems

- DDS (ang. Digital Data Storage)
- DLT (ang. Digital Linear Tape)
- LTO (ang. Linear Tape-Open)
- AIT (ang. Advanced Intelligent Tape)
- QIC (ang. Quarter Inch Cartridge)



# Tape libraries

- Tandberg StorageLibrary T24 2U



# Library of RDX

- Tandberg 8900-RDX





# Storage system classification (access time)

- On-line storage  
RAM , access time in miliseconds, indekses of data bases.
- On-line storage  
Hard drives, HD arrays, access time up to 1 s., applications, data bases, graphics and multimedia.
- Near-line storage  
Optical and magnetooptic drives, access time up to 30 s., archives.
- Off-line storage  
Magnetic tapes, access time in minutes, backup i archives.
- Off-line safety copy  
Additional copies of backup, placed far away from the computer system, ensuring the security of information during natural disasters.



# Media rotation schemes

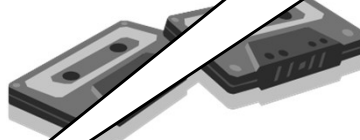
- Full  
All data
- Incremental  
Files/records changed relative to the last full
- Differential  
Files/records changed relative to the last full
- Father/Son  
Full every week interchangeable in 2 media  
Incremental/differential in other days
- Grandfather/Father/Son  
Full every week/month  
Incremental/differential in other days
- ...
- Hanoi tower

media: 6  
horizon: 2 weeks

media: 19  
horizon: 1 year

media: 4  
horizon: 15 days

media: N  
horizon 4N-1 days



Schemat rotacji typu: Wieże Hanoi

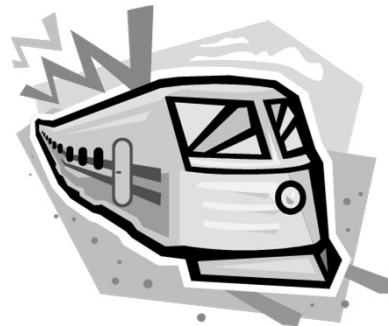
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A		A		A		A		A		A		A		A
	B				B				B				B	
			C								C			
							D							

A	Backup pełny, różnicowy lub przyrostowy	B	Backup pełny, różnicowy lub przyrostowy	C	Backup pełny	D	Backup pełny i zabezpieczenie nośnika
---	---	---	---	---	--------------	---	---------------------------------------



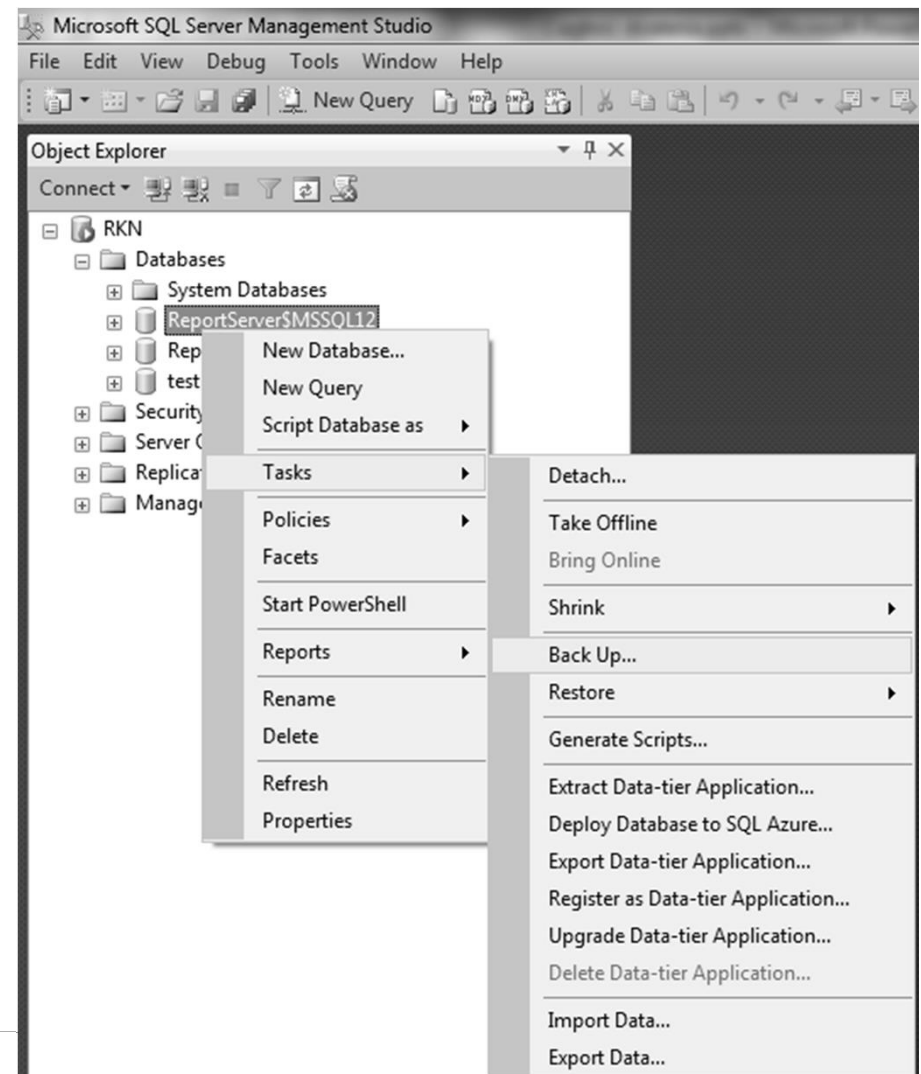
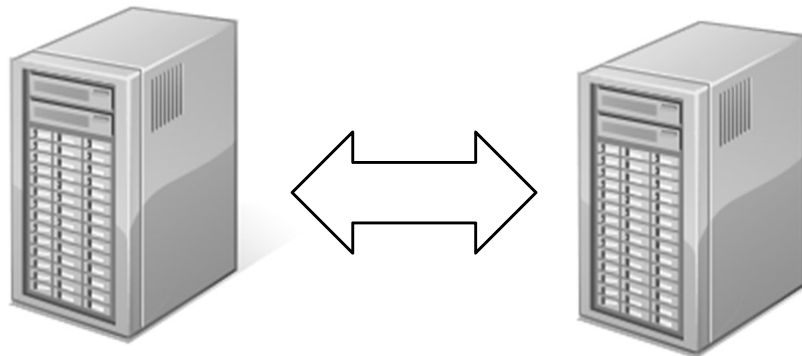
# Elements of recovery scenarios

- The location of emergency backup media
- Transportation carriers
- Source alternative equipment
- The location of installation media
- Tasks for crew



# Levels of backup/replication

- Application level
- File level
- Host level



# VTL – Virtual Tape Library

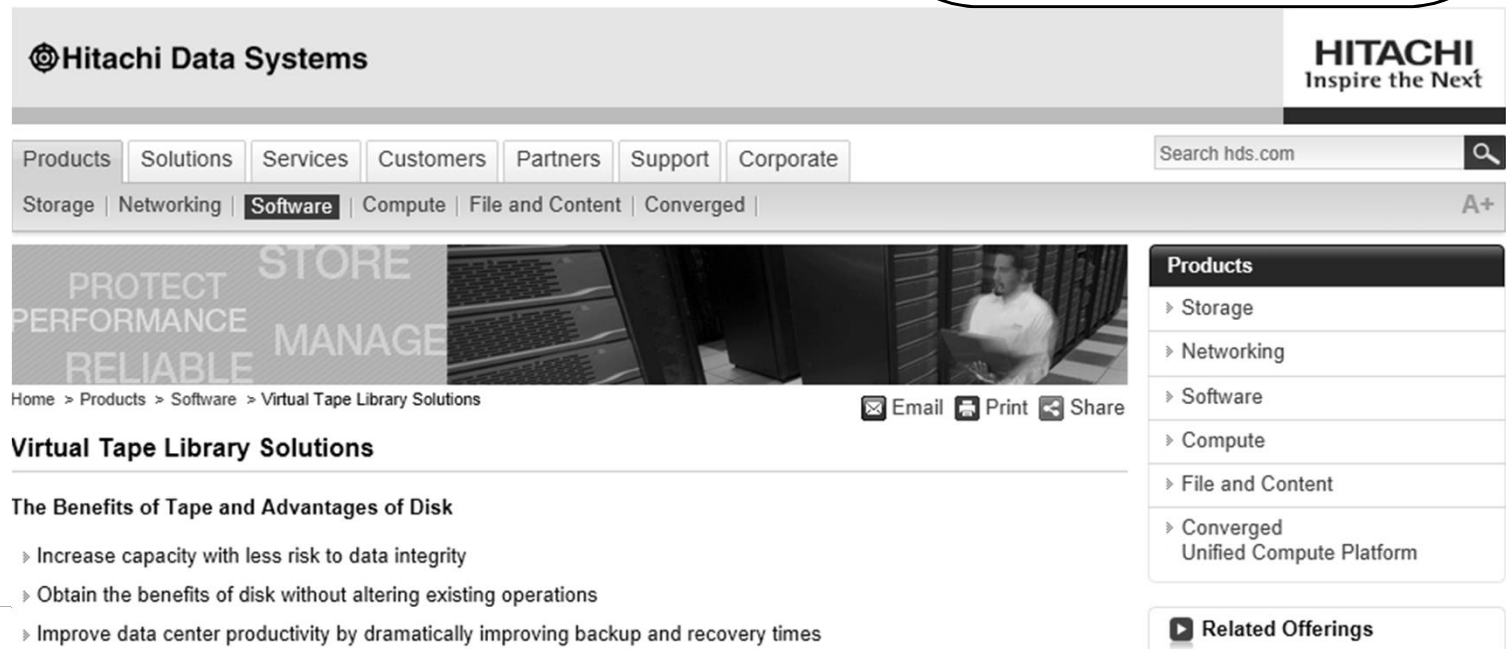
- Allow to use of a software dedicated for tape libraries
- RTO as in a disc-disc solutions
- Deduplication available

Eliminating repeated pieces of data

- On-line
- Post-process

Save up to

- 90% copies
- 70% virtual env.
- 40% office files



The screenshot shows the Hitachi Data Systems website. The header includes the Hitachi Data Systems logo and the tagline "HITACHI Inspire the Next". A navigation bar contains links for Products, Solutions, Services, Customers, Partners, Support, and Corporate. A search bar is located on the right. Below the navigation bar, there is a banner with the text "PROTECT PERFORMANCE RELIABLE STORE MANAGE" and an image of a server room. The main content area is titled "Virtual Tape Library Solutions" and lists the benefits of tape and advantages of disk. A sidebar on the right lists products: Storage, Networking, Software, Compute, File and Content, and Converged Unified Compute Platform. At the bottom, there is a section for "Related Offerings".

**Hitachi Data Systems**

HITACHI  
Inspire the Next

Products | Solutions | Services | Customers | Partners | Support | Corporate

Storage | Networking | **Software** | Compute | File and Content | Converged |

Search hds.com

Home > Products > Software > Virtual Tape Library Solutions

**Virtual Tape Library Solutions**

The Benefits of Tape and Advantages of Disk

- › Increase capacity with less risk to data integrity
- › Obtain the benefits of disk without altering existing operations
- › Improve data center productivity by dramatically improving backup and recovery times

**Products**

- › Storage
- › Networking
- › Software
- › Compute
- › File and Content
- › Converged Unified Compute Platform

**Related Offerings**

source: hds.com

# Cloud Computing in use

- DR

- backup in cloud



mozypro

Fast, simple, and secure  
backup for business servers

Why leave your business' data to chance? Use MozyPro® online  
backup for servers for 24/7/365 data protection.



Get MozyPro



- HA

- functionality based on services available in cloud

# Backup in domestic clouds

- Legal restrictions
  - accounting data stored domestically

IS  
INTEGRATED  
SOLUTIONS

iBard24

• O produkcie • Cennik • Bran  
• Kontakt

iBard24 ▶ Produkty ▶ [iBard24 backup online](#)

**iBard24 Backup Online dla firm**

Zapewnij całkowite bezpieczeństwo firmowych danych

NASK

Polcom

ZETO S.A.  
CENTRUM KOMPUTEROWE

storio

Storio

O nas

Oferta

Aktualności

Kontakt

Twoja Firma  
pod szczególną opieką **STORIO** systemy online

Rozwiązania głosowe

Internet

Transmisja danych

Centrum danych

Studium przypadku

Hosting wirtualny

Hosting dedykowany

Kolokacja

Data Storage ▾

▶ Warianty usługi

▶ Zastosowanie usługi

▶ eSeminarium offline

Backup

Biuro zapasowe

## Data Storage

### Dlaczego Data Storage z GTS?

KLIKNIJ, ABY OBEJRZEĆ PREZENTACJĘ



Usługi klasy operatorskiej dostarczane wraz z redundantną siecią SAN, są zaprojektowane w taki sposób, aby sprostać potrzebom biznesowym klientów i wyzwaniom związanym z obsługą rosnącej liczby danych. Usługi GTS Data Storage to skalowalne zasoby pamięci masowej do przechowywania danych i aplikacji, krytycznych dla funkcjonowania firm. Obsługują wszystkie platformy i systemy operacyjne.

Usługi GTS Data Storage to odpowiednik własnych rozwiązań do przechowywania danych w przypadku awarii.

# Accesss to data in the cloud



- Internet
- Dedicated symetric link PVC
- IP VPN

bandwidth  
reliability  
security  
costs

- Replication into the cloud
  - The possibility of immediate use replicated data





# Classification of data centres

- Tier 1  
No redundancy of media, servers and links
- Tier 2  
as above + redundant of mass memory
- Tier 3  
as above + redundant power supply and network connections
- Tier 4  
as above + all elements are redundant, e.g. network links, mass memory, air condition, servers, generators, power supply



## Guaranteed availability of data centers by class

- Tier 1  
99.671%
- Tier 2  
99.741%
- Tier 3  
99.982%
- Tier 4  
99.995%



źródło: [www.cyberciti.biz](http://www.cyberciti.biz)

--	--	--

# Verification of data centers

- Data center class (min Tier 3)
- Guarantee the quality of services SLA (Service Level Agreement)
- Reference list
- Localisation: Polska/Europa
- The agreement to entrust the processing of personal data





# high availability systems

- Replication on hypervisor level
  - require shared storage
  - lack of resistance to failure SANs



- Backup data centers



# Backup data centers

- Data replication required (SAN-SAN)

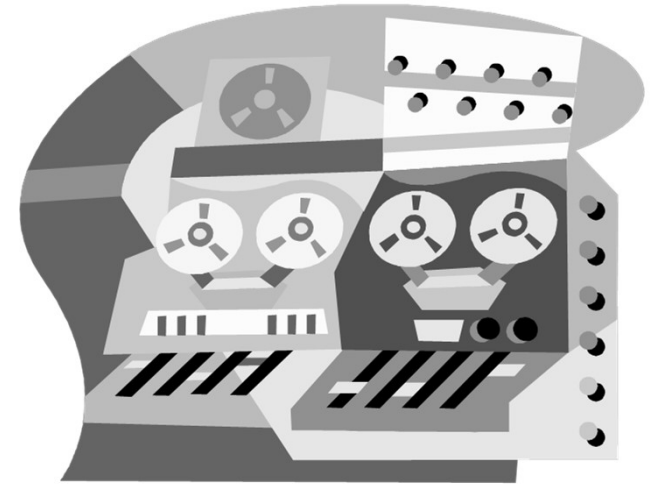
- synchronous,  $RPO \approx 0$   
higher costs, higher link bandwidth, lower distance
- asynchronous,  $RPO > 30 \text{ min}$   
lower costs, lower link bandwidth, higher distance

- Resistance to any disaster

- Classification

- hot sites  
full functionality
- warm sites  
limited to processes critical to the operation of the entity

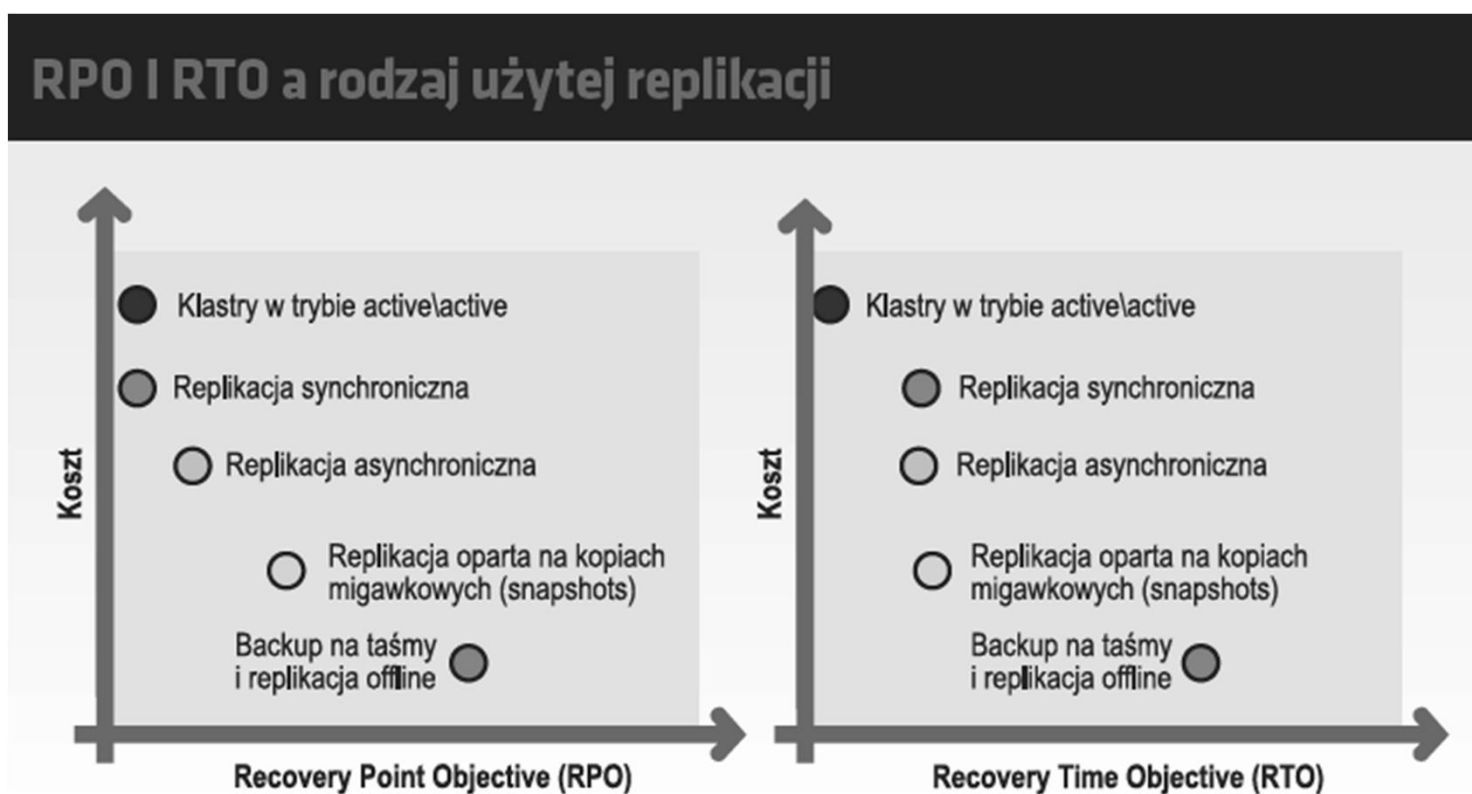
- Virtualization allows you to cheaply obtain full functionality, eg. with limited performance



Transactions at the main site is approved after approval at the backup center

RTO = personel transport time 😊

# Koszty



## Tests, test, tests...

- Required periodic testing
- After the test all the restored systems and data should be smooth
- Current, anytime verification of the recording media



**Backup may fail  
when you want to use it**

Jak często testujesz proces odzyskiwania danych z backupu?

Chociaż proces odzyskiwania danych jest kluczowy w DR, prawie 1/4 respondentów nie testowała go nigdy.

**23,8%**  
NIGDY