

## DEPLOYMENT OF THE CONSOLIDATION SYSTEM OF DONNEES DANS UNE ADMINISTRATION AERONAUTIQUE: APPLICATION OF A LA RVA/VILLE DE KANANGA AND REPUBLIQUE DEMOCRATIQUE DU CONGO

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**Abstract:** *This article examines the technical specifications of the Aeronautique Administration of the Régie des Voies aériennes of the Ville de Kananga and Republic of Democratic Republic of Congo in the gestion and the consolidation of the aeronautique données, as well as the possible solutions for remédier. We present different types of system development processes, including the availability of aspects of techniques, organizations and operations in the context. Finally, the study proposes an analysis of the resulting results after the mise in the donation consolidation system, which is consistent with the lumière of advanced and existing events.*

**Keywords:** donation consolidation, consolidation techniques, aeronautical administration, web application

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### INTRODUCTION

With more and more resources on the number and centralization of donation, the aeronautical administrations continue to improve to respond to security risks, performance and operational efficiency. The Republic of Democratic Republic of Congo (RDC), as the nation develops, is not in this position, in particular in the aviation sector in the region and rapidly developing its donation, an important capital for its security and fluidity. operations.

In this context, it will focus on the development of the donation consolidation system at the Aeronautical Administration in the Kananga area, located in the RDC. This city, located in the national transport center in the central part of the pays, provides a suitable terrain for the implementation of modern outlets of the aeronautical donnés.

The main objective of this city is an analysis of advanced technology and auxiliary devices that confronts the RVA Ville de Kananga in the collection, treatment and performance of

aeronautical donations, as long as it proposes a viable solution and is effective in its form. A donation consolidation system. In the end, you can find a view to estimate the advanced advances that this solution pours into your security terms, resources, and process optimization.

In this application method, you can explore different types of development of the system, including the following techniques, organizations and financial institutions in this process. Indeed, it is easy on the Donnés empires and these cases, it offers practical recommendations for the mise of the Donné consolidation system at this time of administration.

This option will also help you to contribute to the family to continue donation practices in the Aeronautical domain in RDC, tout the pistes of reflexion and outils of concrete in order to enforce the operating efficiency and security at home. sein de la RVA Ville de Kananga.

### I. Travaux Connectes

1. Home Web applications on virtual levels, optimizing the availability of resources and ensuring a high availability.
2. **DEPOERES, F.**, Consolidation of données environnementales: Enjeux et pratiques. Crises and new problems, Nice, May 2010. This article will impact the donation consolidation to support enterprise reporting and contribute to the development of pratique environmental issues.
3. **Helena Hadjipavlou** , Big Data, Surveillance and Confidence: the question of transportation in the airport. This will focus on the analysis of the impact of surveillance technologies based on Big Data in airport environments, especially in that which concerns the privacy of individual users in these systems. The driver provided an evaluation of the effectiveness of basic surveillance systems on Big Data in detection and effective menace prevention.
4. **Kaffa Jackou Rakiatou Christelle** « *Contribution to the operation of the Aéroportuaire: Modification and optimization* . The driver pays a contribution method to the receipt of resources mises in the airports to ensure the security of the passagers.

Combining these different perspectives and adapting other specifications of the aeronautical administration of the RVA/Ville de Kananga, we would like to contribute to the development of a complete and innovative solution for the development of the donation consolidation system in an aeronautical environment. and constant evolution.

## RESEARCH METHODOLOGY

To learn more, we all use the following methods:

- Comparative Method: Compare different contexts or situations to analyze differences and similarities;
- Descriptive method: This method consists of a cartographer on a specific aspect. It is quantitative and based on the studios;
- The terrain search: We are aided by an observer of direct terrain on the terrain in order to compare practical paths and surrounding areas in a high-altitude environment.

- The unified process: Methods for developing the logiciels. This feature will appear in an iterative and incremental way
- Donn e Entry: Consolidation Technique used to centralize donn e issues from hidden sources

## IMPACT DES APPLICATIONS WEB DANS UNE AERONAUTIQUE

The web applications are designed to be sent to the Aeronautical Administration. There are a variety of applications available in the aeronautical network. For example, WePub is a web application that allows organizations to deliver aeronautical information to produce automated aeronautical publications.

Digitalisation is available in the aviation network, augmenting the complexity of all systems. For example, NASA has been working with the Federal Aviation Administration for more than 25 years to develop technologies for drone traffic (FAA, 2024).

The Web applications use the latest information systems. Exposition on the Internet of these applications continues in new forms of menaces that may occur in the security of the information system. ( Abdelhamid MAKIOU (2016, p.10)

The web applications may not be able to connect to the server, and the users will be able to download the latest version. It's not necessary to install the installer because it means: The web applications can be used directly on the web.

A multiplate format that allows collaboration between users ( Jo lle, D et Cazes , A: 2016, p.92) : Web applications can be used on all device types: ordinateur, smartphone, tablette. If they are responsive, they allow users not to use the mother terminal or the mother system exploring the travail ensemble at certain times on a mother document or project.

These web applications present advanced numbers, especially in a h t rog ne environment:

- ✓ **Experiencing user experience** : Great for an active conception, it is more facile and moins cher to rendre a Web system convivial on more plates-forms and different tailles d' cran.
- ✓ **Flexible access** : Employees may be able to import or have access to the Internet.
- ✓ **Client security connection** : Clients have impressions on a modern Web portal and the client service is better in the automated process.
- ✓ **Configuration facile** : It takes a few minutes to configure a new user; Provide one URL, one username and one most of the pass and their parts.
- ✓ **Toujours to the day** : Start all the days accessed to the main version of the application on the Web via a URL, it also accesses toujours to the latest version of the logiciel.
- ✓ **Augmentation of the storage** : If the cloud connection, the storage space is pratiquement infini.

Please note that other inconveniences must be included in the account:

- ✓ **Dependence on the Internet** : If 4G Internet access and Wi-Fi are available on any endpoint, if you connect to the connection, you cannot access your Web application.
- ✓ **Security** : When a number of professionals peuvent penser que les Web applications sont security, il ya toujours des risques associés à l'utilisation d'Internet. In a hot environment, the advanced principles are the simplification of the gesture on the system. The process in all the systems, as long as the manipulation is simple. Moreover, the succès of the hybrid cloud plateforms expand the notification by the position of the applications on the better endroit, the migration of the public cloud and the storage donation.

### **IMPACT OF THE CONSOLIDATION OF DONNEES DANS AERONAUTIQUE**

The donation consolidation is the process used by enterprises to create a donation registration. Base, after examining the connaissances that historical information is transmitted to orient future decisions, commercial operations, etc.

The consolidation of données is a crucial process for all enterprises or organizations to improve the performance of these operations.

- The donation consolidation allows you to operate a more convenient view and complete the organization donation. In combination with proven donations of different sources, we have a clearer vision of the situation, which is essential to prendre these clear decisions.
- Outside, the donation consolidation allows the operating efficiency to reduce the redundances and eliminate the effective errors. The données are centrally located, on the doublons and on guaranteeing that all the information is there and there.
- The donation consolidation ouvre the voice in the artificial intelligence application for predictive analysis and the prize of automated decisions. If consolidation données are exploited, it is possible to identify tendencies, prevent future diseases and find a place in the alarm system to detect powerful anomalies. (Aster.Com).

However, the donation consolidation is not safe. It can be difficult to assemble the installed donnés of disparate systems and the integrator of many other components. Moreover, it is necessary to guarantee the security and confidentiality of the données. These techniques are used to consolidate the donation:

- ETL ( **Extraire, Transformer, Load**)
- Virtualisation ;
- Enter the donation

The donation consolidation is an essential aspect of the donation gesture in a high-altitude environment. The choice of the consolidation technique depends on the number of factors, and includes the specific exigences of the organization, the nature of the donation, the contraintes of the temps and the budget, and the available compétences. It is important for organizations to comply with advances and inconveniences of chaque technique to make a choice easier.(GIORDANO, A: 2011, p.91)

## **Specification of these items**

### **1. Besoins fonctions**

- ✓ Collect donations at real times;
- ✓ Integration of healthy donnés;
- ✓ Networking and quality of données;
- ✓ Analyze and report operations;
- ✓ Gestion of performances;
- ✓ Security of donation;
- ✓ Interoperability of systems;
- ✓ Planning of operating operations;
- ✓ Suivi of the correct conformity ;
- ✓ Maintenance preventive and active activities.

### **2. Besoins operationsnels**

- ✓ Disability and system fiabilité;
- ✓ Performance optimal;
- ✓ Evolutibilité;
- ✓ Gestion of incidents and maintenance;
- ✓ Security of données and correct conformation;
- ✓ Sauvegarde and recuperation of données;
- ✓ Formation and support utilisateurs.

### **3. Contraintes techniques**

- ✓ Volume of données massifs;
- ✓ Varieties of donation sources;
- ✓ Complexity of relations between donations;
- ✓ Existences of performances at real times;
- ✓ Security and confidentiality of donations;
- ✓ Interoperability with existing systems;
- ✓ Tolerance aux pannes and reprise on sinistre

Previously, the management of the RVA/Kananga Aeronautique could monitor the development of the consolidation system that donates many fluids and configurations of the exits, as a contribution to the improvement of operations in this sector.

## **Choose the application or donation consolidation technique**

If you want to choose the best donation consolidation technique for a high-quality environment, more facts will be calculated. Compatibility with different donné formats, integration facilitation with existing systems, scalability and donné security are often crucial.

From this screen, we use our technology to develop the donation technique. In effect, the donné entrepôt is essential for the consolidation of the données of the car, it allows the centraliser, intégrer, d'historiser and analyzer of the données of manière efficiency, that can facilitate the prize of the exact decisions at this time. l'organisation. The entry of the données is essential for the consolidation of the données of the car, it allows the centraliser, intégrer, historiser and analyzer of the données of manière efficiency, that can facilitate the prize of the precise resolutions in the organization. .

### **Development of the Consolidation Solution**

From the conception of the information system, the modification of the données consists of an analyzer and conceals the information content in the system. It allows you to replace the structure of this information and the structure of the storage and other informational characteristics. (

### **Model PROV (Provenance Data Model)**

The model PROV (Provenance Model) is a model of données used to représenter and generate the provenance of données, it is the origin, the history and sub-transformations of données at fil du temps. It provides a frame to capture devices that create the entire sense of activity and process that connects to the creation of a particulate device. The PROV mode allows you to respond to questions such as “How many people don’t do this?”, “What are the modifications?”, “How many modifications are there?” and “What are the applicable processes?” ( Ministry of French Culture and Communication: 2015)

#### **1. Sources of main données:**

- ✓ Download the volume\_: Information on the volume, including details, arrivals, retards, annulations, etc.
- ✓ Données météorologiques\_: Informations sur le météorologiques conditions à dives, endroits and altitudes.
- ✓ Air traffic data\_: Information about the air traffic at real times, including various trajectories, air routes, etc.
- ✓ Données of aéronefs\_: Informations on les aircraft, and compris les caractéristiques techniques, les performances, les maintenance effects, etc.
- ✓ Données des passages\_: Informations sur les passagers, y compris les réservations, les lists d'embarquement, etc.

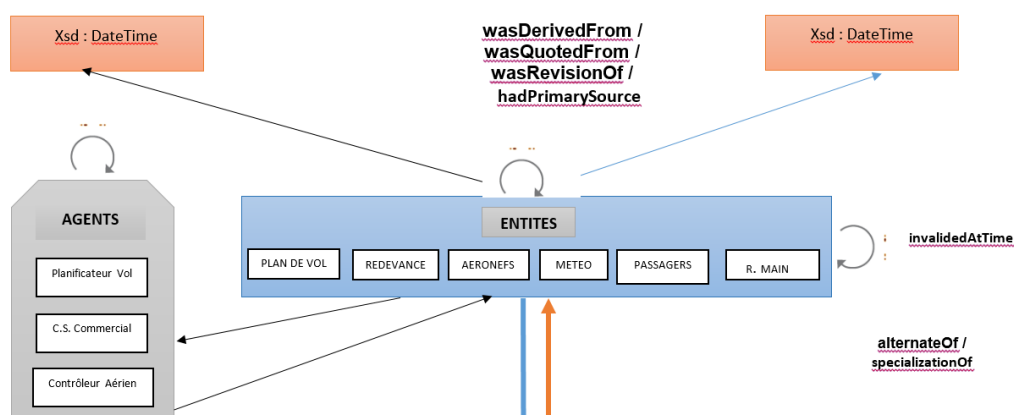
#### **2. Process implementations:**

- ✓ Planning of volumes\_: Process of planning the itineraires, the volume hours, the capacity of the aircraft, etc.
- ✓ Gestion of operations\_: Processing of operations at real times, including the surveillance of météorological conditions, the operation of air traffic, the communication with equipment, etc.
- ✓ Maintenance of aircraft\_: Maintenance and repair of aircraft to ensure navigation.
- ✓ Gestion of passagers\_: Process of gestion of servations, of the barquement of passagers, of the gestion of bagages, etc

### 3. Example of the PROV model:

- **Activity** : Flight plan
  - Agent: Flight Planner
  - Entities used: Don't have any physical data, don't have any traffic
  - Entité generation: Flight Plan
  - Debut time: 08:00
  - Final hour: 09:30
- **Activity** : followed by royalties
  - Agent: Charge the commercial service
  - Entities: Plan the volume, don't have any traffic
  - Entité generation: Royalties
  - Debut time: 09:30
  - Final hour: 10:30
- **Activity** : Gestion of operations of vol
  - Agent: Control the area
  - Entities: Plan the volume, don't have any traffic
  - Entité generation: Rapport d'operations de vol
  - Debut time: 10:00
  - Final hour: 12:00
- **Activity** : Avion maintenance
  - Agent: Maintenance engineer
  - Entité utilisée: Données des aéronefs
  - Entité: Apply for maintenance
  - Debut time: 14:00
  - Final hour: 16:00
- **Activity** : Guide to passages in a volume
  - Agent: Agent d'embarquement
  - Entité utilisée: Données des passagers
  - Entité generation: List d'embarquement
  - Debut time: 17:00
  - Final hour: 18:30

Figure 3.1: Model PROV.O

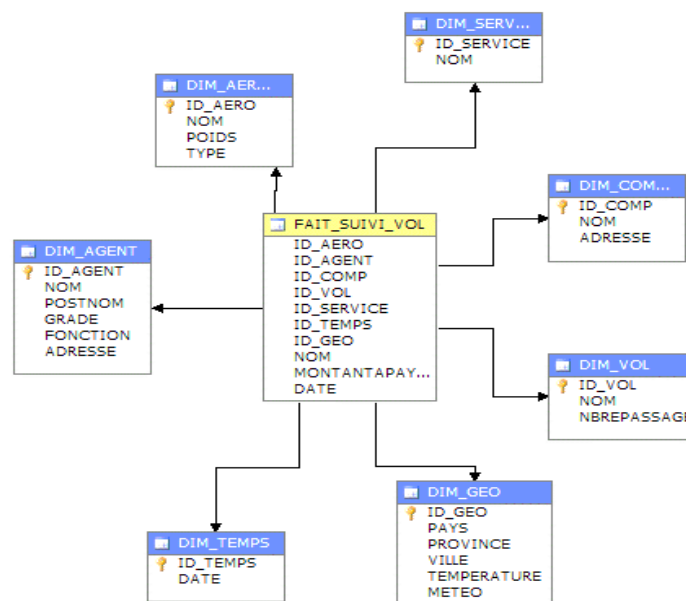


Source: Elaborate with us.

This model allows you to support the proven data.

Cube of données suivant the model into the bathroom

Figure 2. The cube of data that fits the model into the toilet



Source: Created by us.

The cube of données brings a crucial rôle in the gestion and analysis of the donnés' effectiveness au sein d'un entrepôt de données, en off a multi-dimensionnelle view, améliorées performances and a facilité d'utilisation for the fine utilisateurs.

The PROV model allows you to secure the donné provenance, tandis que the donné entrepôts sont the central storage systems for analysis and the decision decision.



Ensemble, the PROV model and a donné entrepôt peuvent être utilisés to provide the provenance of the données stockées in the entrepôt, that allows these to include the fidelity, the quality and the utilité for the various analyses. Intégrant la capture of the provenance of the données in the entrepôt lui-meme, on peut faciliter the audit of the données, better the traçabilité and the transparence, and guaranteeing a better availability of the données.

### **Model by incrément and Algorithme d'incrémental apprentissage**

Comm.e pou r toute s le s fabrications , i l es t import t d'avoi r u n procédé d e fabrication d u logicie l bie n define me e t explicitemen t Decri t e t documenté .

The incremental application (austic connection or in online/online learning) is the process due to the fact that an entry is accrued to these connaissances at a certain time, at some time when it is used. ( Vinh, N.Xuan., Epps, J., Bailey, J: 2009)

An incremental application algorithm can be executed in the following steps:

1. Learn rules from learning database data;
2. Stocker new years and more examples of older people;
3. Utilize the screens to display and navigate;
4. When new examples arrive, apprendre new records in use in new records and new instances;
5. Pass to the tape 2.

### **Incremental algorithm in different phases:**

```
Pour new models in the class C faire
  This class C is in phase 1 also
    Appel the algorithm for creating prototypes
    including;
    Appel the algorithm adjustment;
    There are several examples of class in others
    Basculer in phase 2
  Finsi
Finsi
This class C is in phase 2 also
  Appel the algorithm adjustment;
  This is mal-classé alors
  nbErr[C] ++;
  Si Err S alors
  Appel the algorithm for creating prototypes;
  nbErr[C] = 0;
  Finsi
  Finsi
  Finsi
Finpour
Fin
```

This algorithm is an iterative process that, like new examples, comes with a classification model that uses algorithms to create prototypes and adapt. It uses a mechanism to detect and correct classification errors.

**Example 1: Algorithm iteration of aeronautical redevelopments:**

```

Fonction calculerRedevance(aeronef):
redv := 0
For the type of service in the aeronef:
This service is attributable to others
redv := redv + calculerRedevanceAtterrissage(aeronef)
Sinon si service est stationnement alors
redv := redv + calculerRedevanceStationnement(aeronef)
Fin Si
//Ajoutez d'autres de services si necessary
Fin Pour
Retourner redv
aeronef := DonneesAeronef()
redevanceTotale := calculerRedevance(aeronef)
Afficher "The total redevelopment for the a ronef est:", redevancementTotal
FinFunction

```

This algorithm supposes that we have a set of donn es of aeronautical transactions with characteristics (par exemple, type of flight, parcours distance, etc.) and corresponding aeronautical redevelopments. He uses a mist when he is on the line (also called Stochastic Gradient Descent), or the poids and the biais will be there after the transaction

```

//Initialize the Weights (w) and the bias (b) of the linear
regression
w = 0
b = 0
// Each epoch
For i=1 to n
// Each aeronautical transaction as a whole
For j = 1 to n
// Obtain the actual characters of the transaction and the
redevelopment
Show "Enter transaction"
Read x
Show"Saysir royalty"
Read there
// Predict the royalty
y_pred = w or b
y_pred = (w*x) + b
//Calculator error of prediction
e = y - y_pred

```

```
//Update weights and biases using prediction error and a
learning rate
w = (w + tx) * (e * w)
b = (b + tx) * e
```

### Choice of political security in the consolidation and donation traçabilité.

In a donné entrepôt, the donné traçabilité is essential to guarantee the intégrité, the fiabilité and the quality of the données. If we are concerned, we will choose from the following algorithms:

1. The combination of algorithm Change Data Capture (CDC) and Data Tagging (DT) can offer a native translation in a donné entrepôt
2. Algorithm of the RSA symbology that specifies the information when encrypting the storage donation, transmission and use, so as to protect sensitive information against non-automated access.

Combination of Algorithm CDC et DT
------------------------------------

```

...
1. Fonction CapturerModificationDonnées():
2. What is true:
   données_modifiées = SurveillanceModifications()
   For the question donnée_modifiée in
   données_modifiées:
       EnregistrerModification(donnée_modifiée)
       EtiqueterDonnée(donnée_modifiée)
3. Fonction SurveillanceModifications():
4. données_modifiées = []
5. For each donation in the données_aéronautiques:
   Si donnée_modifiée:
       Ajouter donnée to données_modifiées
6. Retourner données_modifiées
7. Fonction EnregistrerModification(donnée_modifiée):
8. journal_enregistrement.ajouter(donnée_modifiée)

9. Fonction EtiqueterDonnée(donnée_modifiée):
10. tags = ExtraireTags(donnée_modifiée)
11. MettreÀJourTags(donnée_modifiée, tags)
12. Fonction ExtraireTags(donnée_modifiée):
13. tags = Algorithme_D'etiquetage(donnée_modifiée)
14. Retourner tags
15. Fonction MettreÀJourTags(donnée_modifiée, tags):
16. données_aéronautiques[donnée_modifiée].ajouter_tags
   (tags)

```

This pseudo-code:

- ✓ The function `CapturerModificationDonnées` is the entry point to view modifications of aeronautical données continuously. For the purpose of detecting the modification,

please register the modification in a journal and add the techniques to the modification mode.

- ✓ The function `SurveillanceModifications` verifies the aeronautical donnages to detect modifications and receive a list of modified donnés.
- ✓ The function `EnregistrerModification` registers the modification detected in a journal.
- ✓ The function `Etiqueter Donnée` extrait les étiquettes appropriées pour la donnée modifiée et les met à jour.
- ✓ The functions `ExtraireTags` and `MetreÀJourTags` are responsible for extraction and misuse of their respective techniques.

Please provide a surveillance app at certain times of aeronautical donnages, include modifications and implement techniques to facilitate the gestion and analysis of the environment.

### 3. RSA asymmetric encryption algorithm

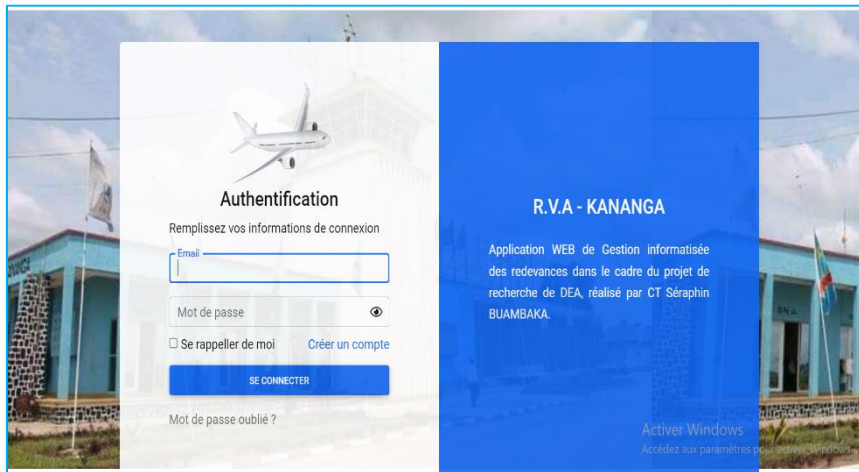
```

1. ALGORITHM GeneraterSAKeys
2. ENTER: None
3. OUTPUT: public_key (n, e), private_key (d, n)
4. FUNCTION CalculateMMI(e, m)
5. RETURN d
6. END FUNCTION
7. FUNCTION ChefrerRSA(message, click_public)
8. RETURN encrypted_message
9. END FUNCTION
10. FUNCTION DecryptRSA(encrypted_message, private_click)
11. // Use the RSA algorithm to view the message and send it
    privately.
12. // Example: encrypted_message = encrypted_message^d % n
13. // (Implementation is used in operations on large numbers)
14. // ...
15. RETURN decrypted_message
16. END FUNCTION
17. FUNCTION Main
18. // Generation of keys
19. p, q = GenerationNumbersFirst()
20. n = p * q
21. m = (p - 1) * (q - 1)
22. e = ChoiceExpositor(m)
23. d = CalculateMMI(e, m)
24. public_click = (n, e)
25. private_key = (d, n)
26. // Example of use
27. message = "Confidential data"
28. encrypted_message = ChefrerRSA(message, public_key)
29. decrypted_message = DecryptRSA(encrypted_message,
    private_click)
30. SHOW "Encrypted message: " + encrypted_message
31. SHOW "Decrypted message: " + decrypted_message
32. END FUNCTION

```

### 3. Presentation of the interfaces

#### 1. Authentication interface



#### 2. General Menu Interface



### CONCLUSION

The modernization of the flow of aeronautical information is the best for sector organisations. From the special place of the Régie des Voies Aériennes (RVA) to Kananga, the consolidation of données with reasonable advances.

The web application is located on the RVA Kananga website and includes other essential objects:

1. **Optimization of operations** : Once applied, the RVA can make more efficient flow of information in volumes, passages and equipment. The consolidation of données allows the centraliser and synchronizer of the information, as well as the errors and doublons.
2. **Security protection** : The web application facilitates the surveillance of people and aviation activities. It allows you to detect rapid anomalies. The consolidation of données guarantees a clear view at a reasonable time and at different times.
3. **Accessibility** : The web applications are not accessible due to the fact that they cannot be connected to the Internet. The agents of the RVA in Kananga can access all the information they need to know.
4. **Reduction of covers** : Consolidation of données allows redundances and information. This can be achieved with a better operating efficiency and a reduction in coats.

The consolidation of données is a necessary step to modernize the aeronautical administration. The RVA Kananga will continue to invest in these technologies to improve their performances and compete.

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