PREMIS

PRESERVATION METADATA MAINTENANCE ACTIVITY

Changes for Preservation Policy Metadata

concerning preservationLevel entity

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PREMIS implementation Fair 2013

Lisbon, PT, Sept. 5, 2013

Overview

Challenge:

- Preservation Policy Metadata –
  - *How to express sustainable preservation policies*
  - *How to record these (in PREMIS)*

PREMIS change:

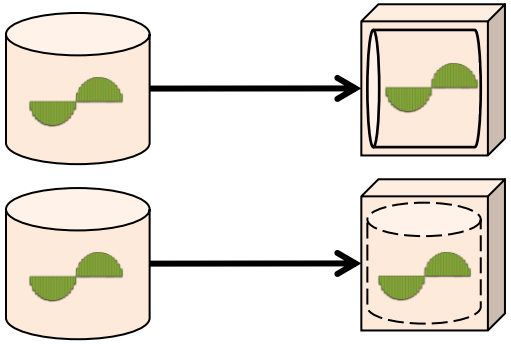
- Allows the preservation policy applied to preserved digital objects to be recorded in more detail by updating the preservationLevel semantic container.

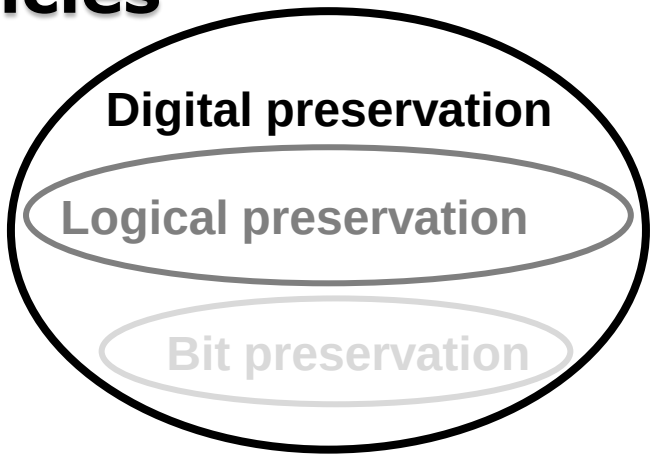
Contents of this presentation

- Preservation Strategies and policies
  - On logical/functional level
  - On bit preservation level
- Challenges
  - Expressing **preservation levels**
  - Preserving preservation metadata
  - Expressing **preservation levels** over time
- An example on the bit level
  - Risks mitigated in bit preservation
  - Bit integrity/safety, confidentiality and availability
- Types of preservation Levels
  - How to express them – also over time
- Summary

Preservation Strategies & Policies

- **Logical preservation**
  - Migration
  - Emulation
  - Technology preservation





The Change from 2.2 to 3.0

Information indicating the decision or policy on the set of preservation functions to be applied to an object and the context in which the decision or policy was made.

Semantic unit	1.3 preservationLevel
Semantic components	1.3.1 **preservationLevelValue** 1.3.2 preservationLevelRole 1.3.3 preservationLevelRationale 1.3.4 preservationLevelDateAssigned

Semantic unit	1.3 preservationLevel
Semantic components	**1.3.1 preservationLevelType** 1.3.2 **preservationLevelValue** 1.3.3 preservationLevelRole 1.3.4 preservationLevelRationale 1.3.5 preservationLevelDateAssigned

Logical Preservation

preservationLevelType = logicalStrategy

preservationLevelValue	Comment
Migration	Migration of digital material to keep data interpretable
Emulation	Emulation of digital material to keep data interpretable
Technical	Technology preservation to keep data interpretable

Preservation Strategies & Policies

- **Bit preservation**

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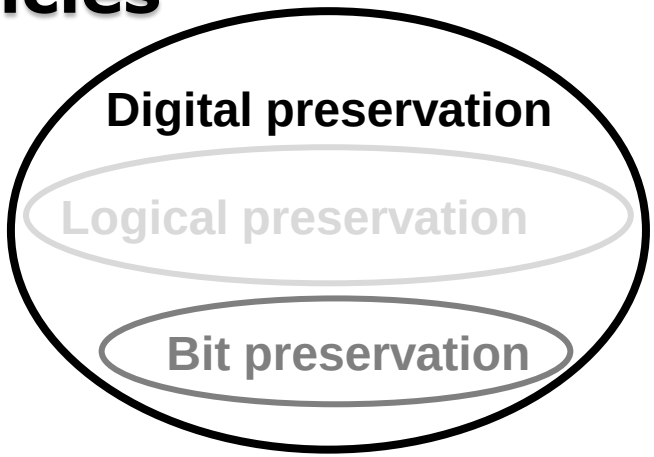
Elements in Bit preservation

Risk mitigation in Bit preservation



ISO 27000 series – at a higher level

Availability

Integrity (Bit safety)

Costs

Confidentiality

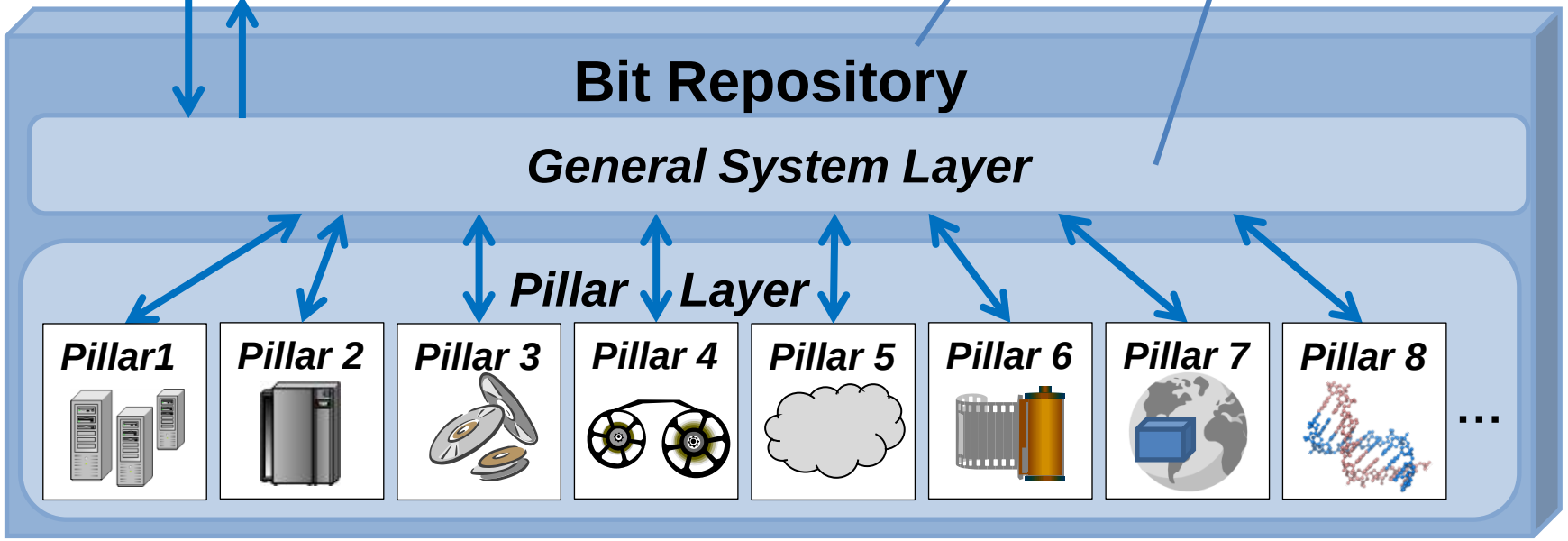
A General View of a Bit Repository

Elements in bit preservation:

- Number of copies
- Independence between copies
- Frequency of integrity checks

Organisation & techniques designed and arranged and used for long-term bit preservation

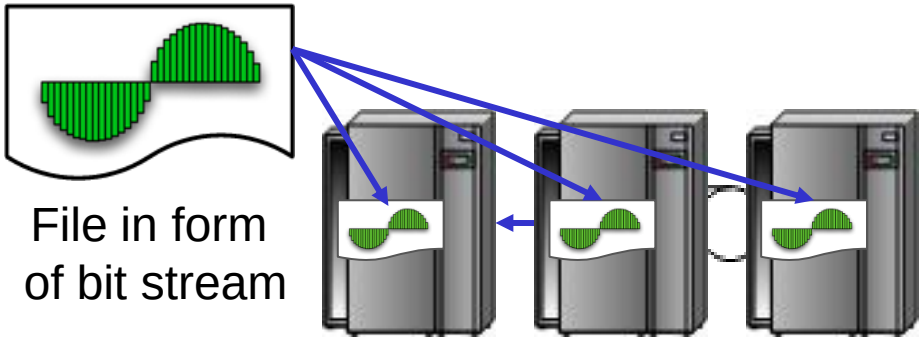
Integrity check Coordination



Integrity – Bit error

Risk: Bits can change value

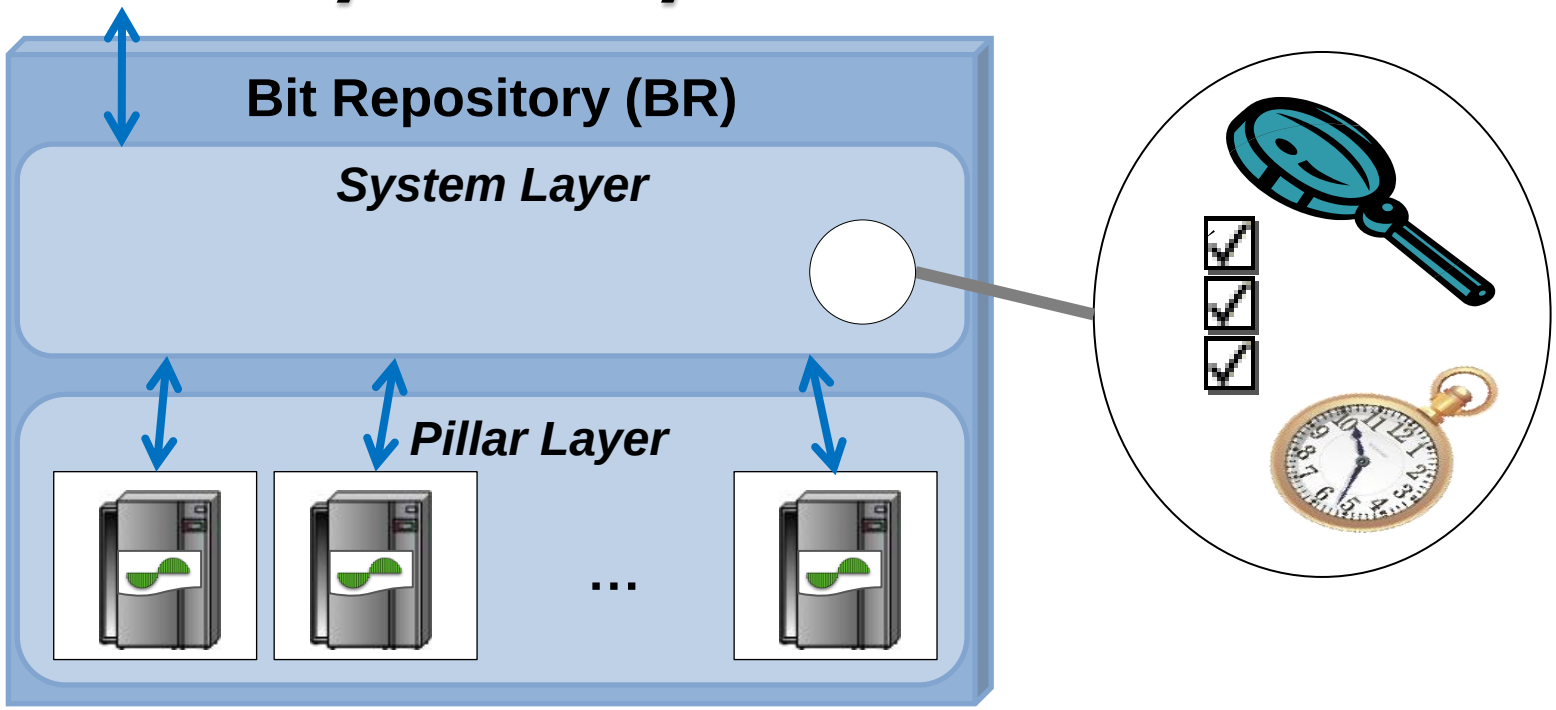
1. Error has occurred in Backup
2. File is corrupted
3. Error is not discovered
4. Cannot determine which file is intact



Solutions:

1. No backup. All are copies of data
2. Vote on which copy that is the right one

Bit error – System Layer



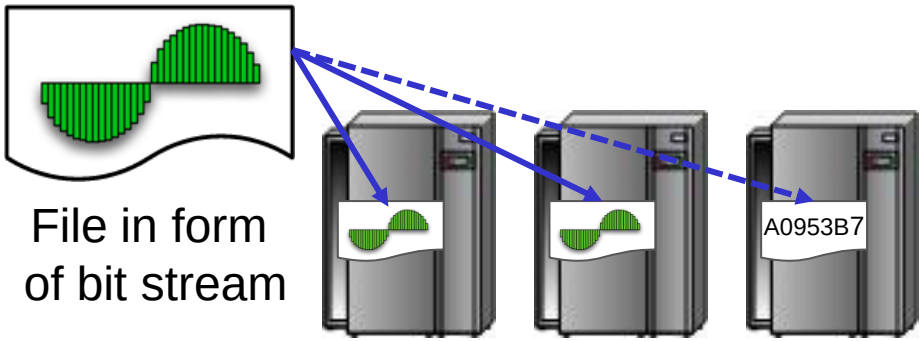
Solutions:

1. System layer checks and follow-up on basis of comparing copies
2. Minimum three voters, *optimize by checksums*

Integrity – Bit error

Risk: Bits can change value

1. Error has occurred in Backup
2. File is corrupted
3. Error is not discovered
4. Cannot determine which file is intact



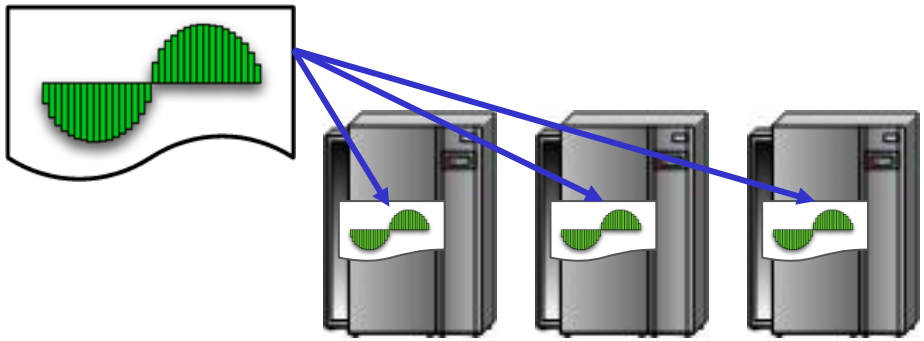
Solutions:

1. No backup. All are copies of data
2. Vote on which copy that is the right one
3. Introduce checksums of files to discover errors

Integrity – Bit error

Risk: The same error occurs for more copies

1. Same hardware
2. Same software
3. Same vendor



Integrity – Bit error

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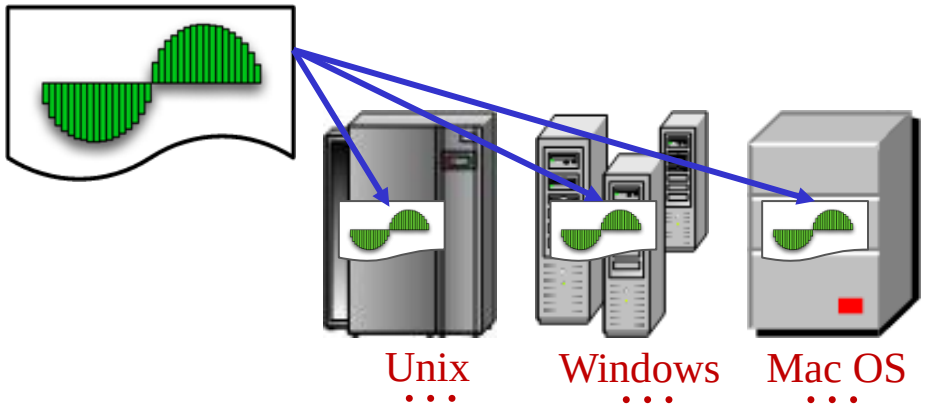


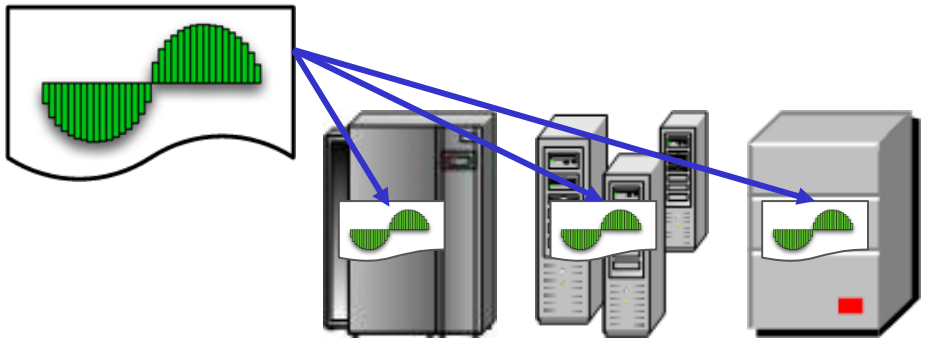
Solutions:

1. Different hardware solutions
2. Different vendors
3. Different software (OS, interpreters, etc.)

Integrity – Disasters

Risk: All copies are damaged at the same time

1. Natural disasters
2. Attacks in connection with war or terror



Integrity – Disasters

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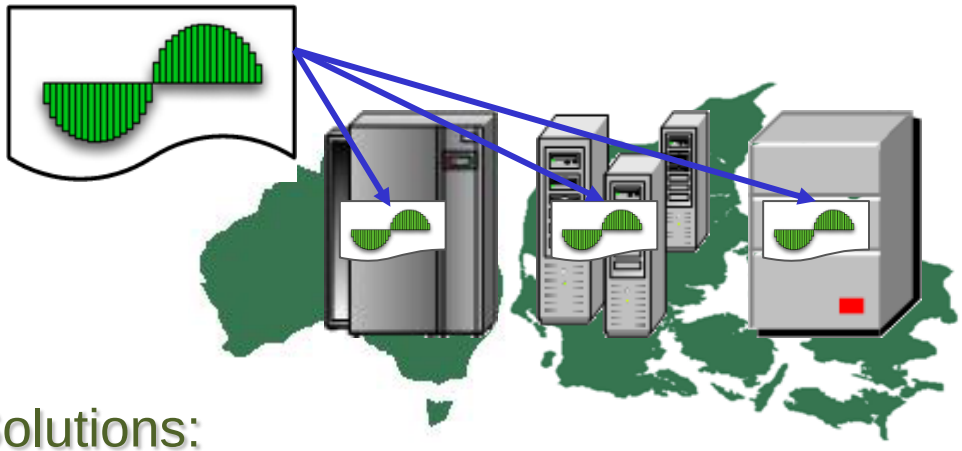


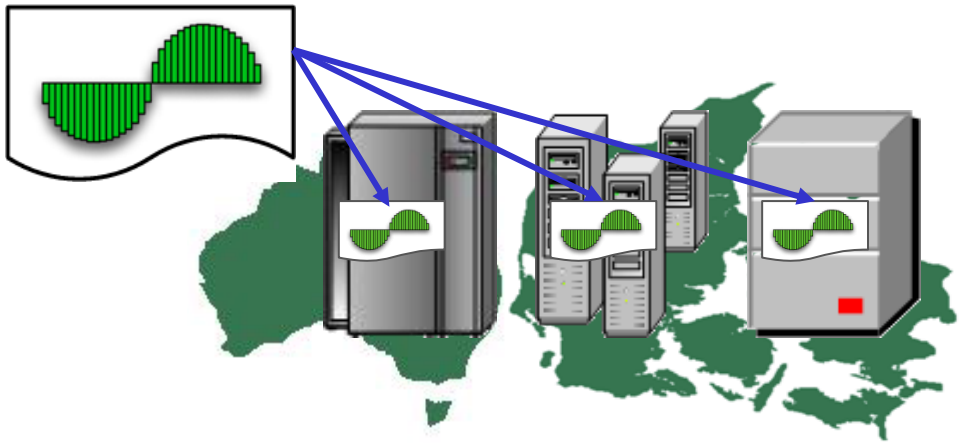
Solutions:

1. Different geographical locations

Integrity – Organisation

Risk: Errors/mistakes are made by the same person/org.

1. The same person has access and has delete rights
2. The same person makes procedural mistakes



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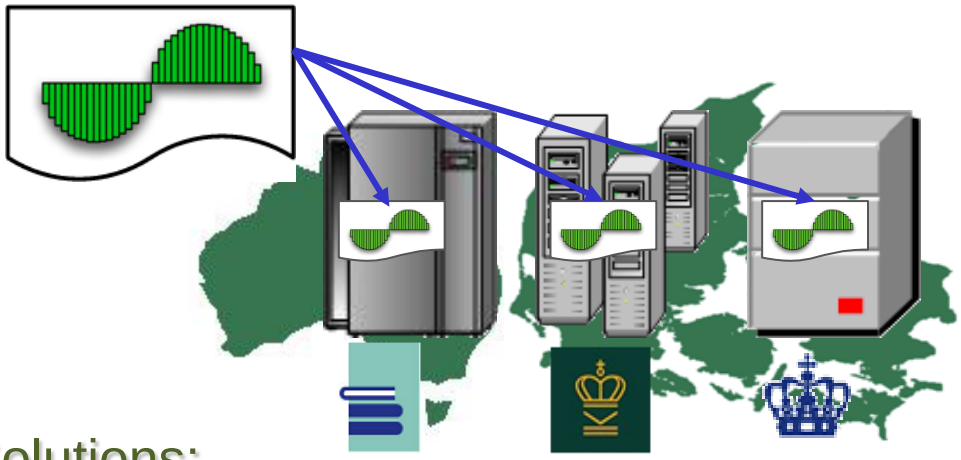


Solutions:

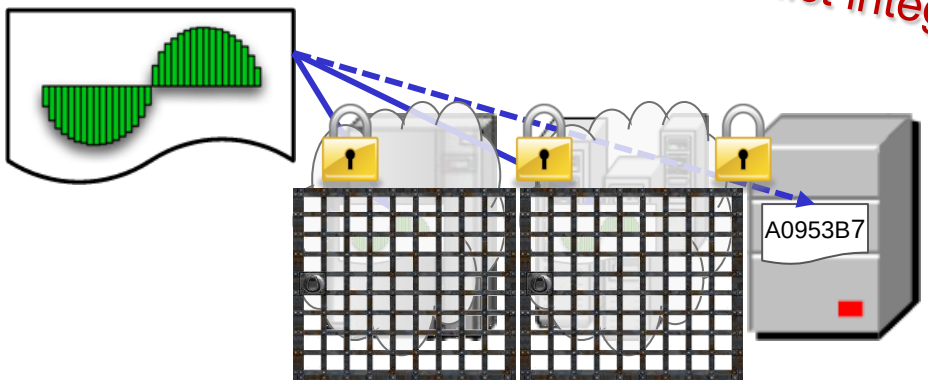
1. Different organisations

Confidentiality

Risk: Unauthorised gets access to confidential data

1. Unauthorised gets access to Bit Repository
2. Unauthorised gets access to data from Bit Repository

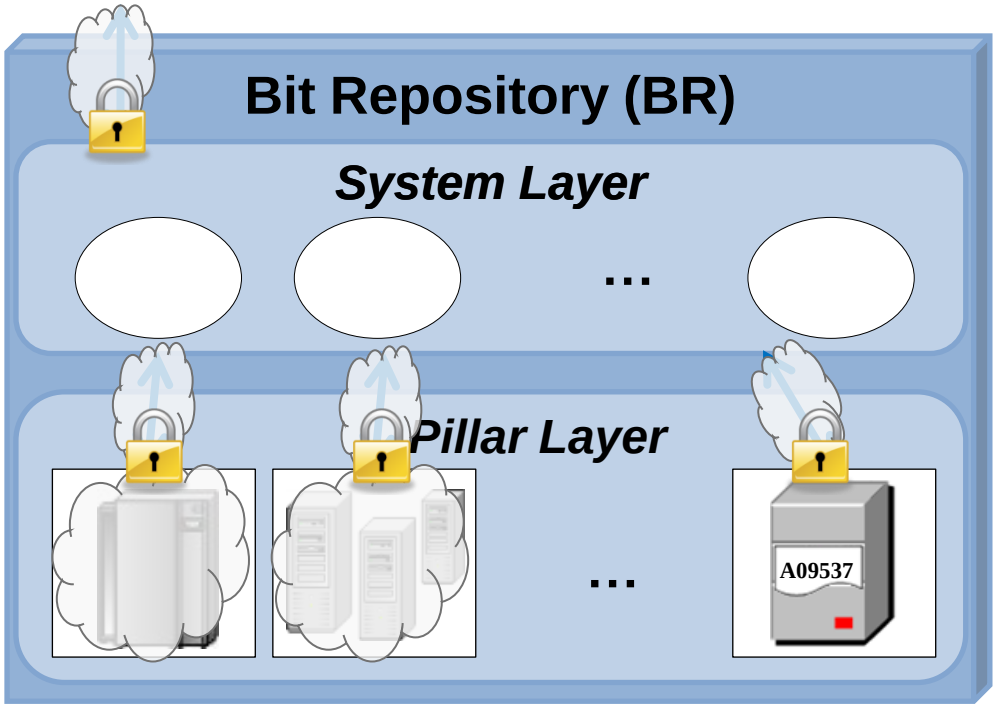
Encryption can conflict integrity



Solutions:

1. Authentication of users of pillars with copies
2. Encryption internally on pillar
3. Hardware secured in locked rooms

Confidentiality – System Layer



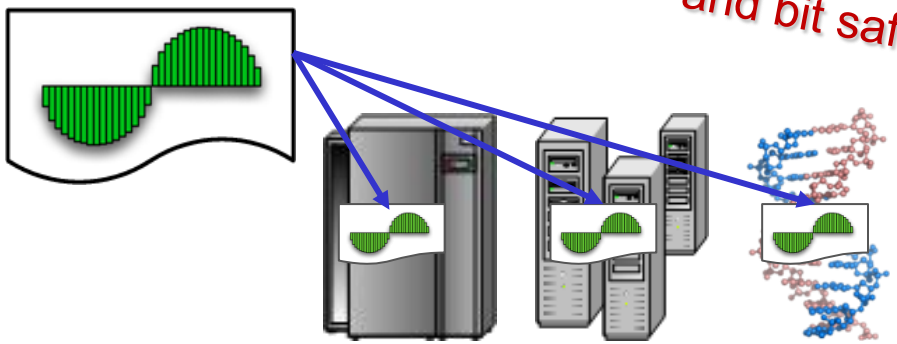
Likewise on System layer

Availability

Risk: Cannot get access as required

1. Cannot get any response on request
2. Processing not possible in reality

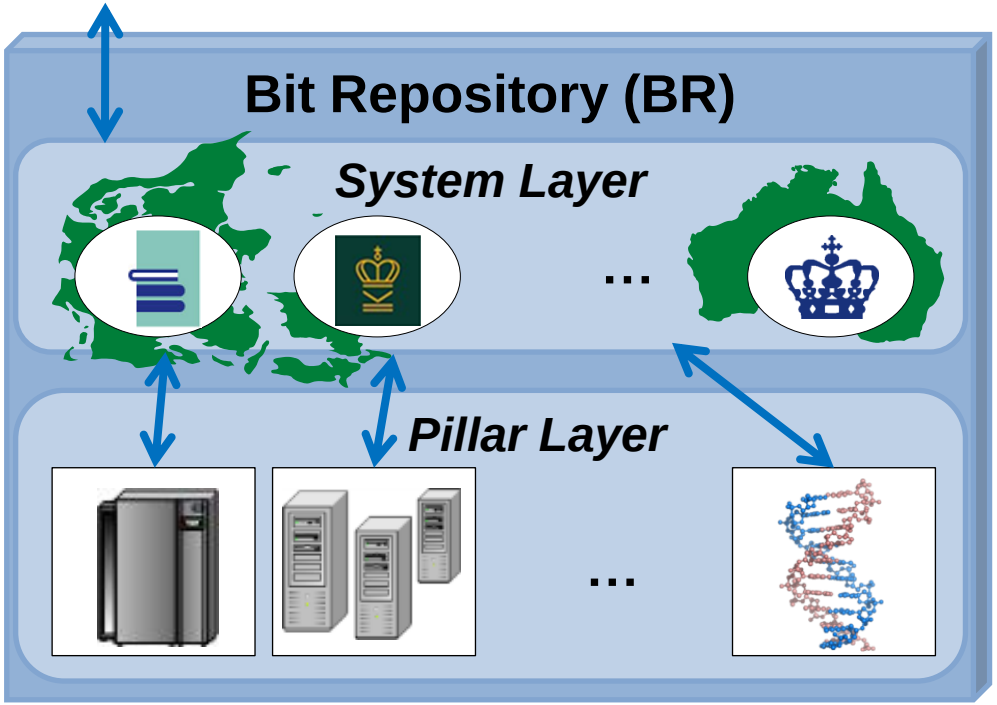
Processing can conflict confidentiality and bit safety



Solutions:

1. Specialised pillar with distributed architecture

Availability

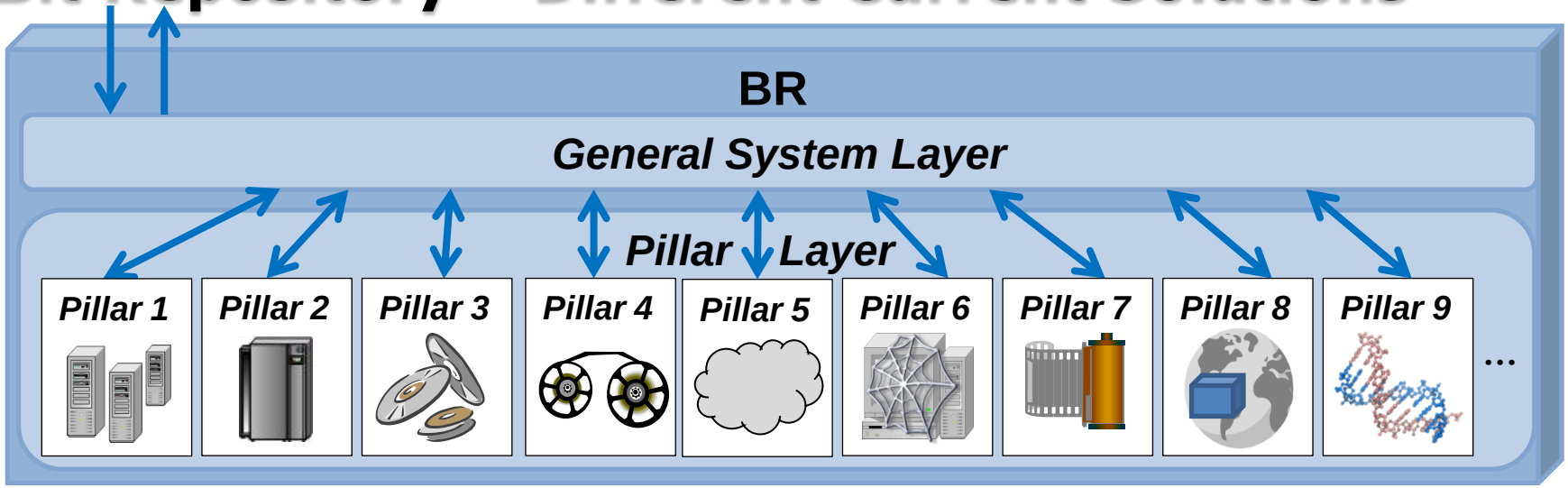


Solutions:

1. Redirection if access to a pillar is down
2. Distributed requests to different pillars
3. Scaling
4. Diversity,
5. …

Depends on what is required

Bit Repository – Different Current Solutions



- Media
- Data safety
- Access speed
- On-line
- Off-line
- Organisational placement
- Geographical placement
- …

Bit safety

Availability

Costs

Confidentiality

Bit Safety preservationLevelType = BitSafety

preservationLevelValue	Comment
Max	Maximum bit safety
VeryHigh	Very high bit safety
High	High bit safety
Medium	Medium bit safety
Low	Low bit safety
VeryLow	Very low bit safety
Min	Minimum bit safety

Bit Safety preservationLevelType = BitSafety

preservationLevelValue	Comment
Max	**Maximum bit safety**
VeryHigh	Very high bit safety
High	High bit safety
Medium	Medium bit safety
Low	Low bit safety
VeryLow	Very low bit safety
Min	Minimum bit safety

Policy:
As high bit safety that we can get

Strategy 2013:
10 copies spread over 3 continents, both optical and magnetic medias, checked every …

Strategy 2050:
8 copies ; at lest 2 on Mars, at least two written to DNA, checked every …

Confidentiality preservationLevelType = Confidentiality

preservationLevelValue	Comment
Max	Maximum confidentiality
VeryHigh	Very high confidentiality
High	High confidentiality
Medium	Medium confidentiality
Low	Low confidentiality
VeryLow	Very low confidentiality
Min	Minimum confidentiality

Confidentiality preservationLevelType = Confidentiality

preservationLevelValue	Comment
Max	Maximum confidentiality
VeryHigh	Very high confidentiality
High	**High confidentiality**
Medium	Medium confidentiality
Low	Low confidentiality
VeryLow	Very low confidentiality
Min	Minimum confidentiality

Policy:
Only restricted access, where it is as hard as it can get for others when skipping encryption

Strategy 2013:
No more than 2 copies, that are secured on off-line medias …

Strategy 2050:
??? …

Availability preservationLevelType = Availability

preservationLevelValue	Comment
Max	Maximum availability
VeryHigh	Very high availability
High	High availability
Medium	Medium availability
Low	Low availability
VeryLow	Very low availability
Min	Minimum availability

...

Preservation Level in metadata

```
<preservationLevel xmlns:xlink="http://www.w3....">
  <preservationLevelType>bitSafety</preservationLevelType>
  <preservationLevelValue>High</preservationLevelValue>
  <preservationLevelDateAssigned>
    2013-01-18T19:28:01.458+01:00
  </preservationLevelDateAssigned>
</preservationLevel>
<preservationLevel xmlns:xlink="http://www.w3....">
  <preservationLevelType>confidentiality</preservationLevelType>
  <preservationLevelValue>Low</preservationLevelValue>
  <preservationLevelDateAssigned>
    2013-01-18T19:28:01.458+01:00
  </preservationLevelDateAssigned>
</preservationLevel>
<preservationLevel xmlns:xlink="http://www.w3....">
  <preservationLevelType>availability</preservationLevelType>
  <preservationLevelValue>Medium</preservationLevelValue>
  <preservationLevelDateAssigned>
    2013-01-18T19:28:01.458+01:00
  </preservationLevelDateAssigned>
</preservationLevel>
```

Preservation Level information

preservationLevelType	Comment
Bit safety	Bit preservation
Confidentiality	Bit preservation
Availability	Bit preservation
Logical Preservation Strategy	Logical Preservation
…	

Types and values can differ

- Policy
  - With institution preservation policies
  - Express values - Same over time
- Strategy
  - Requirements for fulfilment with current technologies …

Questions and Comments