IDOC Risk Analysis

Risks & Responses provided by identified risk categories

Référence :

Risks to the very existence of the structure ?

Or, how IDOC guarantees the continuity of service with respect to its existence as a structure ?

Positive factors

- ➤ IDOC depend on an institute of the National Scientific Research Centre (CNRS) that organises the whole French research, the first research organization in the world with more than 30 000 employees.
- ➤ IDOC depend on Université Paris Saclay, first french university in the shanghai ranking
- ➤ IDOC is recognized as a data platform by CNRS
- ➤ IDOC is recognized as a long term archive by CNES, the french space agency
- ☐ IDOC is part of an OSU, a perennial structure in charge precisely of observation services.

- ➤ The French Ministry of Research, which oversees the CNRS and the university, has made strong commitments to open access to scientific data
  - ✓ National Plan for Open Science
  - ✓ CNRS Roadmap for Open Science 2019

NATIONAL PLAN FOR OPEN SCIENCE
4TH JULY 2018
#openscience

CNRS ROADMAP FOR OPEN SCIENCE
18 November 2019
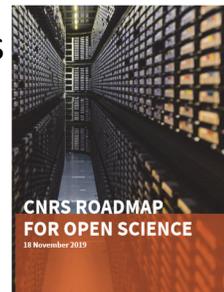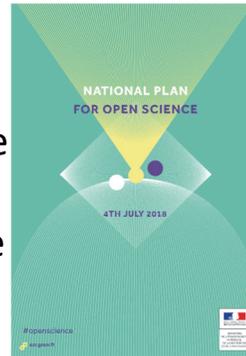
In case of a combination of very unlikely events

- ➤ Other national or international structures are already partners of IDOC according to the thematics and they will be able to take over the services proposed to IDOC: example: MAGYC developed in common with the observatory of Nice
- ➤ A very large part of the hosted data is already replicated in other international structures (sometimes, admittedly, with less advanced features): example: ESA Planetary Science Archive.
- ➤ For the remaining orphaned services and datasets, a call will be addressed to the different European scientific communities concerned and which themselves host services or data

Organizational risks ?
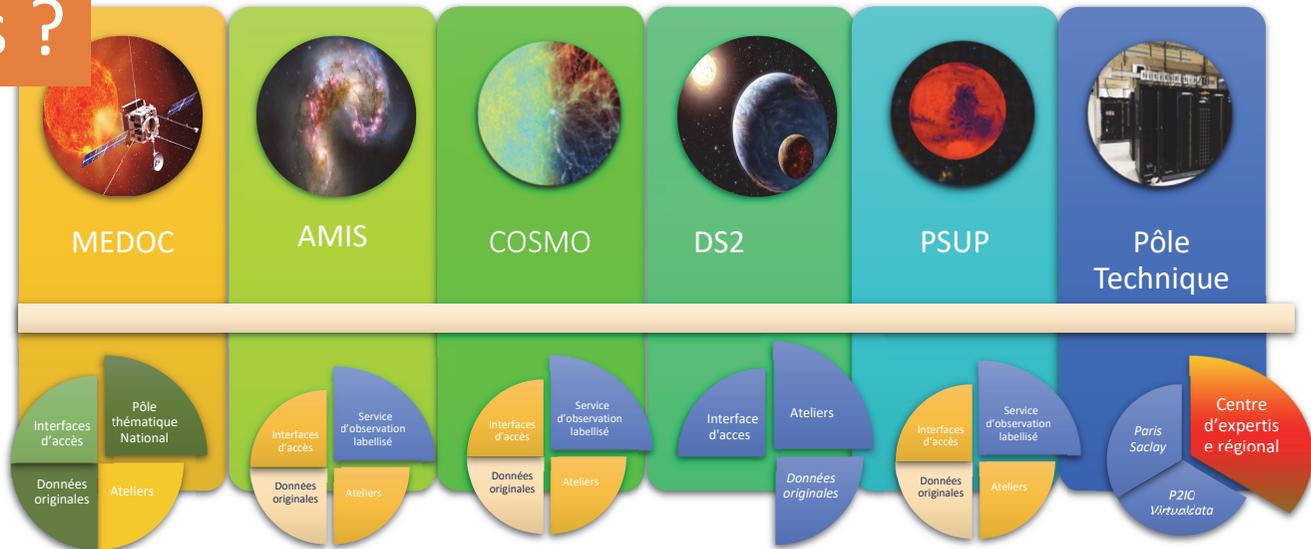
Positive factors

- ✓ Available skills
- ✓ IDOC organization
  - • Steering Committee
  - • User Committee
- ✓ Integration into OSUPS and Université Paris Saclay
- ✓ Active participation in the regional Virtualdata group
- ✓ MEDOC Convention
- ✓ Mutualization strategy
- ✓ Collaborations with other data centers
- ✓ Future IDOC projects underway

Negative factors mitigated by mutualization strategy and partnerships

- ➤ Ratio permanent posts/temporary positions (CDs, services)
- ➤ No recent recruitment on permanent posts
- ➤ Tensions in the IT labour market
- ➤ Limited support from partners beyond the life of the projects (But the data continues to live on)
- ➤ Difficulty in obtaining budgets that allow a broad structuring enabling economies of scale and technological leaps (e.g. resilient distributed storage)

Infrastructure risks ?

Digiteo

Bât 206

Bât 121

AUTHORIZED PERSONNEL ONLY

3 separate buildings, 0,3 to 3 kms away
3 independent electrical inductors
Non-seismic location, non-floodable rooms
Access security by badge
Redundant air conditioning
Infrastructure control:
- Air conditioning,
- Power consumption,
- Water leaks
- Thermal protection

Answer: IDOC machine room infrastructure

Physical network links risks

Answer : IDOC/UPsaY/RENATER Network topology

Renater Paris1 via INRA

Bât 308

Digiteo

Protection at the physical level:
- Path redundancies
- Use of dedicated fibers for indentified flows
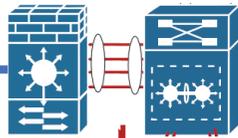
Bât 206

Bât 121

Renater Paris1

Bât 210

Renater Paris2
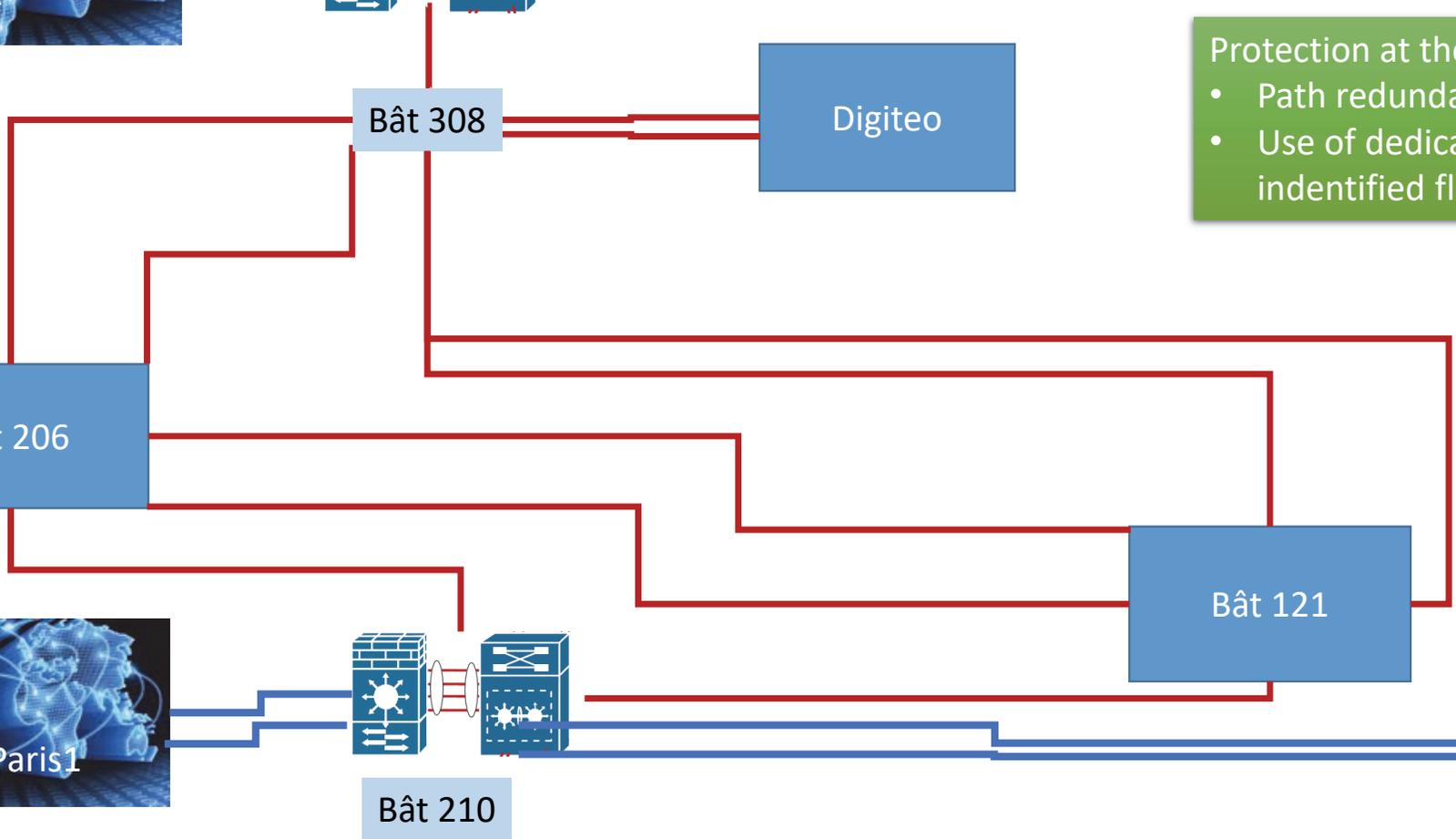
Network access risks

Answer : IDOC defense

Visitors : Independent Wifi with access registration

External ssh access via secure gateway

Instrument Calibration Platform Vlan
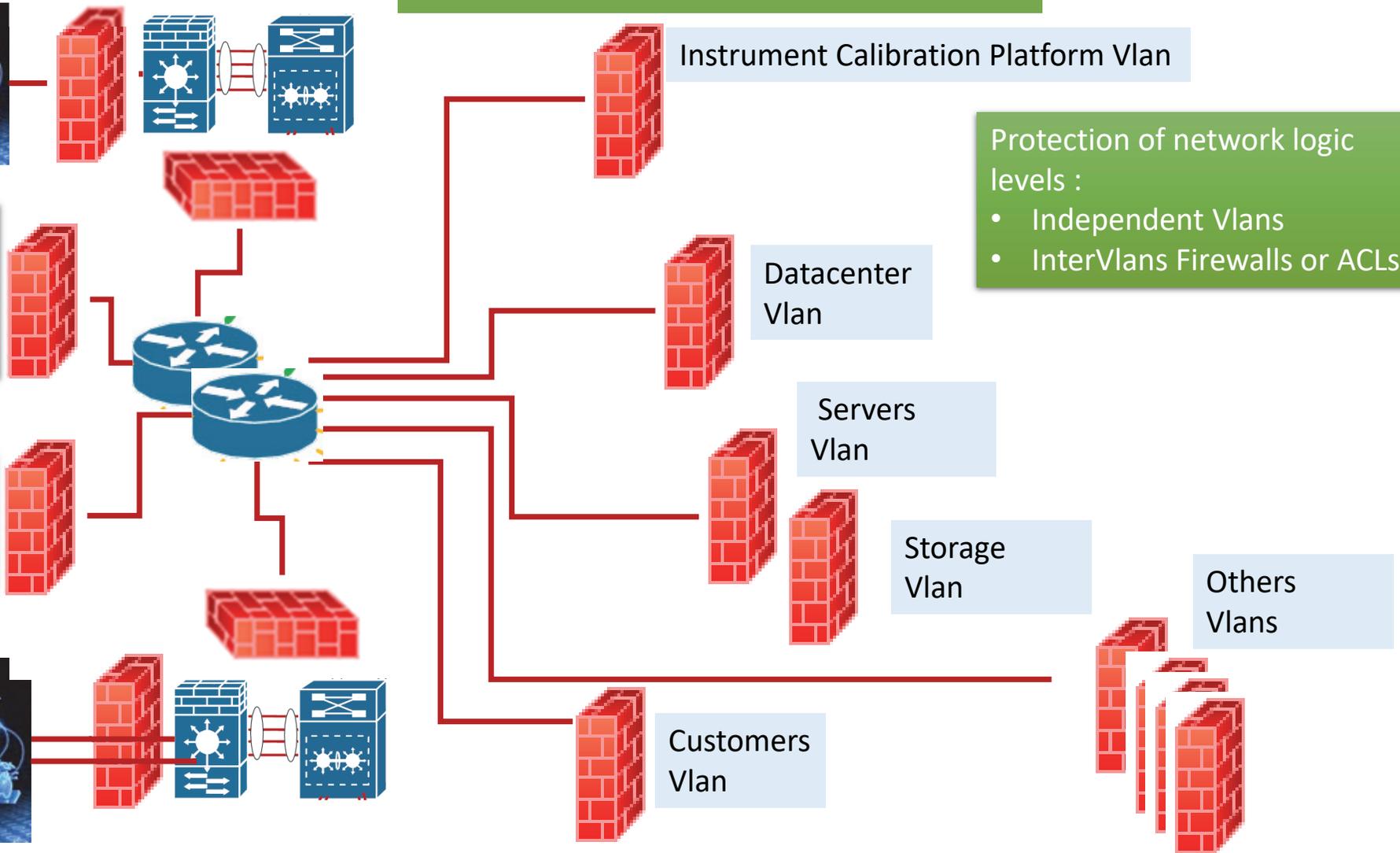
Protection of network logic levels :
- Independent Vlans
- InterVlans Firewalls or ACLs

Datacenter Vlan

Servers Vlan

Storage Vlan

Others Vlans

Customers Vlan

Procedural, People & System risks

Answer : IDOC procedures & rules

Operating System procedures
- ✓ Creation and maintenance of accounts initiated by the human resources departments of the administrative authorities.
- ✓ Centralized authentication
- ✓ Authorized resources used by identified groups
- ✓ Logfiles storage
- ✓ O/S, applications & tools updates
- ✓ Certificates

User procedures
- ✓ Initial information and moral commitment
- ✓ Relevant and measured reminders
- ✓ Antivirus, anti-spam, updates, antimalware
- ✓ Password policy

Rules for the implementation of networks and systems
- ✓ Sharing of infrastructures
- ✓ Redundancy
- ✓ Standardization of configurations
- ✓ Priority to non-proprietary systems
- ✓ Virtualization of dedicated systems by service category

# Risks related to infrastructure design

ITIL approach

Answer: IDOC Design and implementation strategy

- ✓ Kiss: Keep It Simple Stupid
- ✓ Define precisely the responsibilities/tasks of each element and impose the simplest exchanges.
- ✓ Ensure redundancy of key resources.
- ✓ Design with automation in mind.
- ✓ (cf document IDOC-OD-003 IDOC General principles applicable to project design)

Data Risks

Answer :
Data life cycle: redundancy, backup, archiving
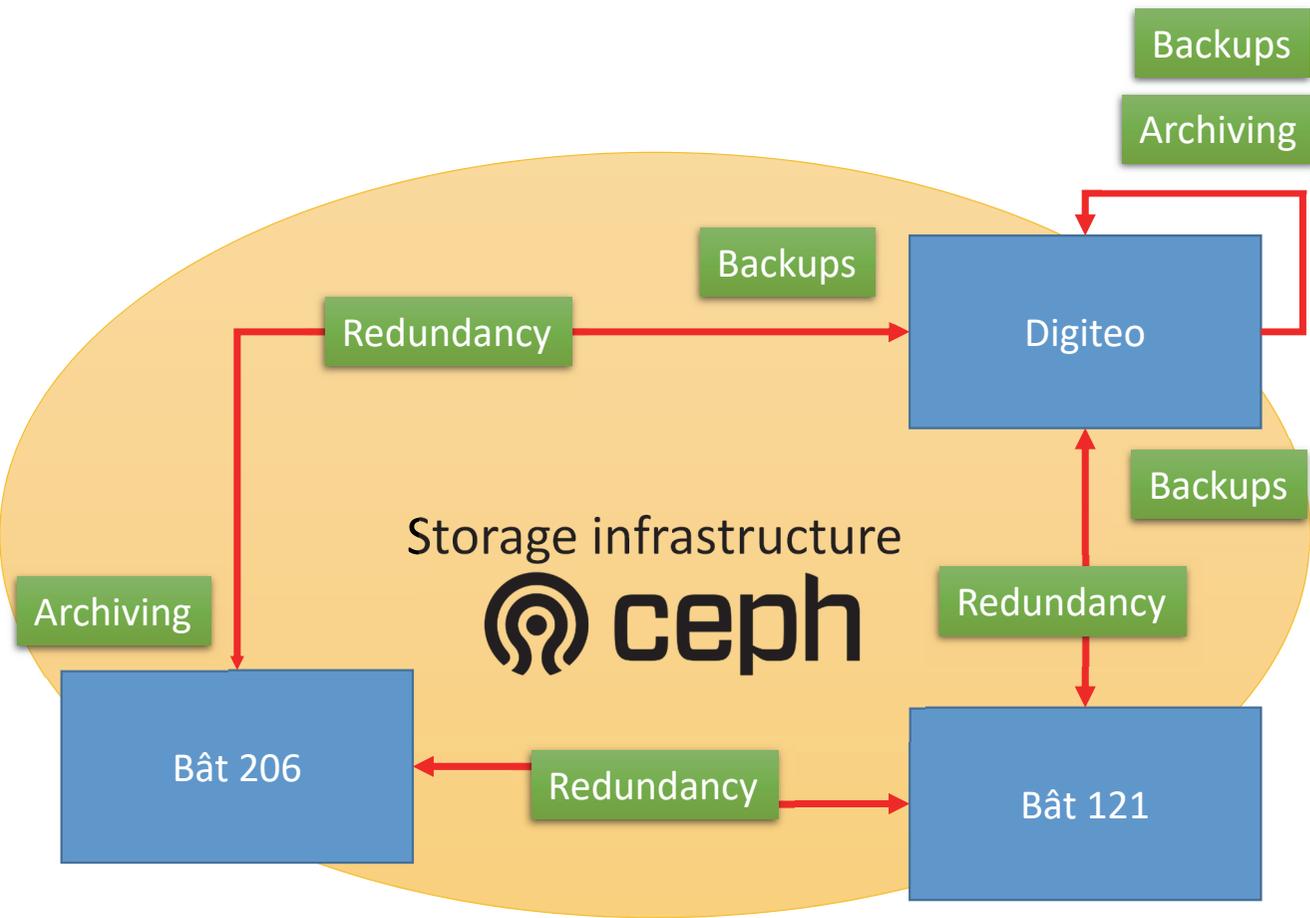
Backups

Archiving

Redundancy: can be based on two or more replicas depending on the criticality

Backups: frequency depends on the versatility of the data

Archiving: Allows to retrieve information as it was at an earlier date or year

Data transfer:
With checksum verification

Backups

Redundancy

Digiteo

Backups

Storage infrastructure
ceph

Archiving

Redundancy

Bât 206

Redundancy

Bât 121

Processing Risks

Answer : Virtualization & clustering

Snapshots

Digiteo

Redundancy

Virtualization infrastructure

PROXMOX

Redundancy

Bât 206

Redundancy

Bât 121
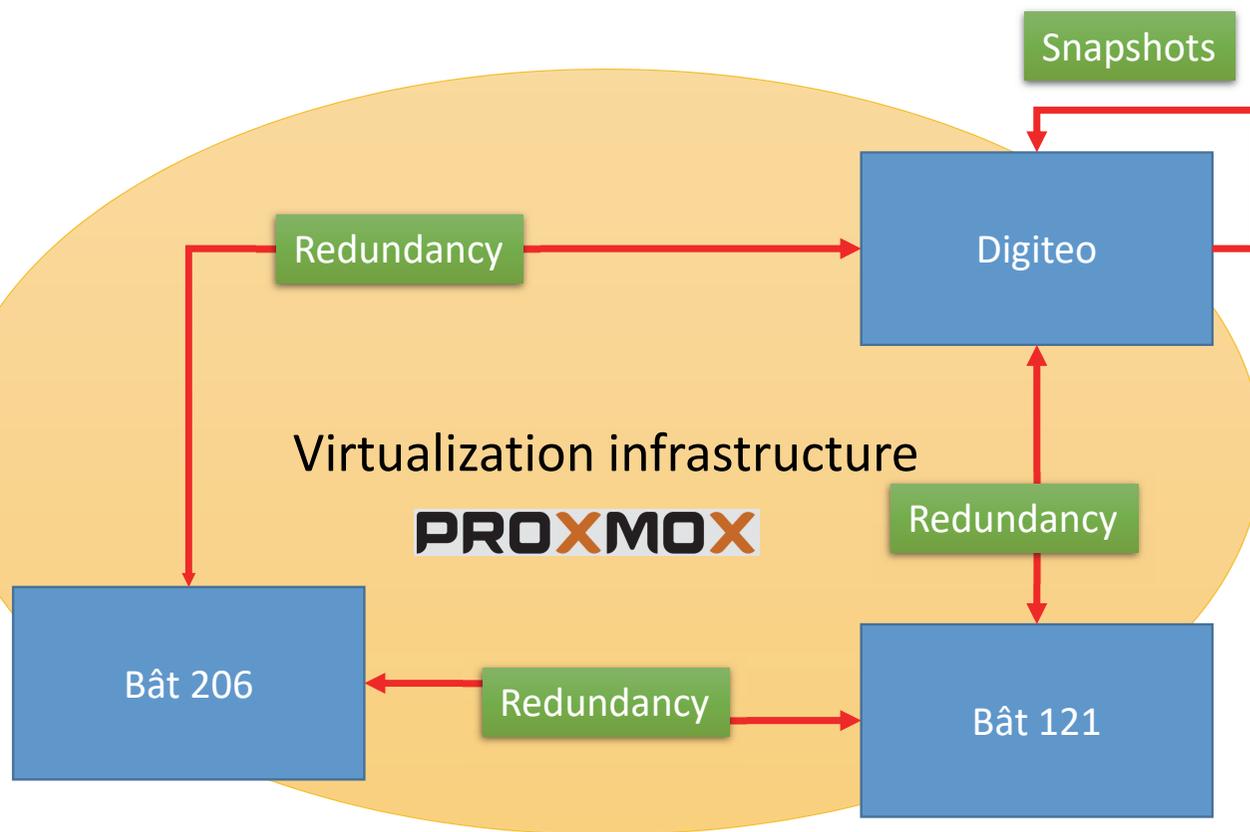
9 nodes High Availability Cluster

Stable and reliable HA service

Snapshots policy

Software design & development risks

Answer : IDOC methodology and tools

IDOC Software design
- ✓ Identification of needs
- ✓ Identification of user targets
- ✓ Identification of roles and responsibilities

IDOC Support tools
- ✓ Development methodology (V-Cycle + Agile)
- ✓ Project management tool (redmine)
- ✓ Configuration management tools (cfengine)
- ✓ Development assistance tools (eclipse)
- ✓ Document management and sharing tool (redmine,gitlab)
- ✓ Unit, global, non-regression unit tests (gitlab)
- ✓ Quality analysis (gitlab-ci, Jenkins)
- ✓ Continuous integration (Sonarqube)
- ✓ Artifact repository (Nexus)

Reminder of the essential elements
- ✓ Kiss: Keep It Simple Stupid
- ✓ Define precisely the responsibilities/tasks of each element and impose the simplest exchanges.
- ✓ Modular design by limiting dependencies
- ✓ Design with automation in mind.

(cf document IDOC-OD-003 IDOC General principles applicable to project design)

Operational risks

Answer : IDOC monitoring and control

IDOC Control and incident action strategy
- ✓ Main incident interface
- ✓ Monitoring by adapted tools of all structuring elements
- ✓ Alarms that can be relayed by messaging and SMS
- ✓ Ticket tool for users
- ✓ Automatic incident recovery scripts
- ✓ Wiki for describing configuration choices
- ✓ Description in the wiki of the incidents listed, their qualification and applicable measures.
- ✓ Information wikis for customers.

Risks related to the maintenance of the Information System

Answer: Internal documentation for tech. team

Risks related to operations

Answer: Incident sheets: example:

...

Guide de survie Ceph

Le système de fichiers distribué Ceph est utilisé à l'IAS pour héberger les données suivantes :

- ** Les données utilisateurs /homeLes données utilisateurs /home* Les données utilisateurs /homeLes données utilisateurs /home
- ** Les images qemu des VMs de l'infrastructure ProxmoxLes images qemu des VMs de l'infrastructure Proxmox* Les images qemu des VMs de l'infrastructure Proxmox
- ** Les données de l'archive HelioviewerLes données de l'archive Helioviewer* Les données de l'archive HelioviewerLes données de l'archive Helioviewer
- ** Les données partagées du cluster de calculLes données partagées du cluster de calcul* Les données partagées du cluster de calculLes données partagées du cluster de calcul

D'une manière générale, tous les pools rbd sont créés en **replicat 3**. Lorsque les serveurs sont répartis sur les 3 batiments (121, 206 et 660), les crush map sont configurées de façon à placer un réplica d'un même pg dans chaque bâtiment.

A chaque opération planifiée qui nécessite un arrêt des services OSDs (disques où sont stockées les données répliquées par placement groups [pgs]), il faut prendre soin de mettre le **cluster en mode maintenance** :

```
$ sudo ceph osd set noout9 dont :
* 3 MON R640
* 6 OSD R740XD
```

Une fois les opérations de maintenance terminées, il faut désactiver le mode maintenance par

```
$ sudo ceph osd unset noout
```

Clusters Ceph à l'IAS

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Edit

pg en statut "inconsistent"

Survient de temps en temps suite à des opérations de scrubbing et se répare très facilement avec la commande

```
pg repair
```

Exemple détaillé :

```
# ceph health detail
HEALTH_ERR 1 scrub errors; Possible data damage: 1 pg inconsistent
OSD_SCRUB_ERRORS 1 scrub errors
PG_DAMAGED Possible data damage: 1 pg inconsistent
    pg 9.2f7 is active+clean+inconsistent, acting [91,102,63]
```

Pour voir la liste des objets en état "inconsistent" :

```
# rados list-inconsistent-obj 9.2f7
```

Pour réparer le pg défectueux :

```
# ceph pg repair 9.2f7
instructing pg 9.2f7 on osd.91 to repair

# ceph health detail
HEALTH_ERR 1 scrub errors; Possible data damage: 1 pg inconsistent, 1 pg repair
OSD_SCRUB_ERRORS 1 scrub errors
PG_DAMAGED Possible data damage: 1 pg inconsistent, 1 pg repair
    pg 9.2f7 is active+clean+scrubbing+deep+inconsistent+repair, acting [91,102,63]
```

au bout de quelques secondes :

Technological risks

Answer: Technology monitoring, modeling, infrastructure migration

IDOC Technology watch
- ✓ Shared through collaborations
- ✓ Active participation in competence/expertise networks
- ✓ Identification of future hard points
- ✓ Participation in the definition of the evolution of the generic tools used (e. g. Sitools/Regards)
- ✓ Monitoring the evolution of norms and standards (and their integration into the tools used)

IDOC Design and implementation strategy
- ✓ Kiss: Keep It Simple Stupid
- ✓ Define precisely the responsibilities/tasks of each element and enforce the simplest exchanges.
- ✓ Ensure redundancy of key resources.
- ✓ Design with automation in mind.

IDOC technology exploration
- ✓ Modeling of the solutions envisaged
- ✓ Sharing with interested collaborations
- ✓ Choice of solution
- ✓ Search for funding for scaling up

IDOC deployment of new technology
- ✓ Ensure the continuity of services
- ✓ Ensure minimal disruption of services
- ✓ Retreat strategies
- ✓ Integration into the control and activation environment

ITIL approach