National School of Management

GOVERNANCE OF INFORMATION SYSTEMS

COURSE MATERIAL
AND PRACTICAL CASES

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About the Course Material

This course support and practical cases on the governance of information systems has been produced based on the books and articles cited in the bibliography, on certain documents and white papers available on the internet as well as on the master's end of studies projects (case study) led by students supervised by the author. Images whose source is not mentioned are freely available on the net and widely used in several sites which makes the initial source difficult to detect

This course material is intended for students of management sciences and commercial sciences and any professional involved in the management of IT services or projects and IT processes.

Support Summary:

Author of the support

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- Research officer and then project evaluator (for 13 years) at the Deputy General Management in charge of information systems of the CNEP-Banque
- HDR lecturer at ENSM
- Head of the Master in Strategic Management of Information Systems
- President of the CFD economic intelligence and information systems
- In charge of the modules:

    - Information system in the organization
    - Information and decision support systems
    - Business Process Management
    - Mapping and urbanization of information systems
    - Governance of information systems

COURSE N°1: INTRODUCTION TO GOVERNANCE

Leading and developing the organization's most important asset now requires the implementation of a real governance system, which must not only be effective but also in perfect harmony with the organization's overall governance system and in agreement with stakeholders. This governance system is composed, among other things, of means of management and regulation of the IS put in place in a company to achieve its strategic objectives; in other words, the main purpose of IS governance is to ensure that the IS is flexible and scalable enough to be able to respond while constantly adapting to the needs of internal and external stakeholders

Section 1: Governance

Although governance and government have the same root; the former refers to the art and manner of governing, while the latter refers to the institution that directs and controls a system. According to (Drucker, 1983), to be successful, the governance of a company must have a good foundation on five pillars which are: setting objectives, organizing work, motivating and communicating, measuring performance and training employees

The first pillar leads us directly to the notion of the strategy of and therefore everything related to the external environment (take advantage of opportunities and avoid threats), the other four pillars concern the internal environment of the company and everything that must be well organized requires standardization and standardization and especially a good description (modeling). According to (Morley, 2011), business processes help achieve the company's production objectives. They require an organizational structure, i.e. organizational units and a network that connects them.

Definition of governance

For CIGREF "governance describes how a system is directed and controlled.
Thus defined, governance is the combination of steering, i.e. ensuring that today's decisions adequately prepare for tomorrow, and control, i.e. measuring the deviation from what was planned." whether it is a company, a community or a nation; Governance is the mechanism by which the various stakeholders ensure that their interests are taken into account. Where we find a system, an organization, stakeholders we can easily find "governance"

Governance of the organization

It is probably common to note that the concept of *corporate governance* was revived in the early 1990s, the objective was above all to find a way to bring the objectives of managers on value creation closer to those of shareholders but also to take into account the interests of other stakeholders (*stakeholders*).

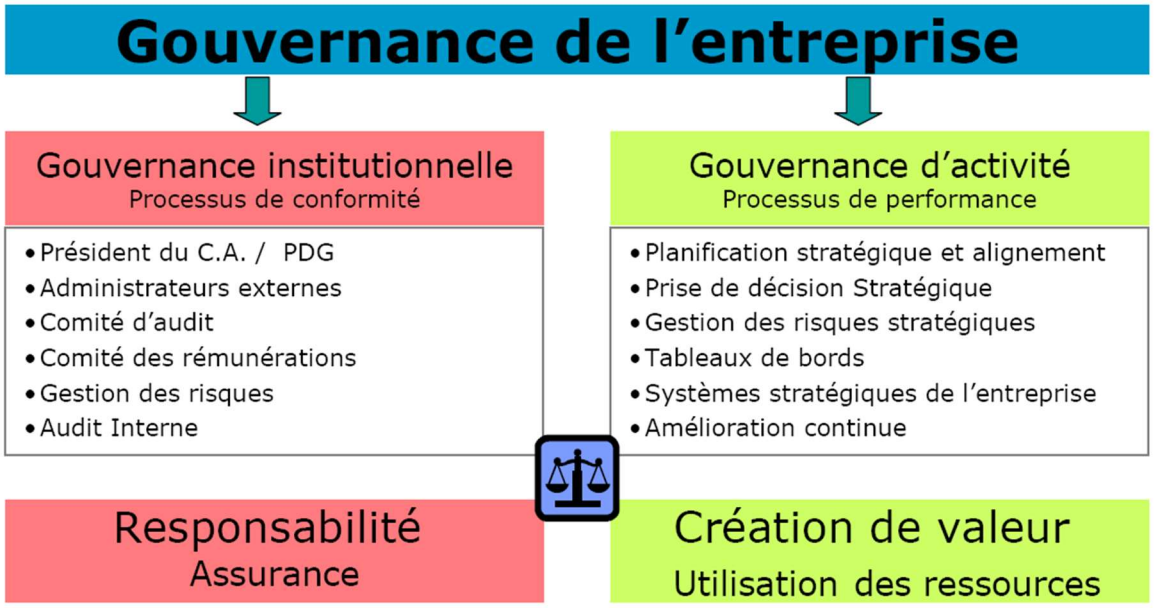


Figure n°1: Corporate governance
Source: Institute for Governance of Information Systems 2005

The literature on the subject of governance is quite plethoric Joly and Moingeon in their book "Corporate governance: theoretical and practical debates" summarized the founding sources of governance principles in the following list:

1. the Cadbury Report (1992),
2. Vienot I (1995) and II (1999) reports,
3. the OECD Guidelines, a compendium of good practices.

According to Joly and Moingeon, the main recommendations emanating from the various reports relate to:

- the missions of the Board of Directors;
- the chairmanship of the board of directors;
- the composition of the Board of Directors;
- selection of administrators;
- the number of mandates held by the directors;
- the number of reciprocal mandates held by the directors;
- the term of office of directors;
- directors' remuneration;
- ad hoc *committees*;
- the formalization of the work of the Council;
- informing directors.

Section 2: IS Governance

The IT Department

Although the concept of IT is relatively new, information systems have always been considered the beating heart of any organization's business.

Figure n°2: the IT department's jobs
Source: CIGREF

From now on, the IT department no longer endorses the organization's strategy since it develops it itself. The following table shows the evolution of the perception of the IT department within organizations from a simple service provider to a body with its own strategy and governance.

Criteria	1960s	1970s	1980s	1990s	2000s
Dominance	Production IT: centralization	Distribution	Personal computing "workstation": personalization	Networked computing "communication": rationalization	Integrated IT "commoditization": optimization
Strategic doctrine	Corporate planning	Competitive analysis	Socio-organizational approach	Process regeneration	E-business
Organizational doctrine	Administration (single technostructure)	Management (differentiation of the technostructure)	Management (multiplication of integrative points of view)	Network management (flexible organization)	Knowledge management (transforming information into knowledge and knowledge into value)
Type of organization	Hierarchical	Hierarchical	Decentralised	Dot matrix	Virtual
Management	Hierarchical	Hierarchical	Delegation	Local and functional	By project
Image of computing	Productivity	Productivity	Cost Center	Strategic	Innovation
Objectives	Automate	Automate	Reduce costs	Link IS to processes	Taking "leadership" thanks to the IS
Keywords	Enthusiasm, ignorance	Enthusiasm, ignorance	Evil necessary, Expensive, Heavy	End User, Service Desk, Usability	Competitive advantage: differentiation and globalization
Big ideas for management	Increase productivity	Increase productivity	Gain in responsiveness	Gain competitiveness	Winning through "leadership"
Big ideas for IT	Automate low-value tasks	Automate low-value tasks	Downsizing, Outsourcing	Process Redesign, Integrated Software	Mission-critical IT on a daily basis

The computer scientist	The one who knows	The one who knows	The expensive one	The one who can establish the organization /IS link	One that can help generate a competitive advantage
ICT Solutions	Mainframe	Minis, Transactional, Core Network	DBMS/R, Microcomputing, Local Area Networks	Client/server approach, ERP/SCM integration	Internet, Intranet, Extranet, SOA

Table n°1: evolution of the IT department
Source: wikiversity.org

It is therefore common to note that today the IT department necessarily knows a mode of governance explicit either it or implicit. Thus, specialists declare that it is not a question of creating the governance of the information system, but really of making it a tool for steering and improvement "Wanting to implement an approach to governance of the information system is first of all admitting that the mode of governance has an impact on the effectiveness of the information system in the short and long term".[1]

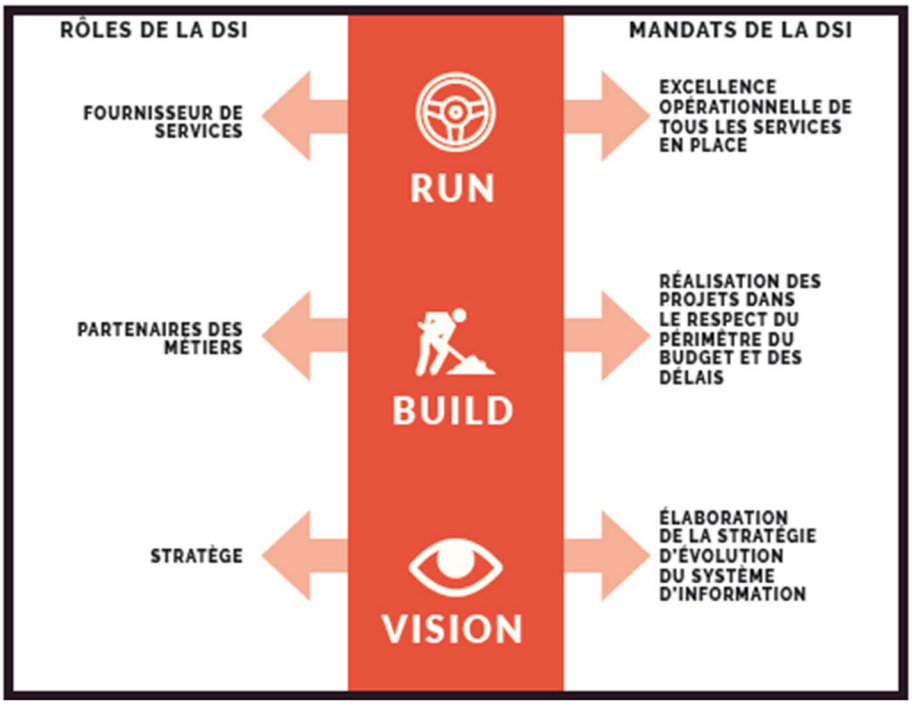


Figure 3: Roles and mandates of the IOD
Source: Audit Guide to the Governance of Information Systems in the Digital Enterprise.2°edition

Still according to CIGREF specialists; Governance must enable IT department managers to answer many fundamental questions; Including:

[1] CIGREF : IS governance

- What should be the modes of relationship between the general management and the information systems directorate?
- What should be the division of roles and responsibilities between the different departments managing and using the company's information system?
- What are the key processes of the IT department?
- How to ensure efficient use of the information system?
- What should be the mode of organization of the ISD, especially in the case of a group?
- How to increase the sustainability of the information system?
- How to reduce the risks associated with the information system?

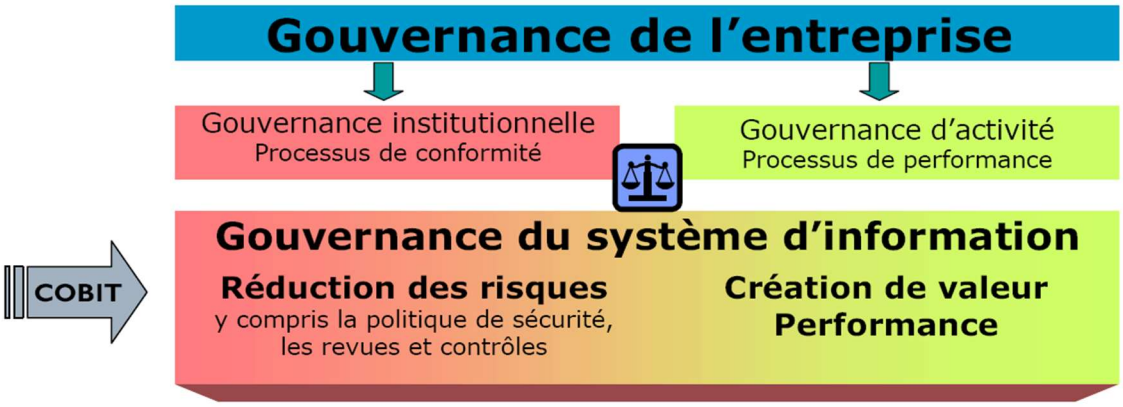


Figure 4: ISD governance
Source: Institute for Governance of Information Systems 2005

IS governance

Based on (Rosthenal-Sabroux, 2009); Governing the information system is:

- know and anticipate the strategic orientations of the company,
- know the state of the art technology,
- control the costs of the information system,
- identify potential risks,
- set a target for evolution,
- Pilot its realization.

(Weill, 2004) considers that the governance of information systems is a steering process that aims to control the decisions to be made as well as the underlying risks and to guide the decisions in order to increase the value and minimize the risks for the organization.

(Van Grembergen, 2004) considers that the governance of IS is based on a set of processes that make it possible to control that the objectives assigned to the IS are well considered and to react if necessary. As a result, it proposes to consider the essential IS processes for IS Governance around a control process (reporting) and an action process for decision-making.

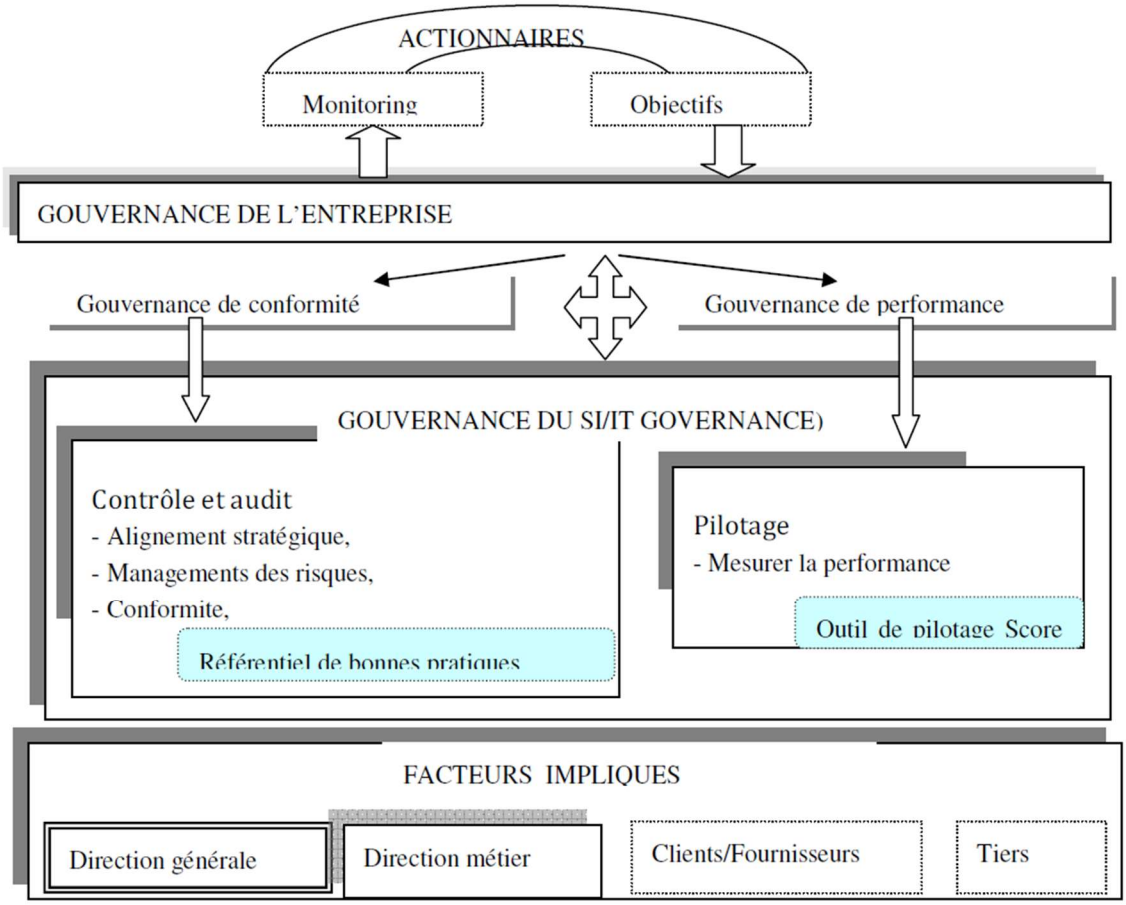


Figure 5: General framework for IS governance
Source: Florance et al. 2007

From the above we can say that the governance of the information system is a coherent device composed of actors, processes and standards for the management of all the activities of the ISD; in perfect harmony with the overall management system of the organization. The objectives of this system are to:

- Contribute to the creation of value for the organization,
- Contribute to the strategic alignment of the IS
- Optimize the use of resources,
- Controlling risks
- Maintain cohesion through good communication.

Section 3: Dimensions of IS Governance

The major challenge of the governance of the information system turns around decision-making (how to make decisions, what needs to be done to make these decisions better and especially how to ensure that these decisions are implemented). That said, the quality of governance comes from the quality of the decision itself, the four pillars of which are:

1. Anticipation

Anticipation is an exercise based entirely on the evaluation of opportunities and risks; the objective is always to make good choices; several elements must be taken into consideration to succeed in this exercise. CIGREF cites four:

- the strategic orientations of the company, the business lines and the information system (notion of alignment);
- the state of the art of technology;
- costs and expenses associated with the information system;
- potential risks.

2. Decision-making

Good governance is based on good decision-making, which means that upstream work must be well developed for the request and processing of information, but also downstream work for the implementation and management of the decisions taken.

3. Communication

Communication is always the best way to get teams on board and minimize resistance to change; this means that IOD managers need to initiate and share a good dialogue at different levels of responsibility.

4. Adaptation

Technologies, the environment and the organization itself remain in perpetual change, a decision is good today but bad tomorrow. The governance system must always remain in line with the new realities of governance to the realities of the organization, technologies and its environment in general.

Section 4: The Practical Foundations of IS Governance

The governance of information systems is too often translated into a theoretical and formal discourse or document, but in reality it is concrete practices that make the governance system successful. The Information Systems Audit and Control Association (ISACA), which is very interested in the governance of information systems, has defined five practical foundations.

Figure 5: The practical foundations of IS governance
Source: http: synergique.files.wordpress.com

The ISD approach must aim to produce shared and actionable visions, outlining the targets and trajectories necessary for good governance. In this context, methods and standards such as ITIL (IT Infrastructure Library) and COBIT or CMMI are in particular supports for putting an information system under control and making it evolve according to the company's strategy.

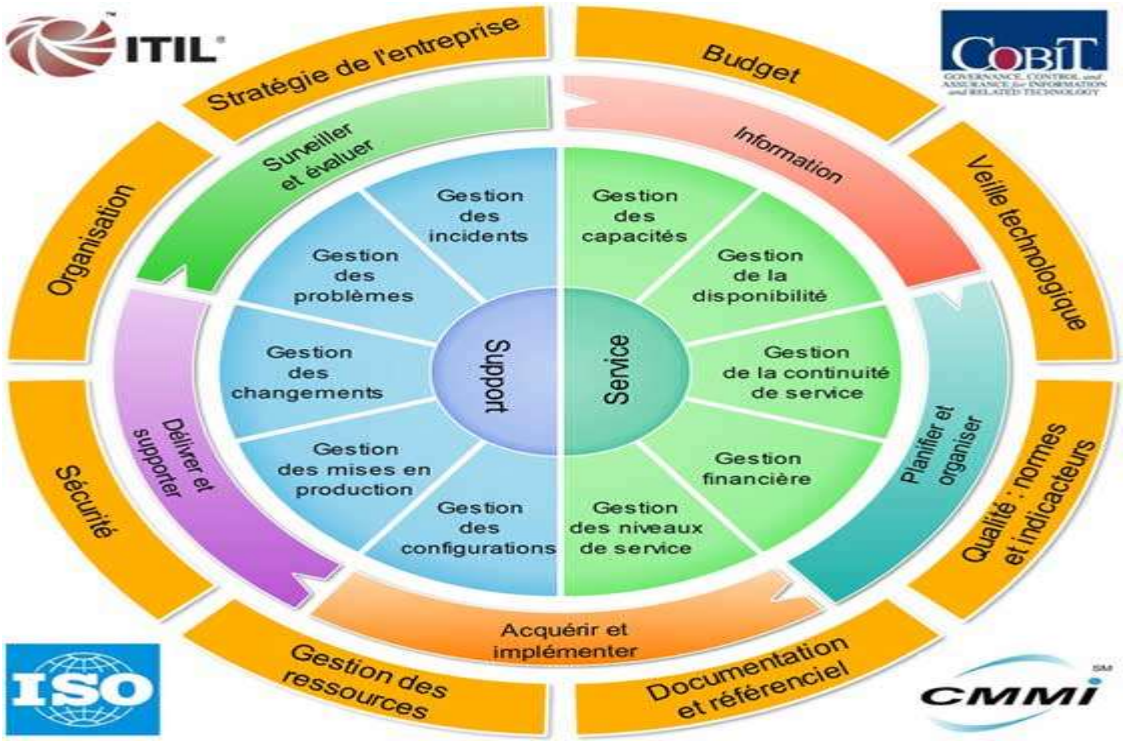


Figure 6: Repositories used in IS governance
Source: http: static.blog4ever.com

COURSE 2: STRATEGIC ALIGNMENT

Introduction

As we have already pointed out in the first course; Corporate governance is primarily about ensuring the balance between institutional bodies, which focus on control and compliance and ensure the proper implementation of the strategy, and "activity" bodies that seek value creation and performance through decision-making processes.

However, the organization is naturally structured in three levels. The first houses the objectives that are achieved through the implementation of the business processes that occupy the third level. These processes are themselves supported by information systems that are obviously at the second level and that serve as a hinge. Experts say that a change in one of these three organizational levels will cause changes with different types of impact on the other two levels.

Long before, Porter, in his 1980 Competitive Strategy bestseller, highlighted IT as an important part of his business model.
"Several technologies are able to satisfy the same need, there is a ceiling price for the existing technology beyond which substitution begins to become attractive to the customer."

With this in mind, the contribution of the IS strategy must be well supported; the challenge would be to align the IS strategy with the organization's strategy. This alignment presupposes two sine qua non conditions:

- First: the proper understanding and integration of the company's strategy by the IT department. The latter remains in charge of the implementation of all these means in the service of this integration;
- Second: the organization's strategy must itself take into account the different constraints and opportunities of IT.

It must be remembered that strategic alignment is not a phenomenon related only to the IS, the rest of the business lines and functions of the organization must also be aligned with the strategy.

Section 1: Definition and value of alignment

The IS strategy

First of all, "Developing the company's strategy means choosing the areas of activity in which the company intends to be present and allocating resources so that it can remain and develop there" (Strategor, 1997);

The IS strategy is a hinge between the action plan of the IT department and the overall strategy and business lines of the organization. According to (rosenthal-sabroux, 2009), the IS strategy must meet the following conditions:

- Provide a global view of the target IS and a trajectory to achieve it over five years
- Be aligned with the organization's business lines

- Be consistent and realistic
- Be customer-oriented
- The risk and cost management component must be well integrated
- Be agile

The following diagram gives us a global view of the IS strategy

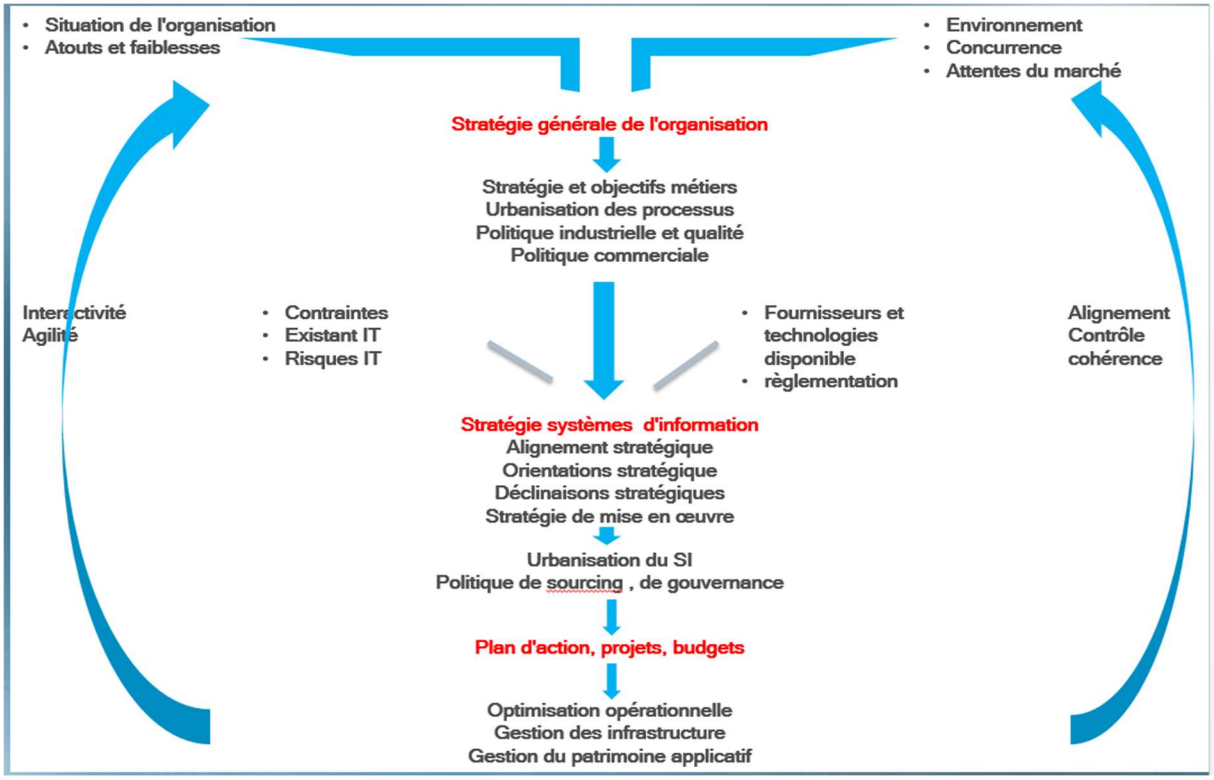


Figure 7: The IS strategy and its link to the IT Gov global strategy and action plan
Source: Rosenthal-sabroux, 2009

Strategic Alignment Definitions

Literally translated from "strategic alignment", the expression "strategic alignment" expresses the idea of setting and following a course. The aim is to align the information system strategy with the company's strategy (Cigref, 2002).

According to (Fimbel, 2007), the alignment of the information system is the managerial practice that aims to "better understand, better create and strengthen the convergences and synchronizations of the IS with the purposes, trajectories, rhythms and maneuvers of the company".

For (Kefi & Kalika, 2003), it is the harmonization between the strategic choices of the company and the technological resources that contribute to provide support for their deployment.

(Galliers 1991) and (Porter 1987) state that the analysis and realization of alignment is important in order to increase the competitiveness and profitability of the organization. As for (Papp 2001) and (Luftman 1996), they suggest that alignment between strategy

and organizational infrastructure can enable companies not only to improve synergy between different organizational subsystems, but also to facilitate the development of the business plan, while increasing profitability and efficiency.

According to Sauer, Southan and Dampney (1997), a lack of harmony between the IS strategy and the business strategy can create a climate of confusion and uncertainty within the organization, which could have a poor impact on the quality of decisions that are supposed to aim for performance objectives.

The Anglo-Saxon definitions are summarized in the following tables:

Références	Définition de l'Alignement stratégique
Broabent et Weill (1993)	*The extent to which business strategies were enabled, supported, and stimulated by information strategies (pp.164)*
Chan et al. (1997)	*The fit existing between business strategic orientation and IS strategic orientation (pp.125)*
Luftman, Papp et Brier (1999)	*Alignment which is defined as applying appropriate IT in a appropriate and timely way, in harmony with business strategies, goals, and needs (pp.3)*
Henderson et Venkatraman (1993)	*The degree of fit and integration among business strategy, IT strategy, business infrastructure, and IT infrastructure*
Tallon et Kraemer (1999)	*The extent to which the IS strategy supports, and is supported by the business strategy (pp.3)*

Table n°2: summary of Anglo-Saxon definitions
Source: Chtourou 2012

Strategic alignment is the basic approach that consists; after defining the priorities, objectives, constraints and framework of the IS strategy, to redesign the organizational structures, the processes of the information system and the production system so that they are in perfect agreement with the strategy of the company. The IS then becomes a real contributor to the company's strategy and therefore brings a visible competitive advantage.

Several strategic alignment approaches and models can be cited (Cifuentes, 2009):

- BITAM (Business IT Alignment Method) (Chen et al. 2005)
- MIT90s Model (Scott-Morton 1991)
- Fujitsu (Australia) Framework (Yetton et al. 1994)
- IS Urbanism: Longépé Approach (Longépé 2004)
- B-SCP (Bleistein et al. 2006)
- BALES (Papazoglou and Heuvel 2000)
- ARIS (Scheer and Nüttgens 2000)
- Wieringa's approach (Wieringa et al. 2003)
- SAM (Wegman 2002)

Section 2: Henderson and Venkatraman's SAM Model (1991, 1993)

Genesis of the "SAM" model

According to the first alignment models emerged from the 80s following research conducted in Information Technology Management "MIT" (Chan and Reich, 2007).

The central idea on which this model is based is that the changes resulting from IS investments will affect the key elements of the organization:

- strategy,
- technology,
- structure,
- management processes
- individuals;

Chan and Huff (1993) proposed an extension to this model based essentially on a central assumption that the strategic alignment of IS is the result of the "fit" between the business strategy and the IS strategy and that this alignment will simultaneously impact the performance of the organization as well as the effectiveness of the IS,

For the majority of academic publications on the subject of strategic IS alignment, the SAM Strategic Alignment Model (SAM), developed by Henderson and Venkatraman, remains the first reference. This model is based on a fundamental proposition according to which the low contribution of IS to the performance of the organization would be explained by the non-alignment of IS choices with business strategy (Chtourou, 2012).

Model dimensions

The SAM is an alignment model built mainly on two dimensions which are:

The strategic fit:

This dimension is vertical, it consists in the coherence of the strategy (globally focused on considerations external to the organization) with the core processes of the organization's business (focused on internal operational functioning).

Functional integration:

This dimension is horizontal, it consists of the coherence of the company's activities with information technologies.

Model domains

The SAM model also identifies four fundamental areas involved in alignment operations: business strategy, organizational infrastructure and business processes, IS strategy, infrastructure and IS processes.

Each of these areas contains interlinked components. Each area can therefore play one of the following three roles (Fimbel, 2007):

- an anchor domain in the sense that it validates and manages the alignment to be achieved,
- a pivotal domain which is the space for the implementation of alignment works,
- An impact domain (the target or recipient) that receives the aligned device.

These four domains will be inserted into the previous two dimensions as described in the figure below.

Corporate strategy covers the company's position in its market, the definition of its strengths and weaknesses and threats and opportunities.
The organizational dimension mainly concerns the organizational structure as well as the business processes. The IS strategy concerns the position of the company in relation to the ICT market the IS infrastructure and processes encompasses everything related to the IT process as well as the application and technological infrastructure of the organization

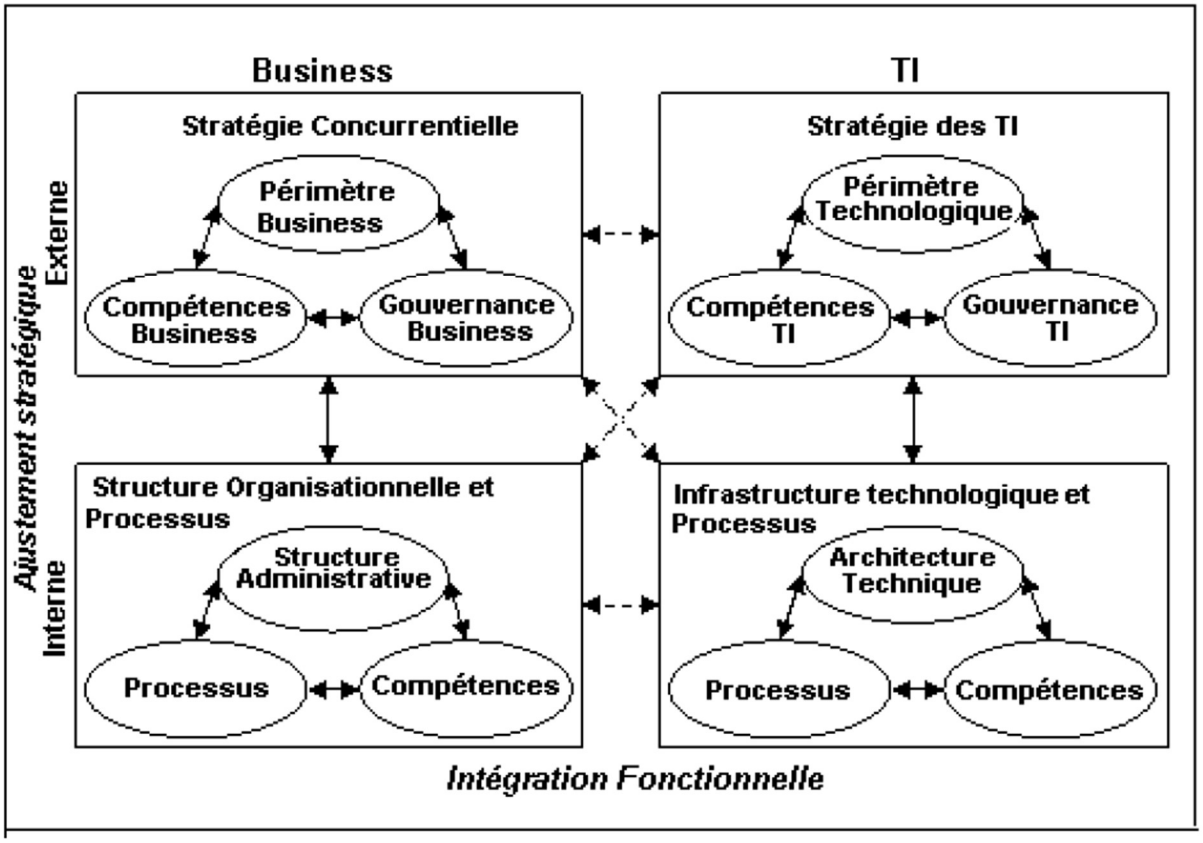


Figure 8: The SAM Strategic Alignment Model
Source: Henderson and Venkatraman 1993

Section 3: Alignment Modes:

Henderson and Venkatraman propose to link the four domains in different ways to align them; This concept is called sequence or alignment mode. an alignment sequence is generated by drawing a line between three of the four SAM domains. The following diagram formalized from the work of Henderson and Venkatraman clearly shows these four possible modes. Two cases are possible and each case contains two sequences or modes:

- Business strategy as a common thread
- Execution of competitive strategy
- Technological transformation

- The IS strategy as a common thread
- Competitive potential
- IS Service Level

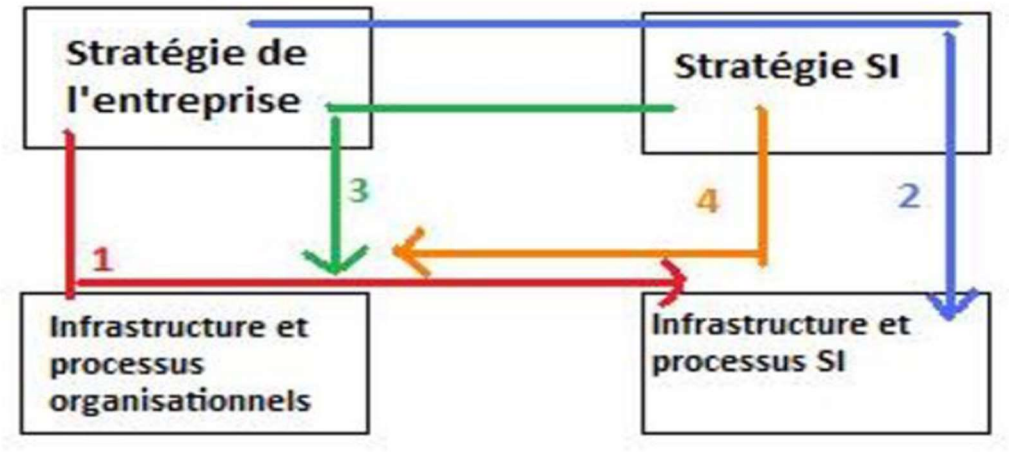


Figure 9: Strategic alignment modes
Source: www.synergique.wordpress.com

First case: Competitive strategy as a common thread

The first two perspectives exist when competitive strategy is the engine of change.

IS at the service of the operational execution of the strategy

This alignment model is the most common and widely used because it corresponds to the classic vision in which the strategy of the general management of the company defines the infrastructure and the operational modes of operation of the activities, i.e. the organizational structure and the processes, these in turn influence the infrastructure and processes of the IS (arrows 1). The organizations concerned by this mode are generally those where the professions are well defined and unlikely to be challenged by information technology.

IS as a vector of technological transformation

In this mode the three areas involved are: competitive strategy, IT strategy and technological infrastructure and IS processes and as for the first mode, it is always the company's strategy that is the initiator. The difference is that the "technological infrastructure and processes of the IS" domain is not subject to the design of the structure and processes of the organization; it is the IS strategy that guides it (arrow 2)

The organizations concerned by this mode are generally those where the professions are well linked to information and communication technologies such as banking and insurance.

Case Two: IS Strategy as a Common Thread (Facilitator)

The next two modes take place when the IS allows the creation of new competitive strategies. IT strategy is driving change.

IS as a generator of the strategy

The three areas involved in this mode are: IS strategy, competitive strategy and organizational structure and processes, here it is. This mode allows, initially, a strategic pairing between the IS strategy and the competitive strategy where the technological vision is the locomotive; The other two areas stem from technological opportunities (arrow 3). The performance criterion of the IT department would then be its ability to implement new strategies based essentially on the state of the art technology.

The organizations concerned by this mode are generally those where the positioning on the market is purely technological, note for example the telecommunications operators.

IS as an operational service provider

The three areas involved in this mode are: the IS strategy, the technological infrastructure and processes of the IS as well as the organizational structure and processes. The IT department not only plays the role of service provider to business processes, but its strategy has a significant impact on the organization of the infrastructures and processes implemented (arrow 4).

Section 4: Conducting a Strategic Alignment Process

Henderson and Vankatraman have made formulating the lineup easy, but directing is another matter. CIGREF has listed five key points to drive a strategic alignment process

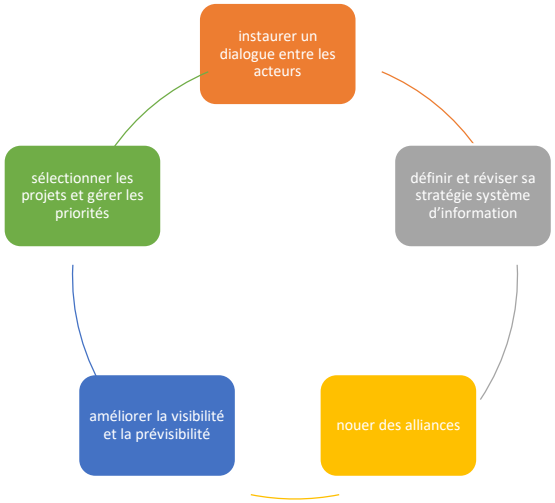


Figure 9: Strategic alignment
Source: inspired by the CIGREF 2002 report

Establishing a dialogue between actors

Especially those who play a very important role in the IS of the organization such as:

- General management;
- business and functional departments;
- the Information Systems Directorate.

This dialogue must have as a guideline the rapprochement between the two shores of the IS, namely the users and the management of information systems. The latter is the first in charge of implementing and promoting the strategic alignment of the information system, cannot achieve this objective without listening, support and commitment from the other actors who are the business departments and the general management.

Define and review your information system strategy

The IS strategy: "An information system strategy must define a target information system, the priorities, the steps and the means necessary to achieve it" (CIGREF, 2002). According to (Rosenthal-Sabroux, 2009) it is necessary, for strategic choices in action plans, to make a certain number of choices beforehand by seeking a happy medium between extreme positions the following table explains this idea

Process standardization System standardization	⟷	Local optimization Freedom of choice of operational staff
System and data security	⟷	Opening the IS to customers, employees and suppliers Ease of access to information Tool mobility
Homogeneity and integration of systems and data ERP approach	⟷	Interoperability of specific systems Specifying Software Tools Best *of breed approach*
Centralization Pooling of resources	⟷	Local responsibility Risk dilution
Economy Cost control	⟷	Performance User satisfaction
Ease of use Automation of functions	⟷	Simplification of the information system Ease of process control
Process modeling Reuse of components Sustainability of investments	⟷	Speed of implementation Agility of the information system
Industrialization of IT support services and processes	⟷	Proximity to support Responsiveness to requests
Reliability, robustness of solutions	⟷	Modernity, innovation

Table 3: Strategic Directions
Source: Rosenthal-Sabroux, 2009

Building internal and external alliances

"A strategic alignment approach must be a win-win relationship for the actors involved. The information systems department alone cannot lead the strategic alignment

process" (CIGREF, 2002). It is obvious that the IT department will never be able to carry out a project of strategic scope such as alignment, working in isolation, the contribution of internal and external sponsors and more than desirable

Improve visibility, predictability and facilitate communication

In this perspective, the use of traditional communication tools is very useful, CIGREF site among others:

- the drafting of target plans, and "mini-master plans"
- the establishment of business correspondents, actors of
- alignment;
- writing business *cases* for all projects,
- the organization of internal events to promote synergies;
- raising awareness among decision-makers,

Select projects and manage priorities

The information systems department must very well define its battlefield and focus only on existential projects, whose management it must master well.

Case Study No. 1	ALGERIA TELECOM: Study of the strategic alignment of the IS

Study of the strategic alignment of the IS[2]

Presentation of ALGERIE TELECOM

ALGERIA TELECOM is a joint-stock company with public capital operating on the market for electronic communication networks and services. Its birth was enshrined in Law 2000/03 of 5 August 2000 on the restructuring of the postal and telecommunications sector, which separates postal activities from telecommunications activities.

Algérie Télécom is therefore governed by this law which confers on it the status of a public economic enterprise in the legal form of a joint-stock company (SPA).Officially operational from January 2003, it is committed to the world of telecommunications in economic, social and cultural development and in line with the objectives assigned to make up for the delays marked in this field.

Presentation of the NGBSS information system:

[2] Excerpt adapted from the master's thesis prepared by CHERHABIL Hadjer and supervised by the author, ENSM école nationale supérieure du management

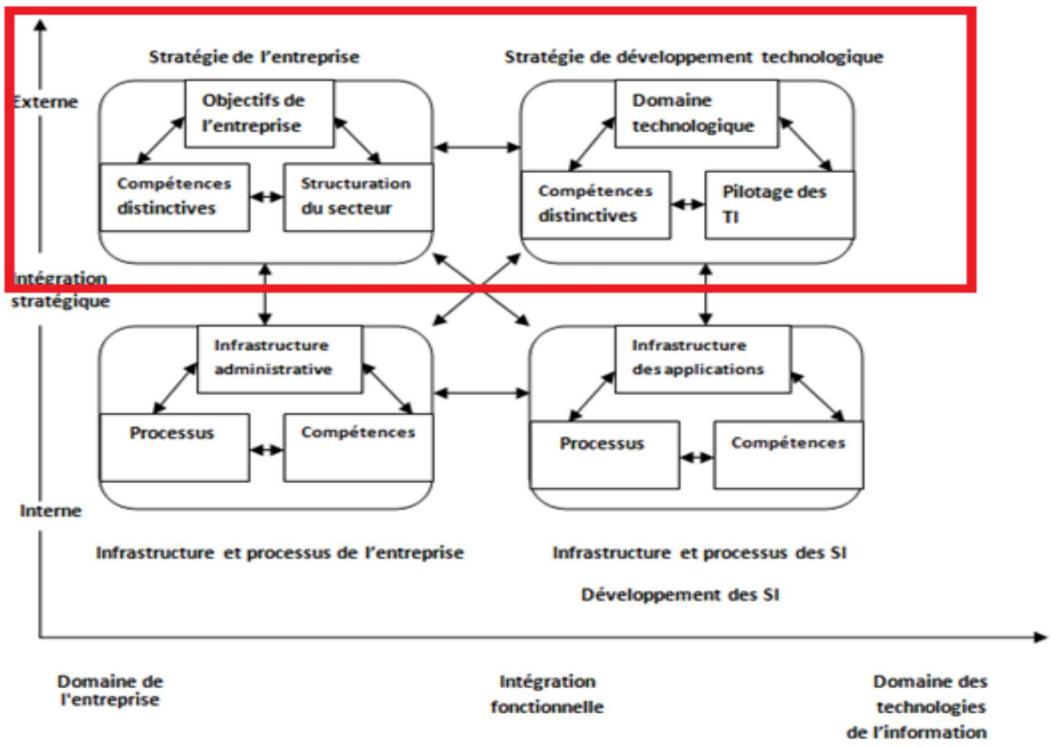
New Generation Billing support system is the set of functional components or activities that define the business of a telecommunications operator, and which are provided by its operational service system (OSS)

This solution makes it possible to manage any information system of Algeria Telecom (CCBS: manages the billing of ADSL, CVBS, ECMS and the billing system "GAIA": which allows the commercial, financial and technical management of the fixed network of Algeria Telecom) in a single interface and in order to adapt to the FMC solution (fixed convergent mobile)

The NGBSS system is composed of 09 modules:

- **CRM: constumer relationship ship management:** It is a module that allows the management of the customer relationship in terms of registration and modification of customer data, services and offers of Algeria telecom.
- **CBS: convergent billing system** is a billing and pricing system.
- **UPC: unifed product catalogue** management the catalogue of offers.
- **USM: universal sale manager** user profile management
- **PRM: part ship management relationship** interconnection management
- **E-care:** customer area on the web
- **UVC: universal vouchers card** management of ticket vouchers and recharge card.
- **BICP: busines interllingent core platform** data extraction, statistics of operations performed and reporting
- **Trouble ticket:** the management of all types of claims.

To study the strategic alignment of the IS of ALGERIE TELECOM we conducted a series of interviews with the different actors of the IS, we also used the use of a questionnaire after sampling. We focused on studying the relationship between the two corporate and IS strategies through the link between the IS and DC departments in terms of strategy development, the coherence of the objectives set, collaborative planning methods and all the factors that can influence the alignment relationship.



We used the Venkatraman model to assess the alignment between the strategy and the NGBSS system (we based ourselves on the two parts framed in red)

	La Direction	Déclaration	Résultat
Evaluation de l'alignement du SI avec la stratégie commerciale	DG	« Les priorités stratégiques de notre entreprises consistent à améliorer la rentabilité économique, augmenter le chiffre d'affaire, équiper tout les zones en réseaux filaire (réseaux cuivre, fibre optique, ADSL), et la concrétisation de ces priorités passe impérativement en collaboration avec la direction SI»	La direction d'ACTEL et ces directions métiers sont à l'origine de la stratégie. la DSI s'adapte alors dans ce cas littéralement aux processus existants, le SI dans ce cas est en mode d'exécution opérationnelle de la stratégie (selon le modèle d'Henderson et Venkatraman)

	DSI	« Le SI est au service de la gestion commercial »	
Compréhension des processus de gestion par la fonction SI	DG	« il existe une compréhension des processus de gestion par la fonction SI mais avec insuffisance »	Manque de communication.
L'accomplissement des activités par la fonction SI	DSI	« Oui la fonction SI est capable d'accomplir les activités dont elle a charge »	
Le SI soutien les changements aux processus de gestion	DSI	« Le SI s'adapte acceptablement avec les changements au niveau des processus »	
Utilisation des tableaux de bord	DSI/DG	La DSI et la DG n'utilise pas des tableaux de bord	
L'échange d'information entre la direction SI et DG	DG	« dans notre entreprise des réunions se font entre les responsables afin d'exposer l'état d'avancement et les problèmes rencontrés dans le but de réussir les objectif fixés par la direction »	Il ya un échange d'information entre la DG et DSI

Alignement entre les objectifs SI et les objectifs métiers		**Satisfaction des utilisateurs du SI** Une grande majorité de répondants 90% sont satisfait par leurs applications SI, une minorité 10% des répondants ne sont pas satisfaits **L'applicatif :** La plupart des utilisateurs sont satisfait de NGBSS.	En générale, le SI couvre les grandes nécessités de travail pour la majorité d'employés ce qui assure leur satisfaction.
Participation a l'élaboration du plan stratégique de l'entreprise	DSI	«la DSI ne participe pas dans l'élaboration de la stratégie de l'entreprise »	

Evaluation of SI alignment (Actel)

Conclusion:

Although there is coherence between the IS strategy and the ACTEL strategy, some points remain to be reviewed in order to improve the alignment process:

1. DG does not consider the ISD when developing the agency's business strategy
2. Insufficient and/or ineffective communication between ISD and DG
3. The tools for managing tasks and monitoring the progress of objectives are outdated and ineffective, which, in the eyes of the DG, makes these tools not credible.

Recommendations:

1. Define strategic plans taking into account the constraints of the IS
2. Prepare and organize a simple and visual communication process (a task and goal management tool).
3. Set up a management and organization system with a visual dashboard-like interface to ensure consistency between strategic plans and their progressive implementation.

COURSE N°3: IT PROCESSES

Introduction

IT process management is a major challenge for any company of all sizes, in most cases; IS processes are considered the primary source of IT department problems; far before the very technologies that are used, because their impact on the company's activities is greater. Good IS governance requires serious consideration of IS processes.

The area of IS processes provides a way to manage the information system, plan infrastructures in a controlled and controlled way. It also provides an integrated framework to structure and organize the IS so that its availability and performance are aligned with its commitments to the business.
It is with this in mind that the largest organizations working on IT processes (SEI, ISACA, PMI, IEEE...) have defined their standards or standards of good practices such as:

- CMMI: Capability Maturity Model Integration
- COBIT: Control Objectives for Business & Related Technology
- ITIL: Information Technology Infrastructure Library
- VAL IT: Value for IT

But first, what is a process?

Section 1: The Process

In ISO 9001 version 2008, the term process is generalized to any activity that produces identifiable output data, In other words, any response to a requirement of the standard that requires the implementation of active provisions can be characterized as a process .we will thus speak of planning process, management review process or non-conformity treatment process or corrective action processes (MOUGIN, 2008). It is also, according to the AFNOR definition, a set of correlated or interactive activities that transform input elements into output elements.

The process is a studied succession of tasks that involve inputs, activities, means such as personnel, equipment, material, information, it is triggered by an event and closed by the achievement of an objective.

"If you can't describe what you're doing as a process, you don't know what you're doing." W. Edwards Deming

Process and procedure

According to (Presenti, 2011) Processes describe the organization's activities from a cross-cutting perspective, focus on objectives and how to achieve them effectively.

The processes essentially answer the questions: What to do? For what added value? With which actors?

Procedures describe how to accomplish an activity or process. The procedures go back to the questions: Where? When? How do I do this? Who?
Figure 1 below better explains the difference between procedure and process.

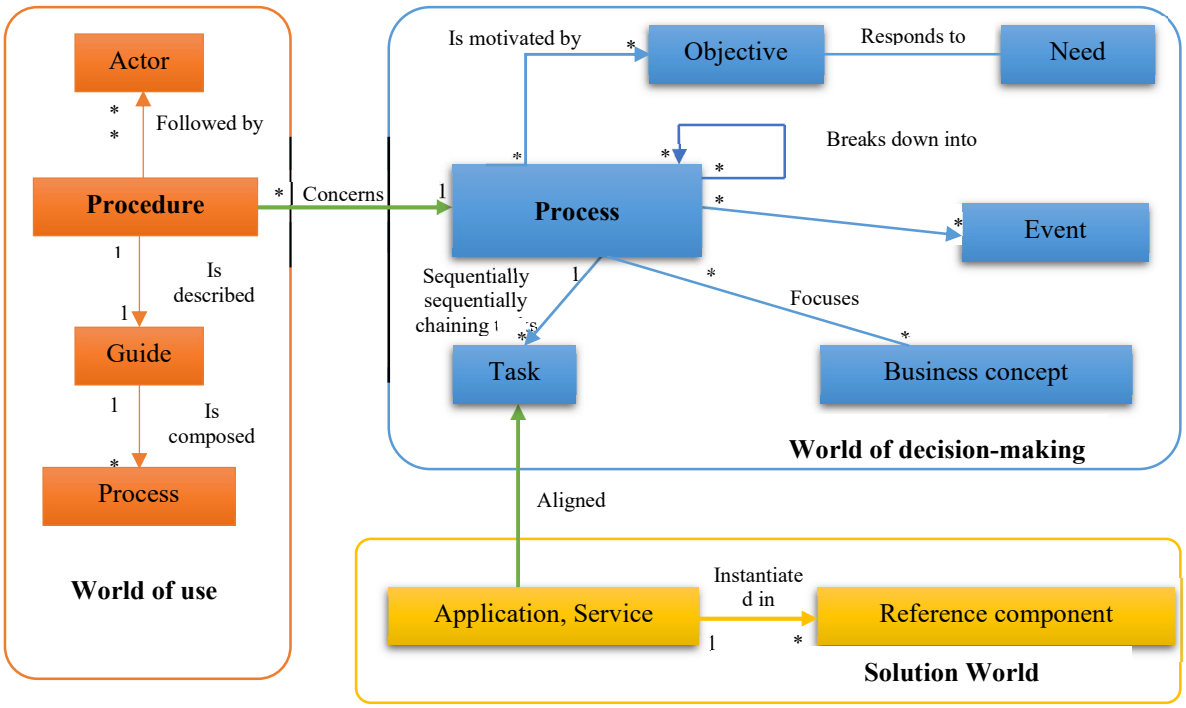


Diagram No. 10 :P rocessus, Procedures, Processes according to PESENTI. Source Pesenti, 2011

According to (GILLES, 2003) A value chain is the networked arrangement of a set of processes to deliver value to the customer, across legal boundaries between companies (extended enterprise) and units of a company (management, departments, etc.).

Still according to the same author; A process is a network of activities interconnected by flows of information or material that combine to provide a tangible or intangible product that contributes to delivering value to the customer.

Process maturity

Before being piloted, a process undergoes several intermediate levels of mastery, namely its degree of maturity; starting by a process that exists in the organization but without any official document that describes it; and arriving at a process driven through key indicators. Process control (business or IT) is itself a process that is built step by step

Note that the maturity of IT processes can be technology-centric (technology-driven) or business-centric (driven by service delivery and contribution to strategy)

The diagram below shows us this construction in the image of a piramyde

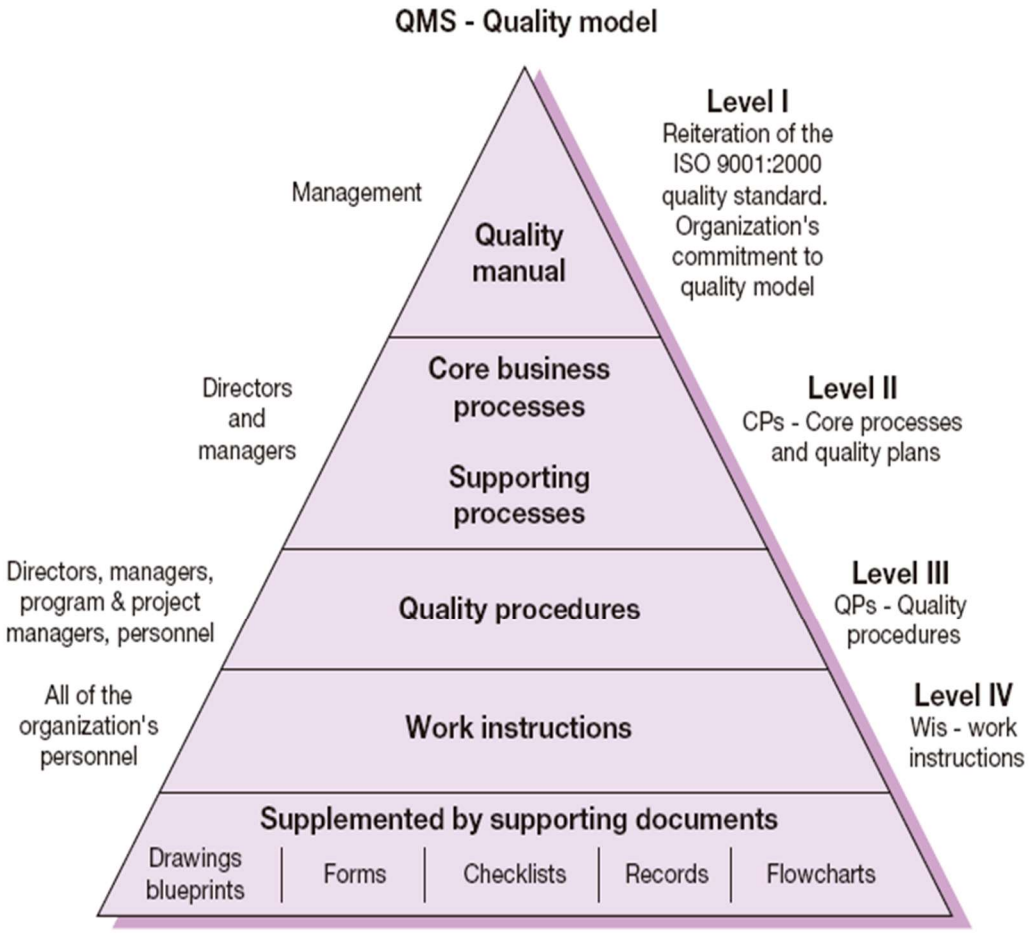


Figure N°11: process documentation
Source: (Tricker, 2006)

That said, high-maturity IT processes will generate more efficient documentation and feedback for good governance of the information system.

Section 2: Service and Service Management

The IT department's processes aim to provide added value to its customers in the form of a service. IT service management is a set of organizational capabilities that enable the service to be delivered; it is constructive on the functions of the ISD.
The different processes of the information systems function are part of the entire process heritage of the organization as a whole; They are classified in the family of processes called "support processes" because they help support the organization's "core business" processes.
The ISD, which is an organization like the global organization, has three main families of processes:

- IT department management process;
- Business processes (to carry out the core functions of the ISD);

- Support process (to ensure the proper functioning of the IS).

The diagram below shows us these three families

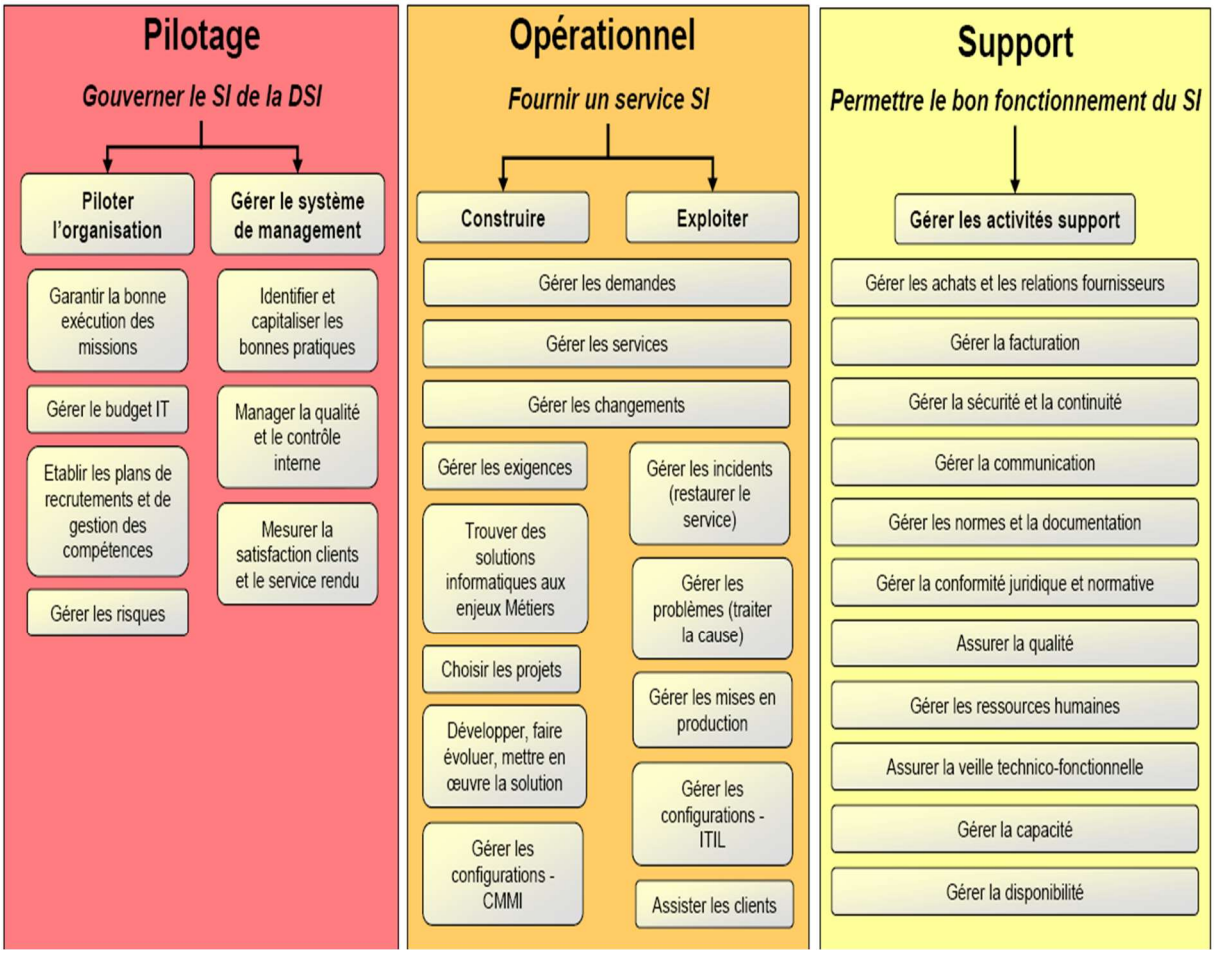


Figure 12: Key ISD processes
Source: CIGREF

The key ISD processes mentioned in this diagram is an example of mapping, resulting from the work of the CIGREF working group, the authors state that this example is not intended to be interpreted as a standard, nor as a model.

Several maturity standards exist. The most relevant and most requested by IS professionals is the CMMI (Capability Maturity Model Integrated); maintained by the Software Engineering Institute. The CMMI does not assess the maturity of ISD processes but that of IS development processes (SEI, 2006).

The diagram below shows us this same mapping of IS processes with the repositories used

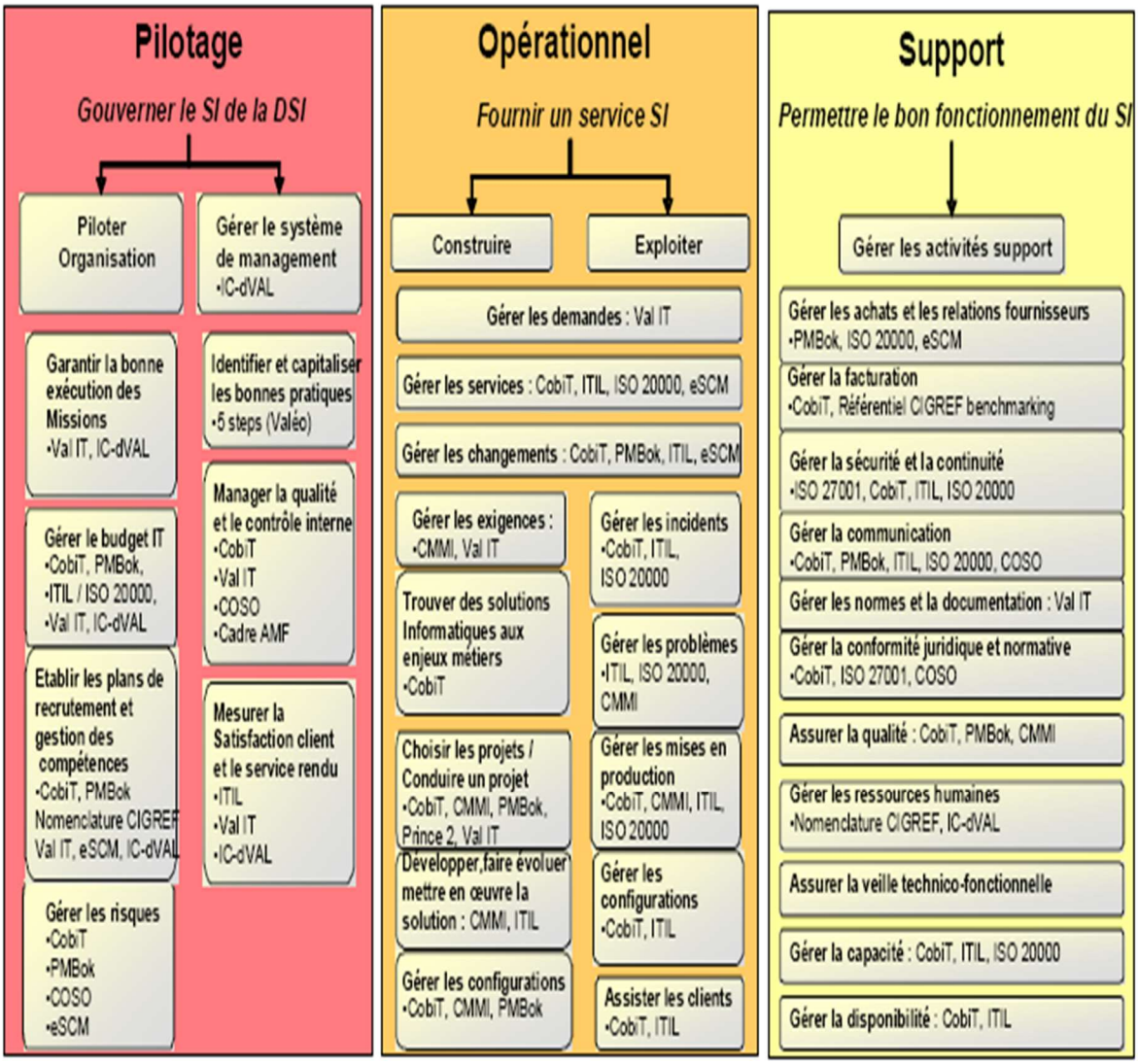


Figure N°13: mapping of IS processes with IS repositories
Source: CIGREF

Knowing the key processes of the IT department is a first step, using the repositories to optimize them is a second, then remains to know what the market offers as tools for identified processes

The CIGREF presents in the table presented above an overview of the different tools used at the IS level of the IT department, excluding Business tools. Moreover, as mentioned by the authors, this mapping represents the tools most used in the CIOs of CIGREF member companies, it is not an exhaustive list of existing tools on the market.

	Outil	Société propriétaire	Catégorie(s)
A	Applix	Cognos - IBM	Gestion des demandes - incidents - changements
	Aris	IDS Sheer	Cartographies
	ARS	BMC Software	Gestion des demandes - incidents - changements
	Artemis	Artemis International	Analyse des temps / Planification
B	Becubic	ASG	Gestion de la qualité
	Blu Age	Netfective	Ateliers de génie logiciel
	B O	B O	Tableaux de bord décisionnels (opérationnels : suivi ; stratégiques : performances de la DSI)
C	Casewise	Casewise	Cartographies
	Cast Value	CAST	Gestion de la qualité
	Changepoint	Compuware	Analyse des temps / Gestion des demandes / Gestion de projets / Planification / Gestion des enquêtes de satisfaction / Tableaux de bord décisionnels
	Clarity	CA	Analyse des temps / Gestion de projets / Planification
	Clearcase - Rational	IBM	Gestion des configurations / Modélisation
	CVS	Open source	Gestion des configurations
D	Dash Board Datadrill	Salesforce	Tableaux de bord décisionnels (opérationnels : suivi ; stratégiques : performances de la DSI)
	Dimension - Change Man	Serena	Gestion des configurations
E	Enablon	Enablon	Gestion des enquêtes de satisfaction / Collecte d'informations - Reporting - Synthèse
	Endeavor	Endeavor	Gestion des configurations
	EPM	Microsoft	Analyse des temps / Planification

Table N°4: IS tools
Source: CIGREF

Section 3: Business Processes: Providing IS Services

The ISD is by definition a service delivery structure within the organization. The success of any organization depends on creating and maintaining a high degree of quality; to the extent that it will allow the company to distinguish itself and position itself well in the market.

With this in mind, the IT department must in turn provide a high level of service, it is essential that the IT department is, in all its aspects (architecture, process and organization), well aligned with business requirements and with a well-defined level of service.

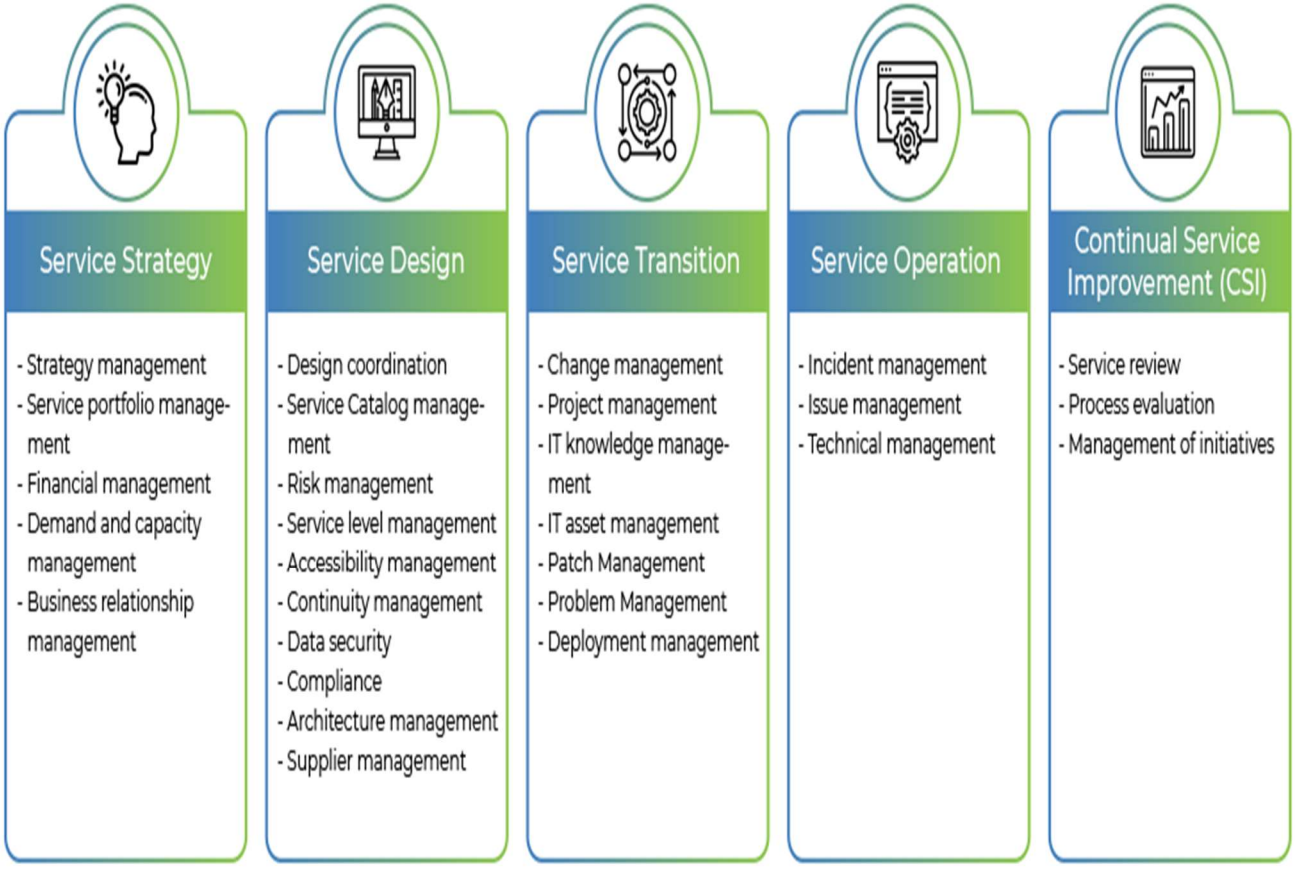


Figure N°14: operational processes
Source: www.modata.com

The process owner is responsible for the overall quality of his process and his process must work in accordance with what has been decided. The Service Owner is responsible to the customers (Service Sponsor) for all matters relating to the completion of the Service; especially:

1. initialization of the service
2. the implementation of the service
3. support and ongoing maintenance of the service

He is the guarantor and responsible for the proper functioning of the service vis-à-vis the customer; Here we can define three categories of customers

1. **Users:** it is the end customers who will use the service (also called service takers)
2. **Customers:** they are the sponsors or the principals, they are the ones who provide the financial means (also called project owner)

A customer can also be a user at the same time. The supplier is of course the person who delivers the service it is the project manager

Section 4: Example of an IT Process Incident Management Process

This is one of the most common processes within the IT department This example is taken from the ITIL repository

Incident definition:

According to the ITIL V3 standard; An incident is defined as any event that is not part of the standard operation of a service and that causes, or may cause, an interruption or decrease in the quality of that service.

They are classified into three types:

1. Software or application problems. Examples:
   - program error slowing down the user,
   - application slowdown, etc.
2. Hardware incidents. Examples:
   - printer output blocked,
   - hard drive soon to be full, etc.
3. Service requests. Examples:
   - forgotten password,
   - request for special documentation, etc.

Incident Prioritization

The impact on the company's business, and the urgency to implement a solution determine the classification of priorities.

		IMPACT		
		Élevé (Organisation en entier)	Moyen (Département, service ou > 5 utilisateurs)	Bas (1-5 utilisateurs)
URGENCE	Urgent	P1 - Majeure	P2 - Élevée	P3 - Normale
	Normal	P2 - Élevée	P3 - Normale	P4 - Basse

Figure N°15: prioritization of incidents
Source: octopus-itsm.com

The incident management process.

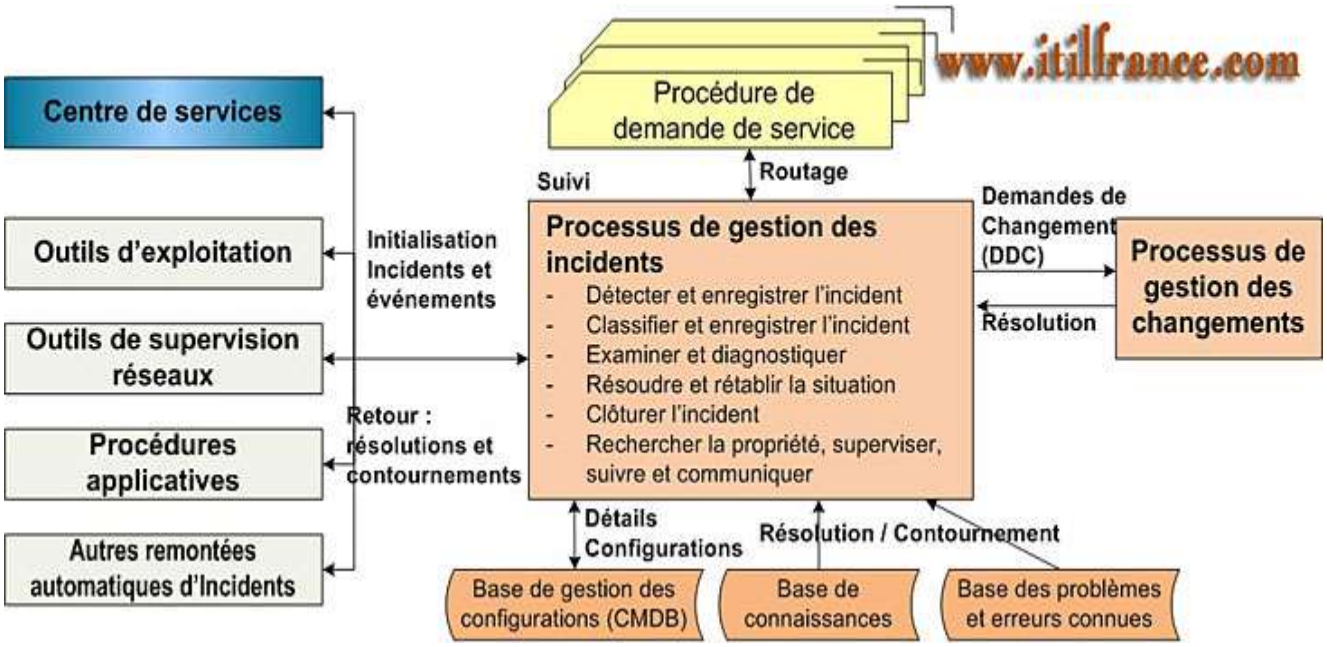


Figure N°16: incident management process
Source: www.itilfrance.com

Process input:

- Details of incidents (from the service desk and the various automatic sources)
- Configuration Details (of the CMDB)
- Search for matches between known problems and problems & errors (from the known problems/errors database)
- Details of the resolution of the incident of a similar nature (from the same base)
- Return of change requests to correct an incident (from the change management process)

Output of the process:

- Service Request Routing
- Change requests to resolve certain incidents
- Updating the database of known problems/errors
- Communication to users (during progress and at closing)
- Reporting to hierarchy
- In the process, incident management activities include:
- Incident detection and recording
- Initial Support and Classification
- Investigation and diagnosis
- Comprehensive incident tracking
- Resolution and recovery
- Closure of incidents

COURSE N°4
RESOURCE MANAGEMENT (IT ASSETS)

Introduction

IT environments are becoming more complex and diverse, and IT assets are becoming even more expensive to acquire and maintain as technology evolves and third parties come up with more and more offerings. IT Asset Management (ITAM) is one of the most discussed topics in IT, and IT managers want to know if their approach to asset management is correct. ITAM plays a critical role in helping IT teams ensure the efficient use of the organization's resources, while supporting the needs of users and business functions.

This is an area where published benchmarks and best practices, as well as certifications, are of great interest. IT Asset Management also uses integrated software solutions that work with all departments that are involved in acquiring, deploying, managing and reporting IT asset expenditures.

But first what is ITAM

Section 1: ITAM

Information technology assets management; Literally translated into IT asset management or IT asset lifecycle management or asset lifecycle management, ITAM is an environment that includes the practices and strategies that enable the best management of IT resources;

Definitions

Gartner defines IT Asset Management (ITAM) as: "providing an accurate account of technology asset lifecycle costs and risks to maximize the value of enterprise strategy, architecture, financing, contracting, and procurement decisions."

According to the International Association of IT Asset Managers (IAITAM), IT Asset Management (ITAM) is a "set of business practices that integrate IT assets across all business units within the organization. It encompasses financial, inventory, contract and risk management responsibilities to manage the full life cycle of these assets, including tactical and strategic decision-making. »

"IT asset management (ITAM) comprises practices and strategies for overseeing, managing and optimizing company-owned IT systems, hardware, processes and data. As part of an ITAM strategy, IT departments implement, track and maintain IT assets, and assess whether those IT assets require optimization, can be replaced with a less expensive option or be upgraded to a newer technology".

IT Asset Management (ITAM) is the set of business practices that join financial, contracting, and inventory functions to support lifecycle management and strategic decisions for the IT environment. Assets include all elements of software and hardware that are in the business environment. (Wikipedia).

It is an exercise that involves the rigorous inventory of hardware and software inventories on which decisions on hardware and software purchases and redistribution

will be made. IT inventory management which allows CIOs to manage their systems efficiently (saving time and money).

Companies that invest in ITAM's effective program development significantly reduce the associated risks and additional costs of advancing IT portfolio infrastructure projects these costs come most of the time due to old, incomplete and/or less accurate information. They also ensure that its assets comply with the company's security standards and regulatory requirements. IT resource management also enables the organization to improve productivity by deploying technology to support user and business needs.

The types of ITAM

According to IAITAM, there are four types of IT asset management:

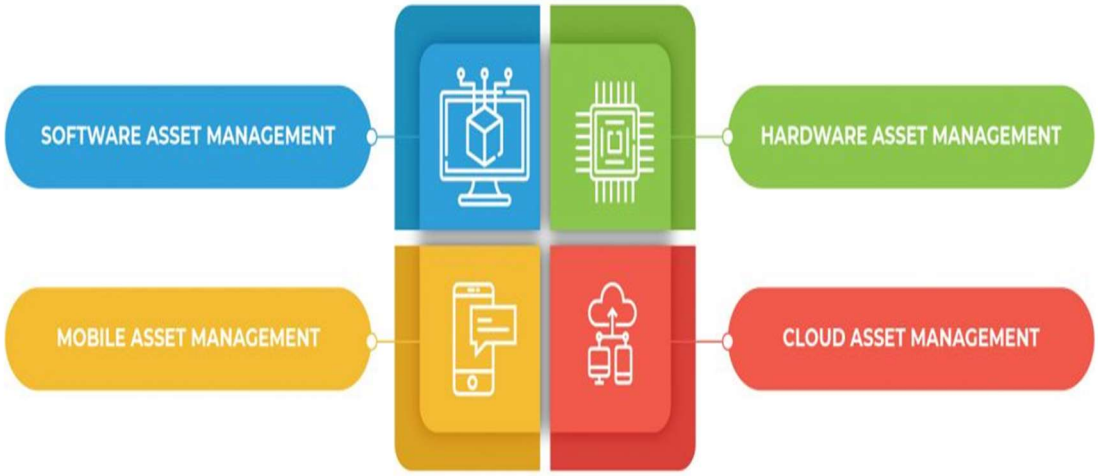


Figure N°17: Types of IT Asset Management
Source: www.modata.com

The IT Asset Management function is the primary point of responsibility for managing the lifecycle of information technology assets across the organization.

1. Software Asset Management

It covers tracking the number of installations, software control, and software licenses. Software Asset Management is a similar process, focusing on software assets, including licenses, versions, and installed devices

2. Physical Asset Management

It covers the discovery and tracking of physical assets; maintain an inventory; recording of financial information; Keep track of the seller and manufacturing details. Materiel asset management involves the management of the physical components of computers and computer networks, from acquisition by disposal. Common business practices include application and approval process, management purchasing, management life cycle, redeployment and disposal management. A key element monopolizes financial information over the life cycle of materiel that helps the

organization make business decisions based on meaningful and measurable financial objectives

3. Mobile Asset Management

Refers to tracking, managing, and monitoring mobile devices.

4. Cloud Asset Management

Refers to the management of cloud-hosted assets.

According to recent research, ITAM encompasses not only hardware, software, networks and services, but also employees and customer data, as ITAM is part of a company's IT service management function. Included in this responsibility are the development and maintenance of policies, standards, processes, systems and measures that enable the organization to manage the portfolio of IT assets in relation to risk, cost, control, IT governance objectives, compliance and performance of companies established by the company.

Key success factors of ITAM

IT asset management is a process that will mature through iterative and targeted improvements. The success of IT asset management programs depends on the involvement of all levels of responsibility within the organization, such as end users, budget managers, IT service departments, and finance.

1. Start with IT asset inventory
2. Ensuring the security of hard and soft Computer security is also hardware
3. Managing assets within the overall governance framework
4. Obtain the buy-in and involvement of employees
5. Continuously evaluate with the measurement

Example of an IT asset

Far from strict and sometimes unexplanatory definitions, we find that IT assets vary from one organization to another depending on the nature of the business, the IT ecosystem as a whole, as well as how information should support decision-making. Nevertheless, we can cite some examples:

1. Infrastructure hardware and user devices

Basically concerns all devices on the network, physical servers, terminals,. Desktops, monitors, printers, phones

2. Leases for facilities and infrastructure

Applies to agreements that allow access to or use of third-party infrastructure

3. Software developed in-house

Applies to any software developed within the organization and owned by the organization

4. Software Licensing

Refers to software developed by others for which the company has purchased a license to use for a specified period of time.

5. Numerical data from operations

Concerns operational data

Section 2: IT Asset Lifecycle

Like everything else in the organization, IT assets have a defined useful life. ITAM uses the concept of the asset life cycle to support the decisions to be made during each phase
In the context of IT asset management, the asset lifecycle is often structured as follows:

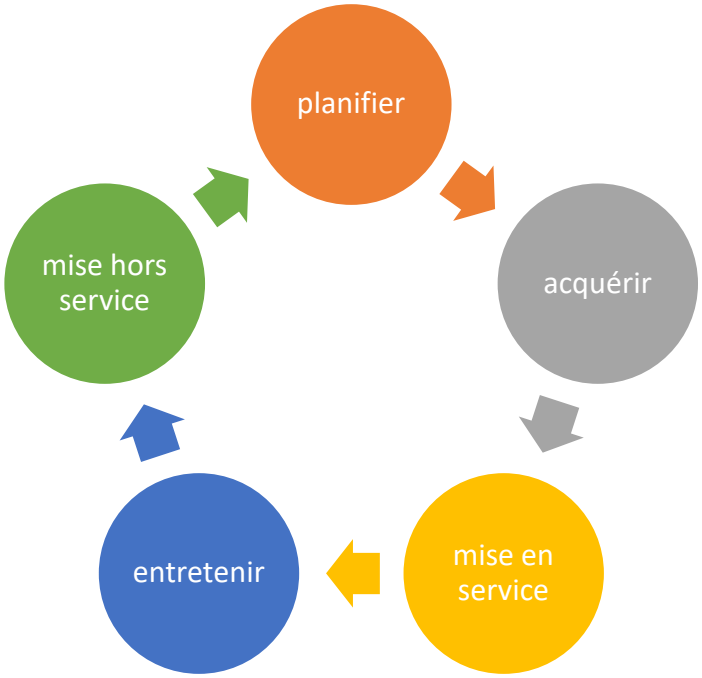


Diagram N°18: life cycle of assets

Plan
This phase is about the strategy and decisions to be made about the necessary assets to be acquired in the organization, it begins when a person within the organization submits a request to acquire a new asset.

Acquire
This phase corresponds to the acquisition of assets through their construction, purchase, lease or licensing; choice of suppliers, contract negotiation, financing procedures

Commissioning
At this point, the asset is used, whether in a data center, a factory, or on an employee's workstation. It is now part of the IT ecosystem this phase also includes everything related to the installation, integration, implementation of operating processes

Maintain
Once the asset is operated and used, its maintenance and the next step is routine physical maintenance, software updates and any necessary repairs. The goal is to maximize their lifespan and minimize risks and costs.

Decommission

All assets reach the end of their life at some point and must be decommissioned. This often includes migrating users to other resources, updating asset records, canceling support agreements, terminating license renewals, and starting to plan replacement assets.

Hardware layout

Several disposition processes are implemented to "rid" the business of assets that are no longer in service. In most cases, these are given to a supplier dedicated to recycling or destroying the hardware. After decommissioning the assets must be managed properly to ensure that they do not get lost before reaching the seller. The latter has, according to the standards, security procedures for tracking assets throughout their possession.

After destruction, the seller provides a certificate of destruction with the serial numbers of the assets they destroyed and recycled. These documents will be used by the organization to verify the serial numbers on their certificate of destruction with those given to the seller. The best suppliers in this field are those NAID certified which concerns the management of electronic waste.

Section 3: IT asset management software

ITAM is an exercise that is also based on the use of a number of software tools that allow a certain degree of automation of activities, especially those related to inventory. Comprehensive business management of IT resources requires the filing of multiple types of asset information, as well as integration with other systems such as procurement and procurement management applications, as well as human resource management and finance and accounting

In the following we will present some features of software tools used by companies to support ITAM processes:

Inventory automation

Intelligently manages the hardware and software components installed within the organization.

License management

Provides a directory for license fees that will facilitate monitoring of license terms and expiration dates.

Patch and release management

Automates the updating of computers through the deployment of software patches to meet current security and efficiency standards.

Application management

Enables users, based on their business needs, to request the acquisition of software products, devices, or other assets using a standardized form, to better manage and monitor the procurement and deployment process.

The catalogue of services / products
Provides a general directory that contains the different types of IT assets (name, edition, version, and license agreement types, ...) approved for use within the organization.

The Configuration Management Database (CMDB)
Configuration management data base is an application that is typically part of the organization's IT service management system, this database provides a centralized repository to record IT assets, their configuration, and their relationship with other components.

The system for fixed assets
Typically linked to the organization's finance applications, it provides a mobile asset directory, which will facilitate the management and reporting of mobile asset data to support financial processes.

Digital Asset Management
Organize, store and retrieve media content, manage digital rights and permissions. Digital assets include: photos, videos, animations, podcasts, and other multimedia content.

The most popular software tools are:

- AssetCloud
- Asset Panda
- BMC Track-It
- Cherwell
- Device42
- GoCodes Asset Management
- Ivanti IT Asset Management Suite
- LogMeIn Central
- ManageEngine AssetExplorer
- MMSoft Pulseway
- ServiceNow
- SolarWinds
- SysAid

Section 4: ITAM Standards, Best Practices and Certification

ITIL® among others, provides recommendations on asset management processes in an operational context, the officially recognized standards for IT asset management are those of the International Organization for Standardization (ISO) as well as the best practices published by IATAM
The ISO 19770 family of standards consists of 5 main parts and was recently updated in 2017.

ISO/IEC 19770-1:
A process framework that outlines best practices for IT asset management in an organization. It enables an organization to demonstrate that it performs ITAM

sufficiently in compliance with the standard to meet corporate governance requirements and supports IT service management activities.

ISO/IEC 19770-2:
A data standard for software identification markers (SWIDs). This standard allows organizations to uniquely identify software deployed on any device.

ISO/IEC 19770-3:
A data standard to describe the rights related to a software and the method for measuring the consumption of the license/right.

ISO/IEC 19770-4:
A measurement standard that standardizes resource utilization reporting. This standard is especially important when managing complex licenses for data centers and for managing cloud-based software and hardware resources.

ISO/IEC 19770-5:
Provides an overview of the ITAM standards and vocabulary defined by ISO.

The International Association of Information Technology Asset Managers, Inc. ("IAITAM") is a professional association of individuals and organizations involved in ITAM. After years of research, consulting and process improvement, IATAM began in 1988 to disseminate good practices as well as the development of advanced training and certification programs.

IATAM provides seven certifications:

- Certified Asset Management Professional (CAMP)
- Certified Software Asset Manager (CSAM)
- Certified Hardware Asset Management Professional (CHAMP)
- Certified Mobile Asset Manager (CMAM)
- Certification in IT Asset Disposition (CITAD)
- Certified Asset Management Security Expert (CAMSE)
- Certified IT Asset Manager (CITAM)

Case Study No. 2	MOTADATA: Description of an ITAM software

MOTADATA[3] IT Service Management (ITSM) helps to provide IT services aligned with business objectives in a simple way.

Business Challenge:

Today, IT has become an integral part of every business and IT management becomes complicated when a business grows. All growing businesses face the same problems: technicians overwhelmed with tickets, security threats, compliance issues, less and less efficient IT services, lack of visibility into IT transformation, limited scope of automation, etc.

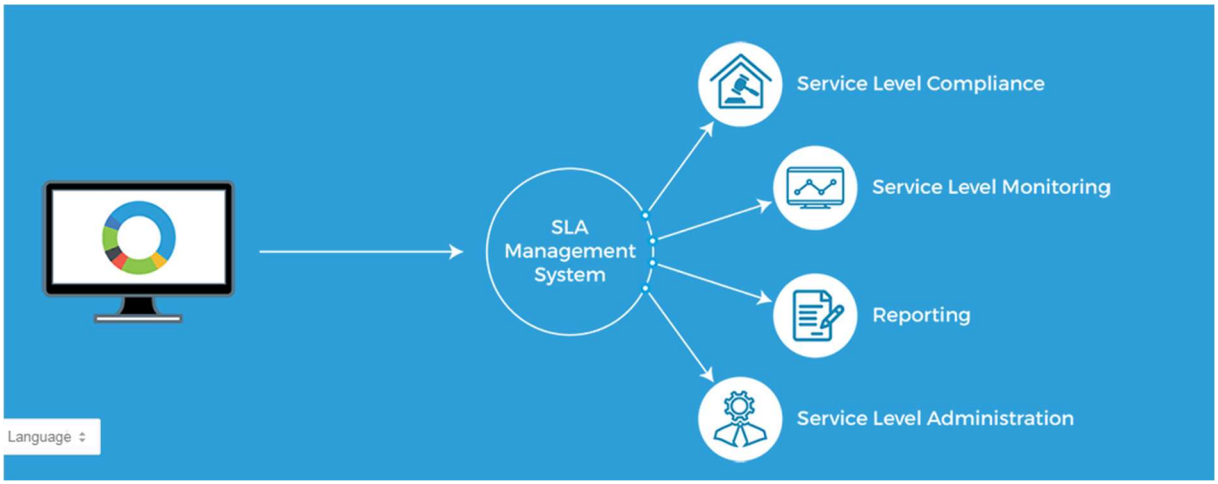
Solution:

A service desk allows you to align your IT with your business.
Identifying and resolving problems Motadata Problem Management helps you identify the root cause of a problem. the helpdesk can receive multiple tickets for a single issue; For example, service unavailability due to server issues. A technician can correlate all tickets associated with a single issue and manage the issue throughout its lifecycle, reducing duplication of work.

Among its multiple features we have chosen the following:

[3] Information from the solution provider's website www.motadata.com

1. Monitor and Track Service Level Agreements for Total Service Level Management



Motadata's Service Level Agreement (SLA) management allows organizations to clearly define the level of services accepted by a vendor's customer, defining the metrics (Availability and Availability, Application Response Time, Performance Benchmark, Response Time, etc.) with which this service can be measured. The platform helps users meet service level agreements (SLAs) for business-level applications and provides out-of-band performance reports for use in capacity planning and efficient utilization of computing resources.

Service Level Compliance

Periodically review service level agreement compliance and leverage the benefits of integrating and trusting your company's tasks into an automated solution that will save you time and effort to complete this process.

Service Level Administration

The platform provides effortless service-level administration, allowing vendor adherence to SLA downtime and availability requirements to be tracked from a single, unified monitoring, administration, and reporting interface.

Service Level Monitoring

Take a structured approach to service level monitoring to ensure high availability of mission-critical business applications and ensure your organization delivers greater business value through better management of your IT and IT processes.

2. Reduced SLA violations

Set targets and receive notification of service level agreement violations. Get details on health trends achieved and remaining in terms of % of service level agreement violations

Proactive alerts and notifications

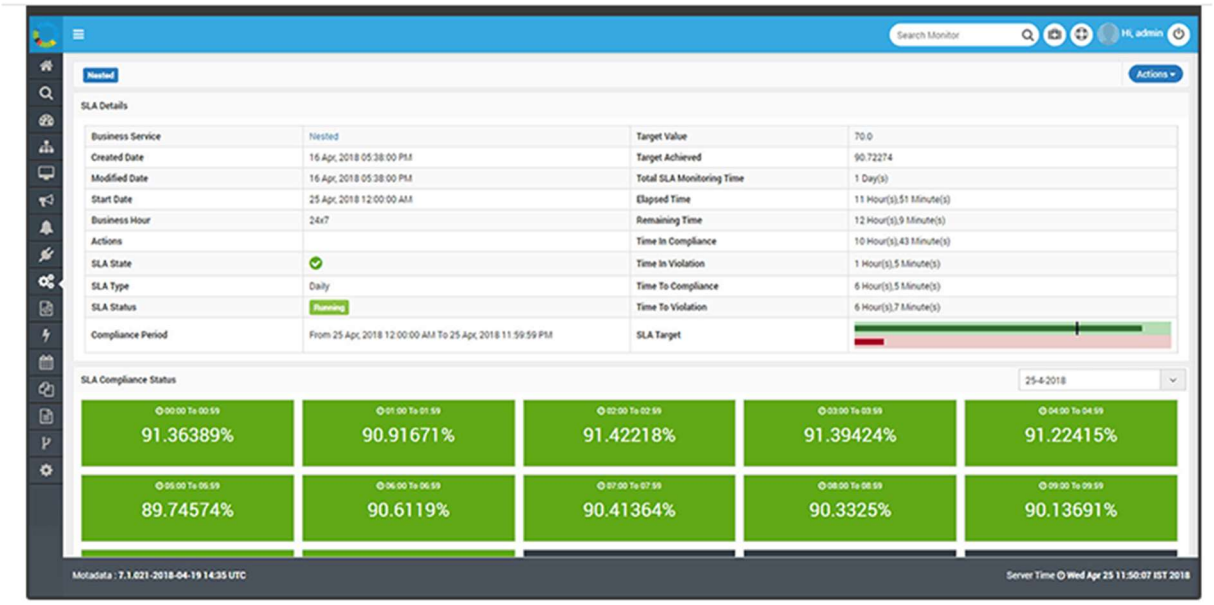
Receive alerts on service level violations with breach time, downtime, LF time, and other details over a period of time

Compliance with service level agreements

Get details on the compliance status of service level agreements, their status, lifecycle for the desired period, and their level of compliance in terms of severity and timeliness, i.e. the number of times the breach occurred, and a history of violations.

Get a holistic view of your business applications

Leverage detailed visualizations to quickly understand active SLAs, automate notifications to keep all parties informed, and access critical metrics to understand business-level performance against service commitments. Monitor and manage service levels to continuously improve services.



3. Network Configuration Management Overview

View recent backups, backup breakdown by device, failure trend, and failed backups from a single view. In addition to that, export the dashboard to PDF/CSV files and you can also set up a scheduler to send the dashboard report via email.

Motadata Network Configuration Management (NCM) organizes and manages the critical network configurations of each component of the IT network infrastructure. IT teams can repair, modify, configure, or upgrade devices remotely with NCM. Reduce the time required to manage critical network changes and repetitive manual tasks across complex, multi-vendor networks with network automation. The platform is pre-integrated with well-known network device vendors such as Cisco, HP, Juniper, and D-Link.

- Simplifies network compliance with automated network configuration management to deploy configurations, create reports, detect changes outside the process, audit

configurations, backup configurations, and more. It supports various protocols such as Telnet, SSH, etc.

- Automated configuration backups
- Quickly locates the most recent configuration backup and applies it to another spare device or deploy it to different devices.
- Improves network security
- Improves network reliability through change monitoring, alerting, configuration backup, and vulnerability assessment
- Saves time and effort
- Saves time and effort
- Saves time by reducing the time required to manage and configure critical changes without any dependency on third-party 3rd party tools.
- Network Configuration Management Capabilities
- Automated configuration for change, backup, and restore
- Saves time and energy by simplifying recurring complex configuration changes instead of manually running them on multiple devices. Quickly recover configuration changes and device failures by restoring the latest configurations.

4. Monitoring and change management

Monitoring and change management allows you to be up-to-date on configuration changes with alerts and also view the changes made. Take advantage of role-based access to fully control who can make changes to devices and configurations.

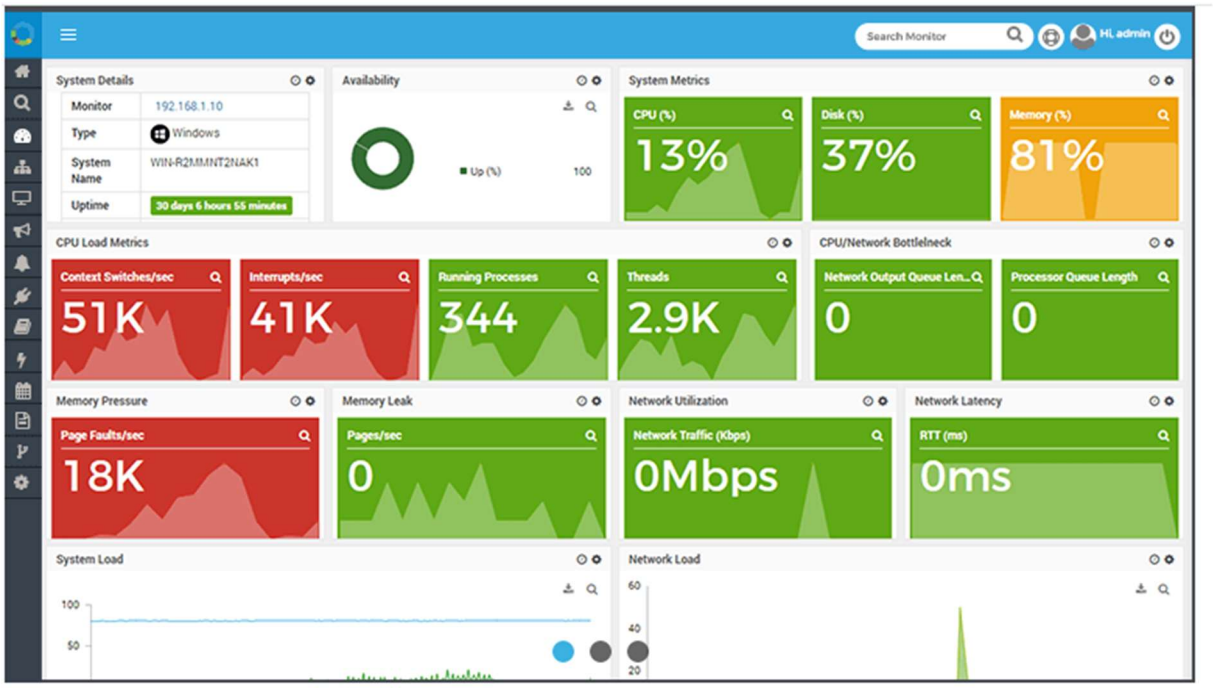
5. Network Security and Compliance

Improves overall network security by easily identifying vulnerabilities through vulnerability assessment. Assess and enforce compliance with critical security standards with out-of-band reports for FISMA, PCI DSS, and more. Protect your network with Reliable Network Configuration Manager

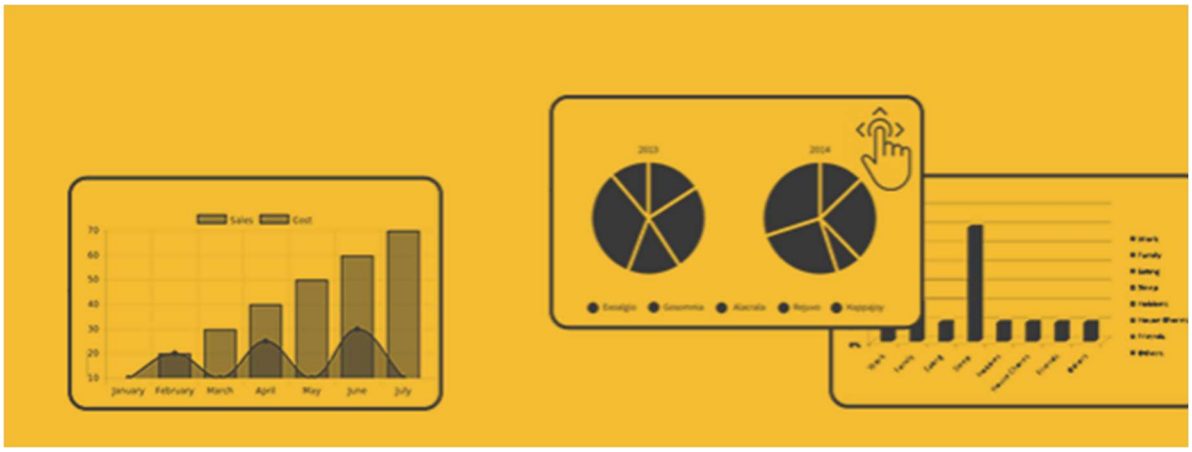
Quickly locates a backup file by simplifying processes such as highlighting configuration errors, scheduling regular backups, archiving scripts, and more. Motadata's automated network configuration management tool can notify you when the device changes. configuration, helping you quickly replace a failed item. Perform backups and restore configurations even using Telnet sessions. In addition, you can compare network configurations and see over time what has changed, you can undo any wrong configuration changes, and much more.

6. Unified dashboard features

Motadata makes it possible to get the most important things in one place. Motadata Network Monitoring Product Suite offers a customized and interactive dashboard that provides visibility of all important metrics on a unified dashboard. In addition, drag-and-drop functionality allows you to add, edit, edit, and delete widgets and customize it to your needs.



Motadata allows you to design dashboards according to your needs is facilitated by the drag and drop function.
Edit your dashboard and reorganize it to stay on top of what matters most.



Motadata allows you to:

- Visualize your infrastructure
- Quickly add predefined data visualizations and dashboards. Build your own data visualizations from scratch, the way you want.
- Fully customizable dashboard
- Fully customizable
- Customize dashboards to your needs by adding widgets. Clone dashboards, add, edit and delete widgets according to your specifications.

COURSE N°5: RISK MANAGEMENT

Introduction

Risk is an integral part of the activities of companies, the management of risks related to information systems is the set of means implemented to mitigate the risks that can damage certain critical assets of the company, in order to ensure the availability of services, confidentiality and integrity of information.

CIOs must first know their critical assets within their organization; the first IT risks began to attract interest in 1970 with centralized systems known as mainframe. They were weak in fact of the homogeneity of the technology (manufacturer technology). The data was centralized and perfectly protected.

In 1985, with the appearance of client/server systems. Risks began to arise as exchanges via networks, data storage was also decentralized and the number of users increased.

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From 1995 with the appearance of the Internet; the exchange and storage of data is carried out globally and no longer with selected partners, Update interventions are carried out instantly and IT risks have become greater.

In this area too, standards and best practices are methodological guides as well as means to guarantee a consistent security approach and are widely used by CIOs.

Section 1: Definitions

Risk management

"Risk management is the process of identifying vulnerabilities and threats to information assets used by an organization in achieving business objectives and deciding on this countermeasures, if any, to take to reduce the risk to an acceptable level, based on the value of the information resource to the organization" (ISACA, 2006).

Risk management is defined by ISO as the set of coordinated activities aimed at directing and steering an organization vis-à-vis risk. There are generally three goals to risk management for IS:

1. Improve the security of information systems.
2. Justify the budget allocated to securing the information system.
3. Prove the credibility of the information system using the analyses carried out.

According to the "IT Risk" produced by ISACA, IT risk is transversal to all compartments of the organization and must be managed as part of enterprise risk management; The risk sensitivity of all organizational compartments should guide the IT risk management process

We can say that IT risk management is a process that allows CIOs to balance the costs of safeguards and realize gains by protecting the organization's IT systems and data.

The risk management process is an iterative process, but unlike a project, it must be repeated indefinitely.

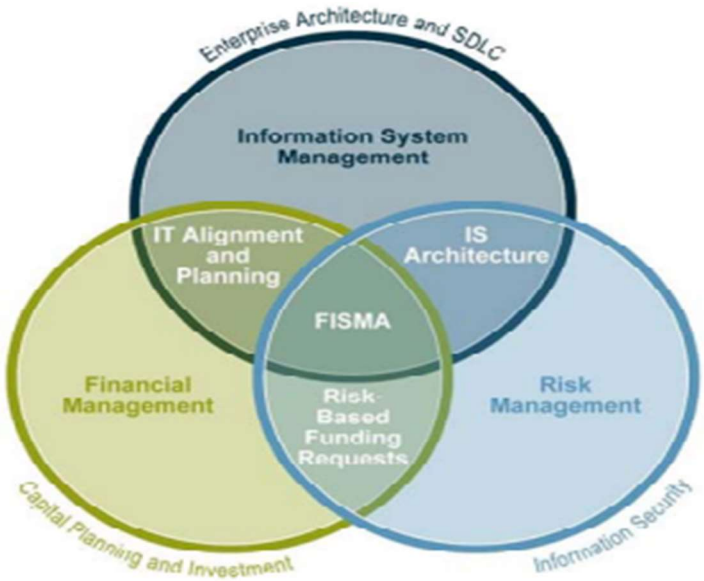


Figure N°19: General framework of risk management
Source: NIST2008

But first What is risk

Risk

The Swiss physician, physicist and mathematician Daniel Bernoulli brought in 1738 in Specimen theoriae novae de mensura the first scientific definition of the word risk: "Risk is the mathematical expectation of a probability function of events".

Risk is an economic concept – the probability of financial losses to the organization this possible loss is therefore, identified, quantifiable and inherent in a situation or activity, associated with the probability of the occurrence of an event or series of events

"Risk is the combination of the probability of an event and its consequences (ISO/IEC, 2002).

The risk can therefore be defined as follows:

Risk = Threat x Vulnerability x Active

The risk here is represented by a mathematical formula, yet it is not a question of numbers, but of a logical concept, whose components are:

The threat:

Is anything that can present a danger to one or more IT resources, the threat can be internal as it can be external to the organization its origin also differs between natural, technological, human or non-human.

The risk factor

Strictly internal, the risk factor is a weakness that a threat can exploit to breach security and harm the organization. It is the embodiment of its vulnerability, it can be the weakness of tools, methods or techniques; It is this weakness that will promote the realization of the threat. Vulnerabilities can be identified through vulnerability scans, audit reports, NIST's vulnerability database, vendor data, commercial computer incident response teams, and system software security scans.

The event

It is simply the realization of the threat, we generally associate with the concept of event the notion of the probability of occurrence or likelihood

Impact

It is the consequence of the realization of the danger on the assets and operations of the company as a whole we can distinguish four categories of impact

1. Operational or functional: anything related to the organization's activities
2. Financial: loss of money
3. Legal or legal
4. Image and reputation of the organization

Section 2: IS Risks

According to the CIGREF 2008 report, risks related to IT uses are part of the operational risks; The criteria taken into consideration for the analysis of IT risks are classic: • Availability; •Integrity; •Confidentiality; •Continuity; • Proof / Traceability / Audibility,. They are therefore classified as follows:

- Informational risks;
- Application risks;
- Risks related to developments;
- Maintenance risks;
- Risks related to infrastructures, servers;
- Project risks;
- Supplier risks.

Still according to CIGREF it is essential to identify these risks, to prioritize them, to link them to processes, and to set up an appropriate governance model in order to manage them both from a financial performance, compliance, continuity, image and information protection point of view...

Section 3: IT Risk Management Practices

A veritable "mess" of standards, repositories and best practices for IT risk management, Although many are no longer used or confidential, specialists estimate that there are more than 200 risk management methods. Admittedly, a great diversity

is offered to CIOs, but on the other hand this multiplicity can lead to some confusion we will present here some by way of example.

But first the following table summarizes some

Méthode	Création	Popularité	Auteur	Soutenue par	Pays	Outils disponibles	État
EBIOS	1995	***	DCSSI	gouvernement	France	logiciel gratuit	
Melisa		**	DGA	armement	France		abandonnée
Marion	1980	**	CLUSIF	association	France		abandonnée
Mehari	1995	***	CLUSIF	association	France	logiciel Risicare	
Octave	1999	**	Université de Carnegie Mellon	universitaire	États-Unis	logiciel payant	
Cramm	1986	**	Siemens	gouvernement	Angleterre	logiciel payant	
SPRINT	1995	*	ISF	association	Angleterre	logiciel payant	
BS 7799		***		gouvernement	Angleterre		
ISO 17799		***		international			
ISO 13335				international			
ISO 15408				international			
SCORE	2004		Ageris Consulting	secteur privé	France	logiciel payant	
CALLIO	2001		CALLIO Technologies	secteur privé	Canada	logiciel payant	
COBRA	2001		C & A Systems Security Limited	secteur privé	Angleterre	logiciel payant	
ISAMM	2002		Evosec	secteur privé	Belgique		
RA2	2000		aexis	secteur privé	Allemagne	logiciel payant	

Table 5: Comparison of risk management methods
Source www.developpez.com

Risk it:

Launched in 2009 by the Information System Audit and Control Association (ISACA), the global IT audit association, it is the first international IT risk management framework that links traditional enterprise risk management to IT risk management and control.
According to the IT Risk framework, risk management encompasses not only the negative impact of operations and service delivery that can bring destruction or reduction of the value of the organization, but also the risk allowing benefits associated with missing opportunities to use technology to enable or improve business or IT project management for aspects such as overspending or late delivery with a adverse trade impact.

EBIOS (Expression of Needs and Identification of Security Objectives)

This is a method developed and maintained by the DCSSI (Central Directorate for the Security of Information Systems). This method, created by identifying the risks of an IS and proposing a security policy adapted to the needs of the company (or an administration).
The EBIOS method consists of five guides (introduction, approach, techniques, tools) and software to simplify the application of the methodology explained in these guides.

Free and open source software. The DCSSI also has a training centre in which training for French public bodies is provided. Also, an EBIOS user club was created in 2003 which makes it possible to create a community of experts allowing the sharing of experiences. A knowledge base to which the EBIOS software connects and provides access to the description of a set of specific vulnerabilities, security constraints, attack methods. It can be enriched via the software.

The EBIOS method is divided into five steps:

1. Context study;
2. Expression of security needs;
3. Threat study;
4. Identification of security objectives;
5. Determination of security requirements.

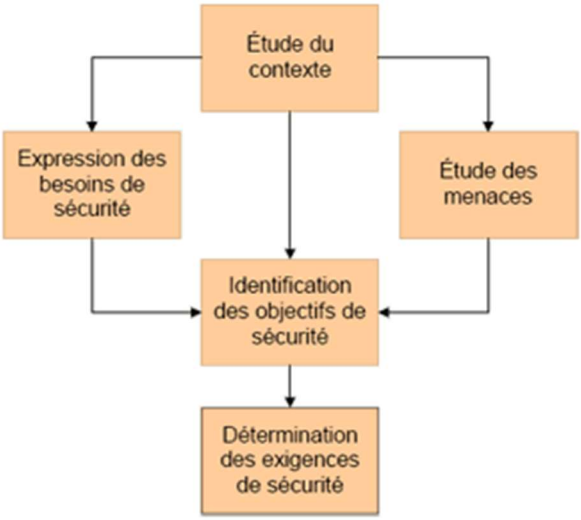


Figure N°20: EBIOS approach
Source: www.ssi.gouv.fr

The Cramm method

(CCTA Risk Analysis and Management Method) was invented by Siemens in England and is supported by the state. Cramm is a rather cumbersome exhaustive method, reserved for large companies since it uses nearly 3000 control points. It has two variants: Cramm Express and Cramm Expert and is compatible with BS7799.

Software is provided with the method for simulation, reporting and monitoring of security measures.

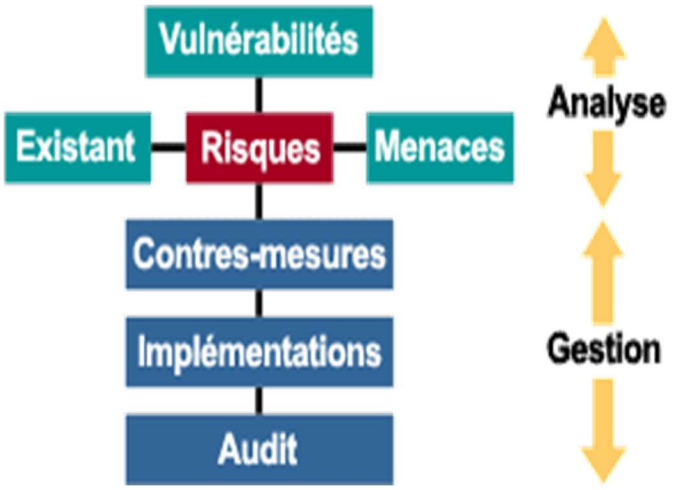


Figure N°21: general approach of the Cramm method
Source: www.Cramm.com

The Cramm method is composed of three phases:

1. Identification of the existing
2. Threat and vulnerability assessment
3. Choice of remedies

The OCTAV method

This risk assessment method is published by the Software Engineering Institute (SEI) of Carnegie Mellon University, recognized in the field of IS security (Federation of Computer Emergency & Response Team – CERTS). (United States) in 1999. Carnegie Mellon University is the focal point for CERTs. Octave is intended for large companies, but recently a version adapted to small structures exists: Octave-S. Its purpose is to allow a company to carry out the risk analysis of its IS by itself, without external help (consultants). For this, a catalog of good security practices is provided with the method.

Octave consists of three phases:

1. Organizational view
2. Technical view
3. Security Policy

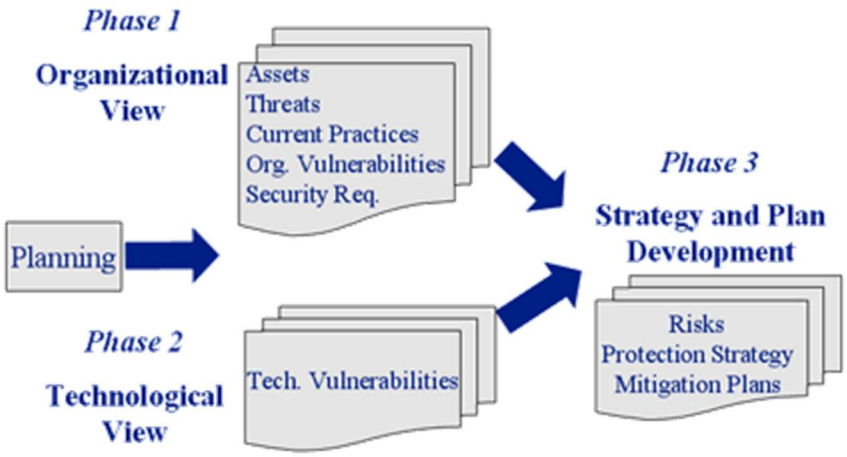


Figure N°22: Phases of the Octave method
Source: www.cert.org/octave

ISO/IEC 27001

The ISO/IEC 27001 standard, published in November 2005, defines the policy for the management of IS security within a company. It is derived from the BS 7799-2:1999 specification *(Specification for Information Security Management Systems) which defines the requirements for creating an ISMS* (Information Security Management *System).* It specifies in the annex certain security controls, taken from ISO/IEC 17799, whose implementation is mandatory.

ISO 27001 includes six process areas:

1. Define an information security policy.
2. Define the scope of the information security management system.
3. Conduct a security risk assessment.
4. Manage identified risks.
5. Select and implement controls.
6. Prepare a Statement *of Applicability (SoA).*

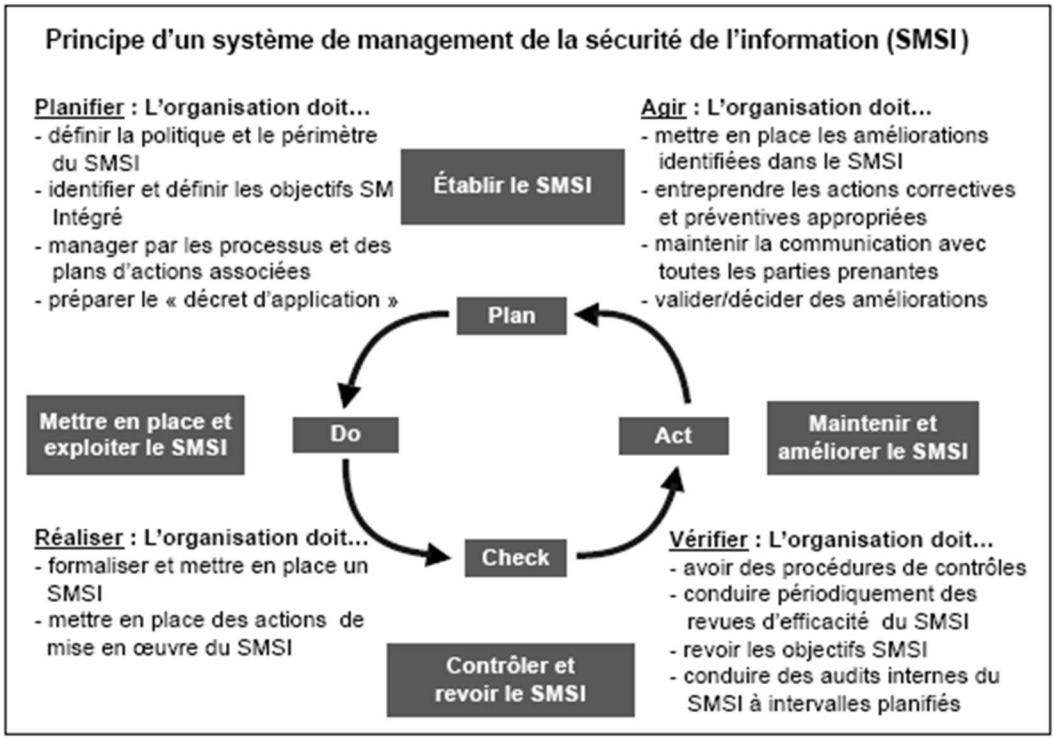


Diagram N°23: SIMS
Source: Moisand, 2009

ISO/IEC 17799 and ISO/IEC 27002

The ISO/IEC 17799 standard of 2005, renamed ISO/IEC 27002, specifies an information systems security policy that is presented as a guide to good practice. Overall, according to this standard, the approach to securing the information system is a process containing four phases:

1. Perimeter to be protected (list of sensitive assets).
2. Nature of threats.
3. Impact on the information system.
4. Protective measures to be put in place.

ISO/IEC 27002 provides examples and guidance on levels 1 to 3, and lists a series of measures for level 4. It has 39 control categories and 133 verification points divided into 11 areas.

ISACA's "IT Risk Practitioner Guide" compares IT risks and ISO 27005. The overall comparison is shown in the following table:

Risk Management Constituent Processes			
ISO/IEC 27005:2008	**BS 7799-3: 2006**	**NIST SP 800-39**	**Risk IT**

Settlement Background	Organizational Context	Frame	GR and RE domains more specifically RG1.2 Propose IT risk tolerance, RG2.1 Establish and maintain accountability for IT risk management RG2.3 Align IT risk practices with enterprise risk practices, RG2.4 Provide adequate resources for IT risk management, RE2.1 Define IT risks scope of analysis.
Risk assessment	Risk assessment	Evaluate	Process RE2 comprises: RE2.1 Define IT risks scope of analysis. ER2.2 IT Risk Assessment. RE2.3 Identify risk response options. ER2.4 Conduct a peer review of computer risk analysis. In general, the elements as described in the ISO 27005 process are all included in the IT risk; However, some are structured and named differently.
Risk treatment	Treatment and risk management decision made	Answer	ER 2.3 Identify Risk Response Options AR2.3 Addressing exposure to risk discovered and opportunity
risk acceptance			RG3.4 Accepting IT Risk
Risk communication	Ongoing risk management activities		RG1.5 IT Promoting a culture of risk awareness RG1.6 Encourage effective communication of IT risks ER3.6 Develop IT risk indicators.
Risk monitoring and review		Monitor	Rg2 Integration with ERM. ER2.4 Conduct a peer review of computer risk analysis. RG2.5 Provide independent assurance on IT risk management

Table 6: comparison between methods
Source: www.ISACA.com

Section 4: Risk Management Process Activities

Before any action, it remains necessary to clearly delimit beforehand the perimeter of intervention is what it is the whole company or a subsidiary, a factory .. etc) and of course consult the overall risk management strategy and policy.

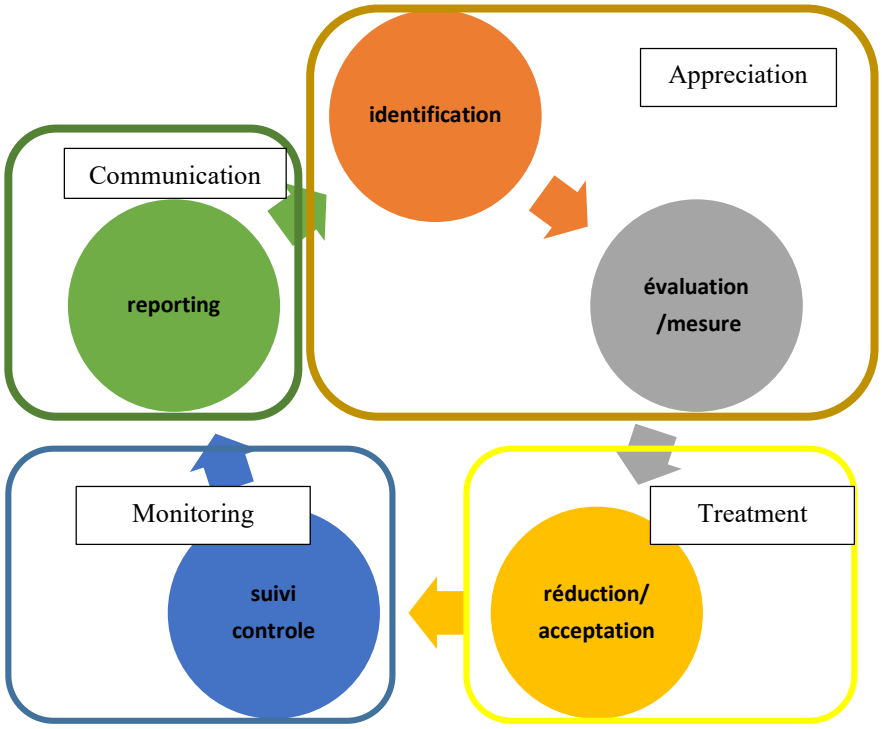


Figure N°24: The risk management process
Source: Rosenthal-sabroux, 2009

Before starting the identification of risks, it is necessary to first identify the IT assets the objective is to select the critical assets for the organization, this exercise is important when the budget dedicated to risk management limited

1. Assessment

a) Identify threats

As we have explained, the threat is anything that can harm the organization. It should be noted that carrying out this exercise two main and complementary methods are used: monitoring and exploitation of the state of the art monitoring concerns technologies and regulations and falls under the security function of the IS. The exploitation of the state of the art is shared between IS security and IT management (Rosenthal-Sabroux, 2009), threat databases are also used

There are many other types of threats including:

- Natural disasters.
- System failure.
- Accidental human interference. .
- Malicious humans. There are three types of malicious behavior:
    - Interference: concerns the deletion of data, distributed denial of service (DDoS) against websites, or physical theft of IT assets caused by an attacker
    - Interception: concerns piracy
    - Identity theft: concerns the misuse of someone else's credentials

This exercise remains incomplete if it is not associated with a good identification of internal vulnerabilities

b) Assessing likelihood

Concerns the evaluation of the impact of the realization of threats ranging from simple malfunction to total shutdown of the information system on business processes. Business process mapping must be established beforehand. This assessment can be quantitative as it can very well be qualitative (the likert scale can be used

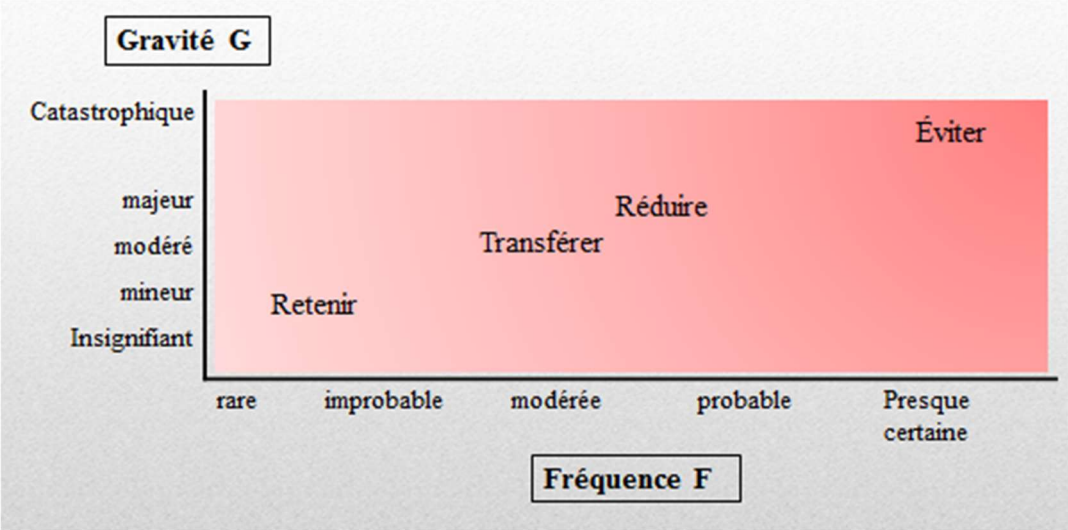


Figure N°25: representation of the results of a risk analysis

2. Risk treatment

After being identified and prioritized, the notion of severity can be associated with the different risks the following diagram shows the three categories of risks;

1. Risks of high probability and high impact should be avoided
2. The risks of low likelihood and low impact are to be accepted in the state
3. The others are risks that require treatment and control

Classes de criticité	Niveau de risque	Décision associée
C1	Acceptable en l'état	Aucune action n'est à entreprendre
C2	Acceptable sous contrôle	Organiser un suivi en termes de gestion du risque dont son transfert par la prise d'assurance
C3	Inacceptable	Refuser la situation et prendre des mesures en réduction des risques

Diagram N°26: Risk criticality classes

The processing may be implemented by technical means, such as computer hardware or software, encryption, intrusion detection mechanisms and identification and authentication subsystems. Another non-technical processing measure concerns security policies as well as administrative measures in a comprehensive manner.

4. Risk monitoring

According to (Rosenthal-Sabroux, 2009), surveillance has three objectives:

1. Assess the effectiveness of existing treatment measures
2. Detect risks that are not included in the management system
3. Optimize the existing system

COURSE N°6: MASTERY OF SI PROJECTS

Introduction

An IT project is complex by definition. Conducting a business IT project, whether it is the development of new software or the installation of an information system solution, such as an integrated ERP software package or CRM-type customer relationship management, is not a simple task.

The intangible nature of an information system increases risks. And the related uncertainties. Also, this type of project involves multiple actors and interacts with the organization of the company.

According to Coopers & Lybrand (1994), only 20 to 25% of change projects achieve all the desired objectives. In terms of BPR, the very initiators of reengineering – Hammer & Champy – agree that the failure rate is around 70%. According to Kepner Tregoe, 2/3 of companies that have implemented change programs record short-term profitability gains, but the same proportion is the same or worse in the medium term. 60% of managers rate their employees' reactions as ranging from indifference to hostility.

But first what is project management

Section 1: Definitions

The project

The Project Management Institute, an international project management standardization organization, defines a project as follows:

"A project is a temporary venture decided with the aim of creating a unique product, service or outcome."

1. **Company:** this is to give an economic scope of the project, with all that this entails (resources, budget and risks incurred).
2. **Temporary:** this means that each project has a well-defined beginning and end,
3. **Product, service or single result:** a project creates unique deliverables, a product or service, a software application, ...

According to ISO 10006, a project is a single process that consists of a set of coordinated and controlled activities with start and end dates, undertaken with the aim of achieving a goal that meets specific requirements such as time, cost and resource constraints.

AFITEP and AFNOR define a project as "a set of actions to be carried out to satisfy a defined objective, within the framework of a specific mission, and for the realization of which not only a beginning, but also an end has been identified" (AFITEP, 2000).

Each of these three definitions highlights the interrelated activities of a project and the uniqueness of this process, in addition to the underlying constraints that constitute the three elements of the Project triangle: objective, means, deadline.

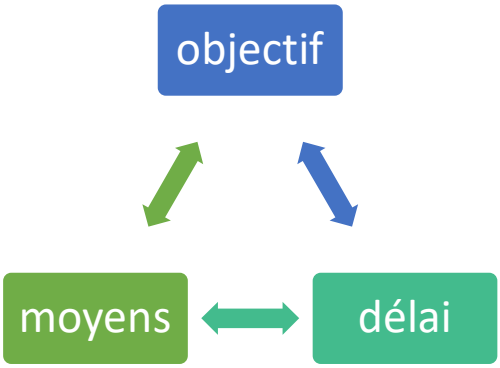


Figure N°27: The project triangle

Project management

According to the IPMA framework (IPMA, 1999) "Project management consists of planning, organizing, monitoring and controlling all aspects of a project, as well as the motivation of all those involved in the project, in order to achieve objectives safely and within the defined criteria of cost, time and performance. This includes the management tasks necessary for the performance of the project. »

According to AFITEP and AFNOR (AFITEP, 2000): Management is "the set of tasks that make it possible to carry out any operation to a successful conclusion".

Project management is the use of a cocktail of knowledge, skills, tools and techniques but also art and common sense for the realization of an idea into a product or service, this involves among others:

1. Manage the various needs, concerns (and sensitivities) of stakeholders.
2. Counteract competing constraints caused in particular by the content; quality; timeline; the budget; resources and risks

Management de l'intégration du projet	Management du contenu du projet	Management des délais du projet
• Élaboration de la charte du projet • Élaboration de l'énoncé préliminaire du contenu du projet • Élaboration du plan de management du projet • Direction et pilotage de l'exécution du projet • Surveillance et maîtrise du travail du projet • Maîtrise intégrée des modifications • Clôture du projet	• Planification du contenu • Définition du contenu • Création de la structure de découpage du projet • Vérification du contenu • Maîtrise du contenu	• Identification des activités • Séquencement des activités • Estimation des ressources nécessaires aux activités • Estimation de la durée des activités • Élaboration de l'échéancier • Maîtrise de l'échéancier
Management des coûts du projet	**Management de la qualité du projet**	**Management des ressources humaines du projet**
• Estimation des coûts • Budgétisation • Maîtrise des coûts	• Planification de la qualité • Mise en œuvre de l'assurance qualité • Mise en œuvre du contrôle qualité	• Planification des ressources humaines • Formation de l'équipe de projet • Développement de l'équipe de projet • Diriger l'équipe de projet
Management des communications du projet	**Management des risques du projet**	**Management des approvisionnements du projet**
• Planification des communications • Diffusion de l'information • Établissement du rapport d'avancement • Management des parties prenantes	• Planification du management des risques • Identification des risques • Analyse qualitative des risques • Analyse quantitative des risques • Planification des réponses aux risques • Surveillance et maîtrise des risques	• Planification des approvisionnements • Planification des contrats • Sollicitation des offres ou des propositions des fournisseurs • Administration du contrat • Clôture du contrat

Table N°7: Project management areas
Source: PMBOK, PMI

Section 2: Characteristics of IS Projects

Software development is not like the manufacture of a machine or the construction of a building, software is a set of programs, processes and rules, and possibly documentation, relating to the operation of a data processing set (Larousse); whose development is software engineering (Software engineering is particularly concerned with systematic procedures that ensure that large software meets customer expectations, is reliable, has low maintenance costs and good performance while meeting construction deadlines and costs).

Based on (Morley, 2006); The triplet objective, means, deadline presents, in the field of information system, three specific characteristics, namely:

1. There is interaction between the objective on the one hand and the means/deadlines on the other hand: A first identification of the objective leads to an evaluation of the overall project load.
2. The objective of the project is not perfectly defined until the completion of the project: an information system remains something abstract, so it is difficult to give a visual representation. Added to this is the fact that the business process

models representing the changes made are also abstract and do not take into account the experience of the actors that is gradually expressed.

3. The development of an information system does not take place in an organizational vacuum, but in an organization, whose particularities are part of the characterization of the project itself; areas of uncertainty develop as well as the strategies of groups or individuals.

We retain two types of software development:

Tailor-made development:

In this type of projects the information system is developed 'from scratch' by Si professionals according to the needs of the users.

COTS/ERP development:

These projects concern the Selection, Purchase, Adaptation, Integrations of COTS Software Components Subsystems, (standard system applicable as such or adaptable to the needs of the buyer).

In this type of projects pre-developed applications can be used; COTS can be standard and therefore directly integrated or adaptable; requiring configuration according to business needs.

Also, in this type of project, it is not a development itself, but rather a work of selection, adaptation, assembly and updating.

Packages often offer more functionality than organizations need and/or vice versa do not cover all functions

The following table compares these two types of projects.

	From scratch	**COTS/ERP**
Development cost	most expensive	the cheapest
Time	very long	reduced
Programming errors	Significant Risk	Very low risk of programming errors
Need	If exactly matches user needs	do not follow the user's needs very well

Table 8: Difference in development from scratch and COTS/ERP

Section 3: Organization of an IS project

Like any other project, the large-scale information system project is based on bipolar management, the MOA project owner and the MOE project manager. The MOE, Project Management, is responsible for the actual realization of the project, while the MOA, Project Management, is focused on the administrative and functional aspects of expressing the need and monitoring the progress

Maître d'ouvrage – Client

According to the AFITEP dictionary: "Legal person who decides on the construction of a structure, ensures its financing and entrusts it to a project manager"

The contracting authority is the natural person who bears responsibility for the project of the contracting authority it is the customer by whom the work is carried out

- The client
- Masters the basic idea of the project
- Is responsible for the work (project result)
- Provides functional specifications
- Validates the functional recipe of the solutions
- Pays production expenses
- Assumes use of the product after transfer of ownership

The client can be a team or a hierarchical entity of the organization for which the IS is carried out, the future users; It can also be an internal or external service provider to the company requested to ensure the interface between the user and the supplier.

Project Manager – Supplier

Still according to the AFITEP project management dictionary; The project manager is a natural or legal person who carries out the work on behalf of the contracting authority and who assumes overall responsibility for the technical quality, the deadline and the cost" he is the supplier who carries out the work

Project Manager Project Management (CP MOE) is the natural person who bears responsibility for the project management

Responsibilities of the CP EOM:

- design, study and carry out the work (project result)
- Validate the technical recipe of the solutions
- guarantee the proper technical implementation of the solutions
- deliver the product on time in order to be remunerated
- He is responsible for the technical choices inherent in the realization of
- the work in accordance with the requirements of the contracting authority
- He is responsible as part of his mission to designate a natural person responsible for the smooth running of the project

The function of project manager can be fulfilled by a computer team that carries out the IS Internal or external to the requested company, ensures that the work meets the needs of the customer it can also be fulfilled by a team of future users of the IS, the employees of the organization.

Figure N°28: Organization of the project
Source: www.chef-de-projet.org

Section 4: Project Development Methods

Classic methods:

IT projects have been managed for several decades with a rigid approach (everything must be planned, everything must be predictable) based on a classic "waterfall" life cycle model or its "V-shaped" adaptation, based on a set of sequential activities that naturally begins with the collection of needs, the definition of the product, development, and which ends with testing

The following table presents this breakdown with the correspondences between the vocabulary of the Merise method that of the SDMS method, and that resulting from the MCP method which served as a reference for the AFNOR Z67-101 standard.

NORME AFNOR Z67-101	MERISE	SDMS
	Schéma directeur	
Étude préalable Exploration Conception Appréciation	Étude préalable Observation Conception/Organisation Appréciation	DBS (Définition des besoins du système) CAS (Conception de l'architecture du système)
Conception détaillée	Étude détaillée	SES (Spécifications externes du système)
Réalisation	Étude technique Réalisation	SIS (Spécifications internes du système) Programmation Test
Mise en œuvre	Mise en œuvre	Conversion Installation
Évaluation	Qualification	Bilan

Table N°9: classic division
Source: (Rota, 2006)

The Waterfall Model

The main purpose of the waterfall model, inherited from the building, is to accurately define the tasks of the supplier and the customer who accepts or rejects the result. There is no possible return on the options validated at the end of the previous phases, there is tunnel effect and also inability of the end user to validate the intermediate steps.

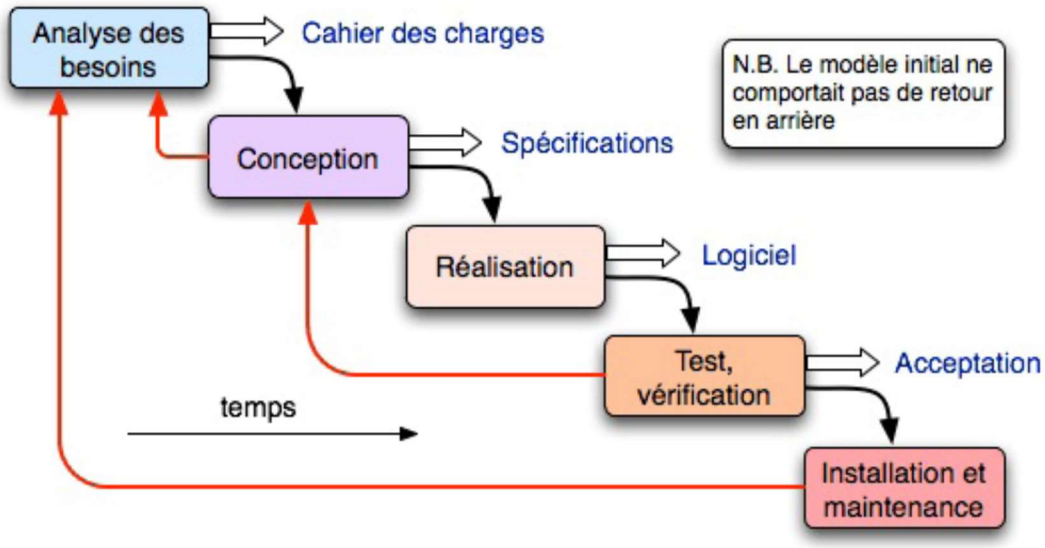


Figure N°29: waterfall cycle

V-cycle

Adaptation of the waterfall model to the world of computer science which highlights the top-down path whose principle is the validation of each step is covered by tests; Always the tunnel effect and no questioning of the choices of the previous step

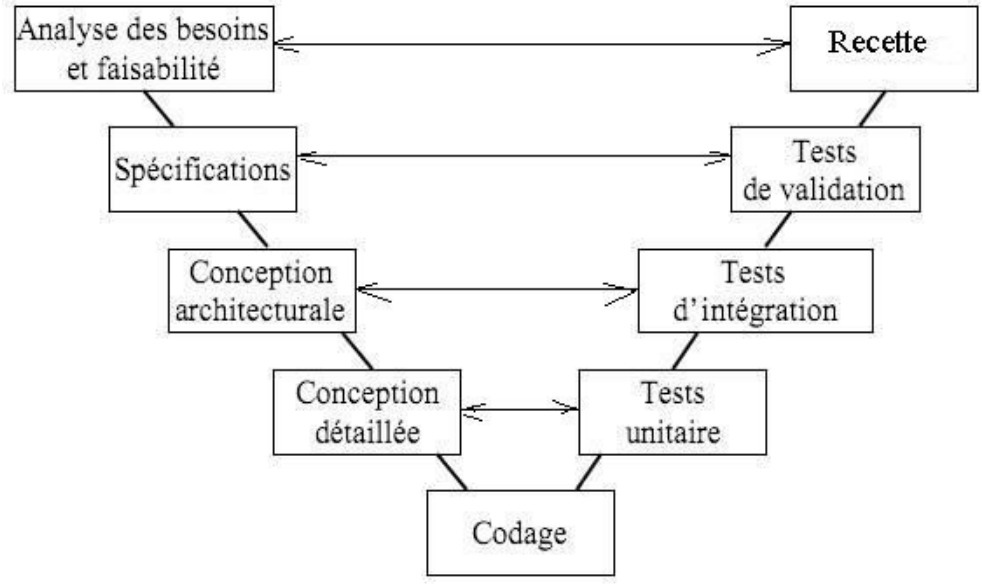


Figure N°30: V-cycle

The limits of the classical approach

- Rigidity of the approach
- The tunnel effect
- Poor communication
- Late removal of risk factors
- A plethora of documentation

Agile methods

From the 1990s, developers began to use methods that were less predictive and more flexible in the face of adaptation needs, thus making the activity more agile and therefore better able to cope with market constraints. These are the so-called "agile" methods. "An agile method is an iterative and incremental approach, which is conducted in a collaborative spirit, with just the right amount of formalism. It generates a high-quality product while taking into account the changing needs of customers. (Rota, 2006)

Still according to the same author; Iterative development consists of dividing the project into several stages lasting a few weeks; Each step is then called an "iteration". However, it should be noted that the result of an iteration is not a prototype but rather an intermediate version of the final product; This is a minimum version of the expected product. Features are gradually integrated over the life cycle, so the system is gradually enriched to overall satisfaction. Each iteration is a mini-project in itself that includes all the development activities carried out in parallel: analysis, design, coding and testing, not to mention project management activities.

The benefits of iteration development

Sometimes described as artisanal or unannounced methods by detractors, these methods show great efficiency, especially in terms of team membership, non-resistance to change and clearly light formalism, by arpport to its predecessors. The following table summarizes some of these benefits

Avantage	Les +
La communication est de meilleure qualité.	Les malentendus, incompréhensions, incohérences sont mis en évidence tôt dans le projet ; il est donc encore possible de les corriger. L'utilisateur a la possibilité de clarifier ses exigences au fur et à mesure. Le client reçoit des « preuves » tangibles de l'avancement du projet.
La visibilité est meilleure.	Le client peut ainsi visualiser les travaux plus régulièrement, au fil de l'eau, sans attendre la fin du projet, puisqu'à la fin de chaque itération, les fonctionnalités retenues sont développées, testées, documentées et validées, prêtes pour l'exploitation.
La qualité est évaluée en continu.	Les tests sont effectués à chaque itération, les anomalies détectées sont corrigées au fur et à mesure.
Les risques sont détectés très tôt.	Grâce aux activités de développement précoces, les risques sont détectés tôt et résolus rapidement.
L'équipe prend confiance.	L'itération donne une occasion d'apprendre, donc de capitaliser ou d'adapter les pratiques pour la suite du projet. Les premières itérations fiabilisent les prévisions. Le changement n'est plus une menace, mais au contraire, l'opportunité de mieux faire et de mieux satisfaire le client.
Les coûts sont contrôlés.	Les coûts sont limités, en termes de risques, au périmètre de l'itération ; s'il faut reprendre une itération, on ne perd que les efforts de cette itération et non la valeur du produit dans sa globalité. On peut aussi arrêter le projet à l'issue de quelques itérations si l'on n'a plus de budget.

Table N°10: Incremental development
Source (Rota, 2006)

"Agile" methods were officially launched in 2001; a meeting between 17 authors who met to exchange and find a common base of values and good practices to highlight an

organization of software development projects less structured and lighter and breaking with the methods hitherto in force,

The result was recorded in the "Agile Manifesto". The agility of the methods refers to the ability they are supposed to give to circumvent obstacles and adapt to the particularities of each project. Agility is largely human and organizational in nature.

The methods that can be qualified as agile, since the publication of the Agile manifesto, classified by date of publication are:

1. Rapid application development (RAD, 1991)
2. Dynamic systems development method (DSDM, 1995, English consortium marketing RAD)
3. Scrum (1996)
4. Extreme programming (XP, 1999)
5. Adaptive software development (ASD, 2000)
6. Feature-driven development (FDD, 2003)
7. Behavior-driven development (BDD, 2003)
8. Crystal clear (2004)

Case Study No. 3	EASY CREDIT: Managing an IT project

The EASY CREDIT project[4]

Creation of an IS for managing the various applications for remote bank loans (at the service of individuals and professionals)

How to facilitate the credit application procedure via this IS which manages all the application procedures for the different types of credits of individuals or professionals remotely?

Utilities:

- facilitate the application process for different types of credits for applicants (individuals or professionals)
- Optimize the management of credit applications for bankers

Stakeholders

- Banks
- Special
- Professionals
- Insurance
- Government
- Dealers
- Real estate developers

Objectives of the SI EASY Credit:

1. For applicants:

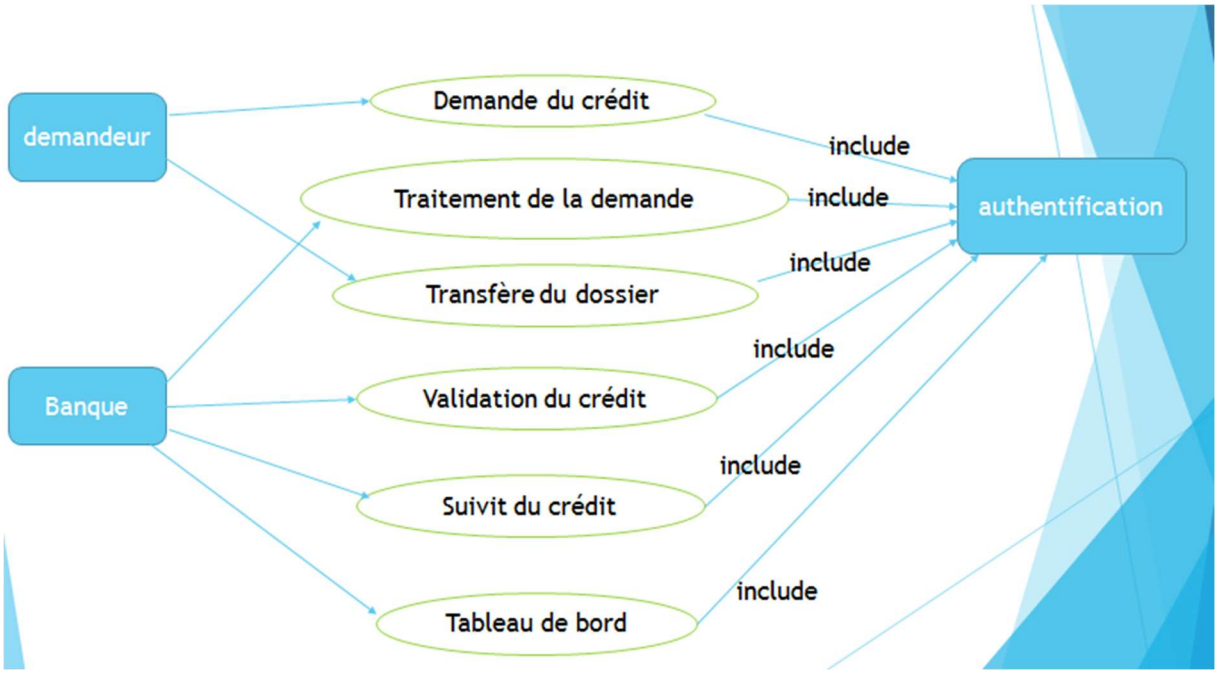
- Avoid travel by credit applicants
- Time saving
- Remote monitoring of the evolution of the processing of his files.

2. For Banks

- Ensuring better management of credit requests
- Automatic processing of applications (reduced risk of non-solvency of applicants)
- Decision support (dashboards summarizing applications and credits)

Overall IS use case diagram

[4] Excerpt adapted from a project led by MSSI master's students (DJEMA Amina, HOUAS Aicha Sara, BENMECHERI Zahra, MESLOUH Rayan Nouria, MECHBEK Abdelmotaleb, MIMOUNI Brahim, ABAIDIA Djamel) of the Ecole Nationale Supérieure de Mangement under the direction of the author



Calculates delays

Using the WBS "Work Breakdown Structure", represents, in the form of a tree, the different work components necessary to achieve the result as described in the PBS (Product Decomposition Structure).

It provides an answer to both questions:

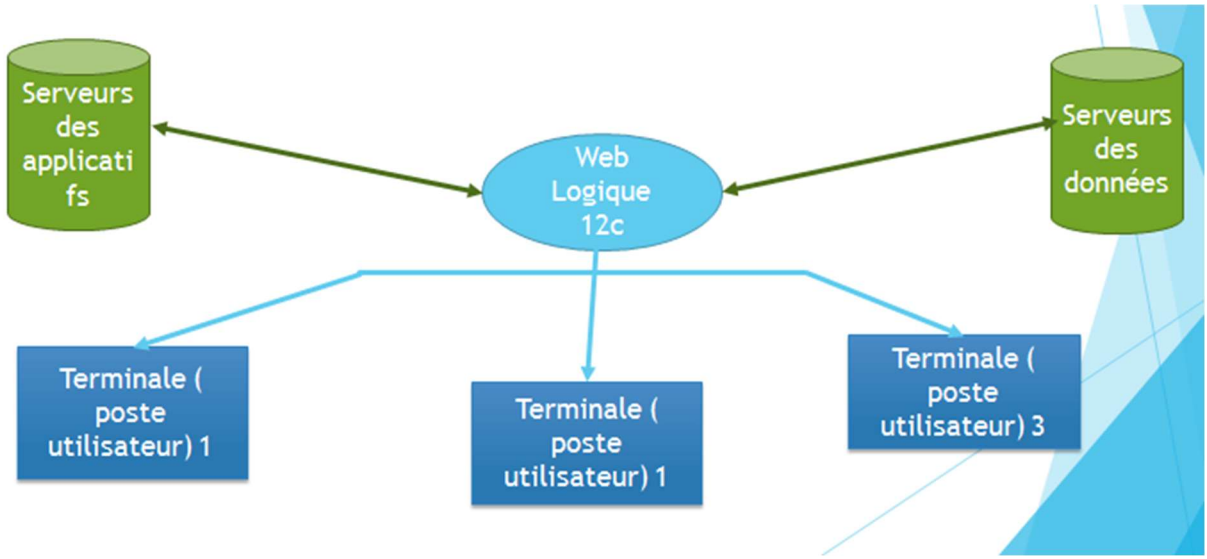
1. What should be done?
2. How should we go about it?

We will first carry out a general design on the whole field, We will continue the work through the sub-projects, which we will decide when planning them.

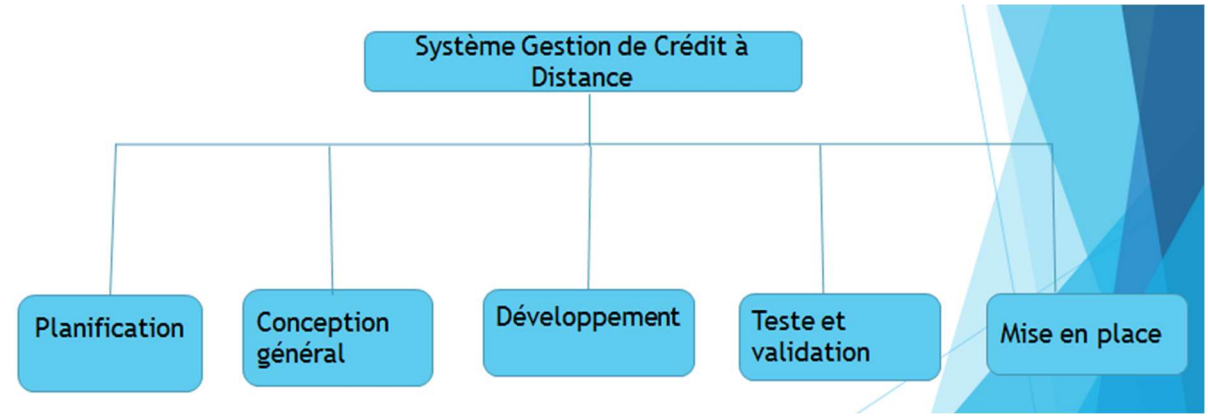
Each has a design phase, then a development and testing phase, and finally the resulting sub-projects will be integrated.

The general design charged by project manager to give an overall presentation on the project, programming language, equipment (servers and development stations).

Programming language used Oracle 11G (three-trireme architecture).



Project breakdown (according to WBS)



The calculation of deadlines:

Identification of activities; we will make a breakdown by type of work (task), WBS

Phase	Taches	Temps
Planification	- Cahier de charge - Estimation de ressources	03 jours 01 jours
Conception général	• création de demande • étude primaire • Étude secondaire • transfère du fonds • gestion de crédit • Tableau de bord	05 jours 05 jours 05 jours 05 jours 05 jours 05 jours

Phase	Taches	temps
Développement	• création de demande • étude primaire • Étude secondaire • transfère du fonds • gestion de crédit • Tableau de bord	10 jours 05 jours 05 jours 10 jours 15 jours 05 jours
Teste et validation	• création de demande • étude primaire • Étude secondaire • transfère du fonds • gestion de crédit • Tableau de bord	01 jour 01 jour 01 jour 01 jour 01 jour 01 jour
Mise en place	Intégration du système globale	05 jours

Total duration 95 days

Sequencing spots:

Tache précédente	Tache	Nom de tache
Aucune	A	Planification
A	B	Conception général
B	C	Développement
C	D	Teste et validation
D	E	Mise en place

Project graphs:

- The rest on the service on MS Project (separate file);
- Total: 95 days worked;
- Start on 06/04/2018, end on 16/06/2018;
- 4 months and 10 days.

Calculate costs:

phase	tache
Estimation les nombres des lignes d'instructions programmés (Développement)	• création de demande: 1700 Inst; • étude primaire: 1300 Inst; • Étude secondaire: 1500 Inst; • transfère du fonds: 2300 Inst; • gestion de crédit: 5000 Inst; • Tableau de bord: 8000 Inst: • Totale : 19800 Inst

19800 Instruction It is therefore a simple project

Type de projet	Charge en mois-personne	Délai en mois
Simple	Charge = 2.4 (Kisl) 1.05	D = 2.5 (Charge) 0.38
	Charge = 2.4 (19.8) 1.05 Charge = 55.17	D = 2.5 (55.17) 0.38 D = 11.5

Average team size = Load/D = 55.17/ 11.5 = 4.8 (5 Person)

Estimated salary per person

- salary Person/month = 5 m;
- Global Salary 5p/m = 25m;
- Development cost = 25 × 4.5 = 112.5 M

The Global Project Cost = 200 M

Risk management

Meeting of the work team for a BRAINSTORMIG session which aimed to:

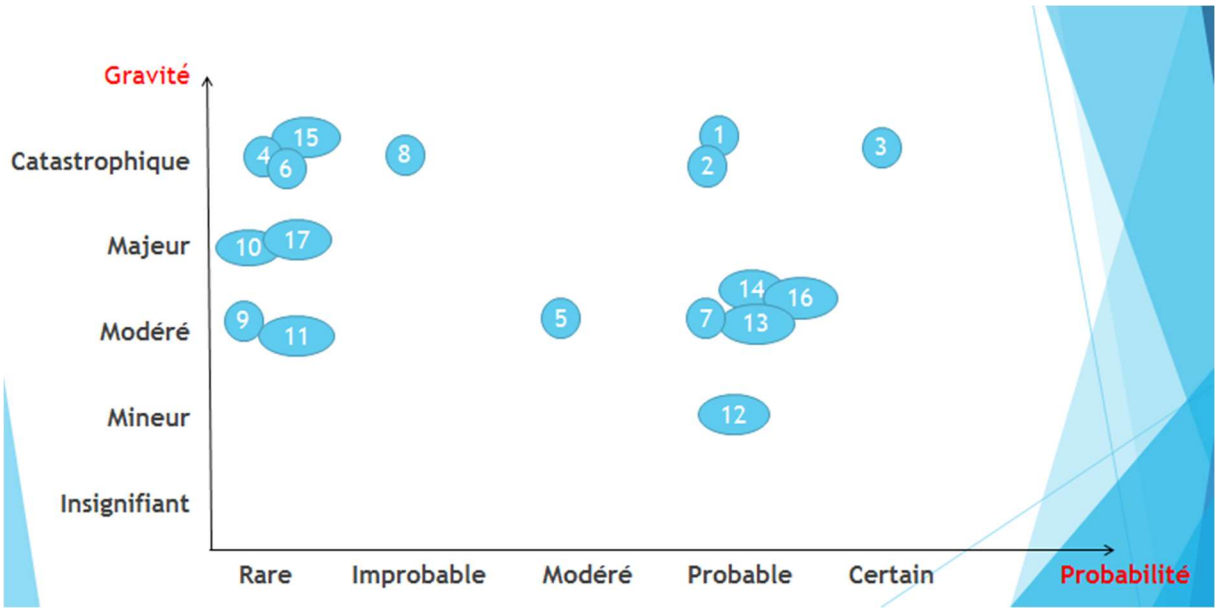
1. A global vision of different types of risk;
2. Identification of the risks related to each phase of the project (according to our division);
3. Assess the likelihood and impact of each risk;
4. Ranking of risks according to their acceptance for damage reduction.

Identification and evaluation

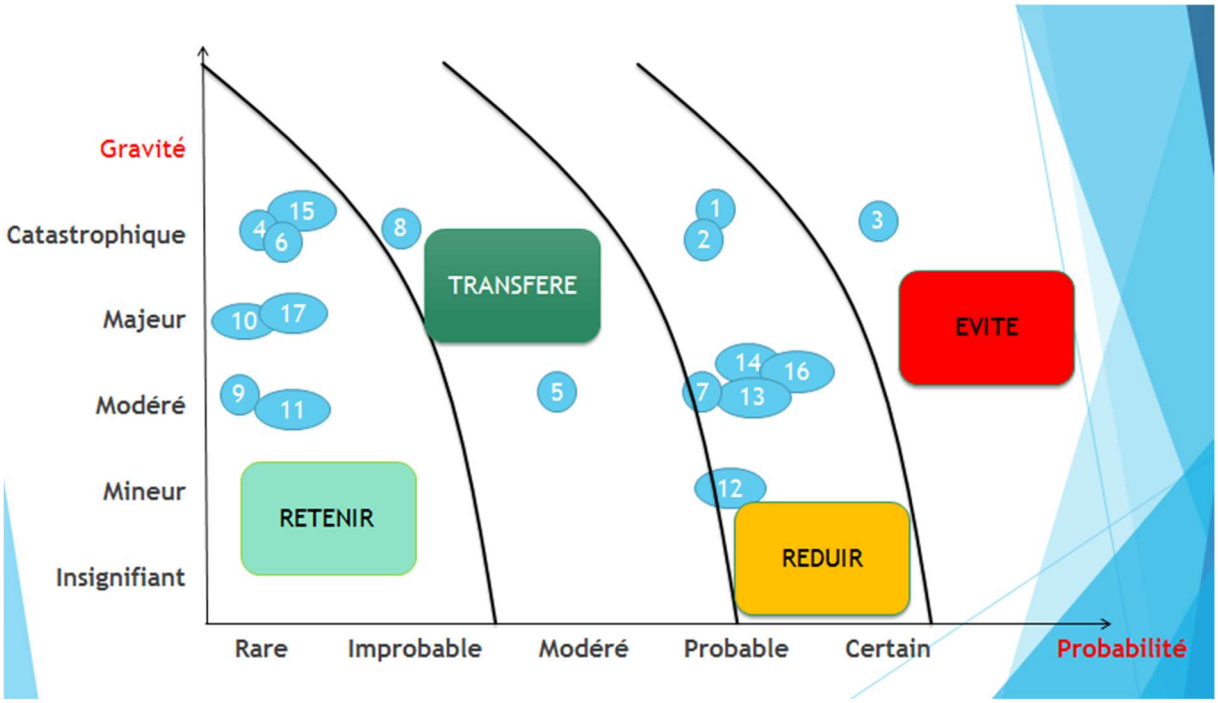
Risques	Probabilité	impact
1- Sous estimation des charges et délais	Probable	Catastrophique
2- Mauvaise expression du besoin par le maitre d'ouvrage;	Probable	Catastrophique
3- Mauvaise interprétation du maitre d'oeuvre;	Certain	Catastrophique
4- Maque de compétence du maitre d'œuvre;	Rare	Catastrophique
5- Mauvaise coordination entre le maitre d'ouvre et maitre d'ouvrage dans l'expression des besoins.	Modéré	Modéré
6- Manque de développeurs compétents;	Rare	Catastrophique
7- Absence du personnels;	Probable	Modéré

Risques	Probabilité	impact
8- limites de capacités informatique;	Improbable	Catastrophique
9- La non métrise des nouvelles informatiques;	Rare	Modéré
10- Manque d'équipement;	Rare	Majeur
11- Absence d'espris d'équipe;	Rare	Modéré
12- Les pannes;	Probable	Mineur
13- Délais des contraintes;	Probable	Modéré
14- Obsolesance des software;	Probable	Modéré
15- La non incompatibilité entre le hardware et le software;	Rare	Catastrophique
16- Saturation de l'application a cause d'un faible débit;	Probable	Modéré
17- Risque structurel de la CNEP au cas de changement de directeur qui mène a la non validation de projet;	Rare	Majeur

This estimate can be presented by a graph as follows:



Then for better visibility we divide the graph into three zones

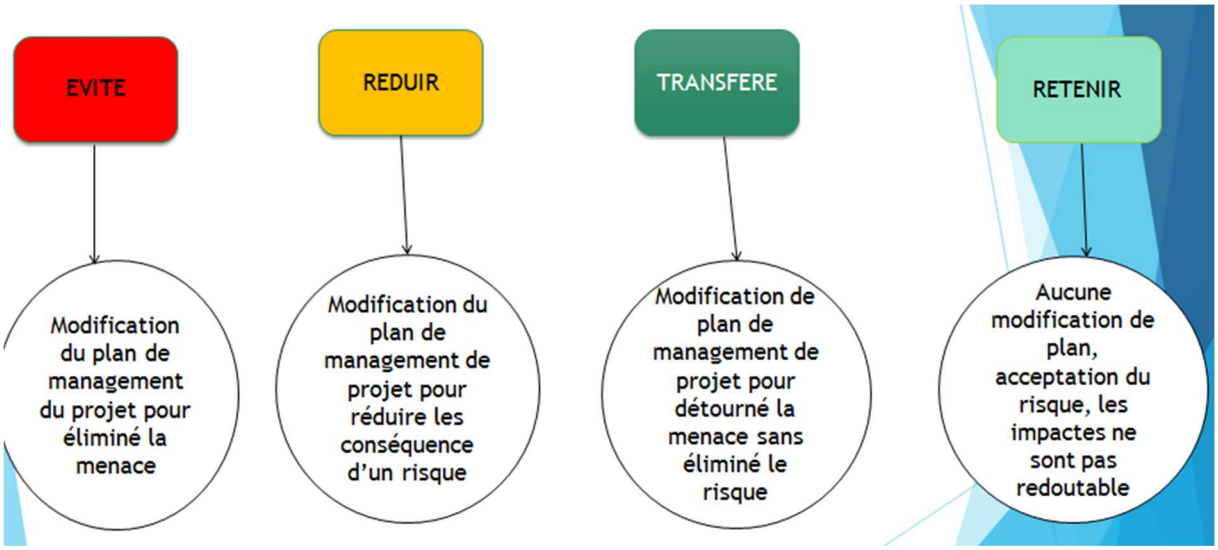


The results are then recorded in the following table:

Risques
1- Sous estimation des charges et délais
2- Mauvaise expression du besoin par le maitre d'ouvrage;
3- Mauvaise interprétation du maitre d'ouvre;
4- Maque de compétence du maitre d'œuvre;
5- Mauvaise coordination entre le maitre d'ouvre et maitre d'ouvrage dans l'expression des besoins.
6- Manque de développeurs compétents;
7- Absence du personnels;

Risques
8- limites de capacités informatique;
9- La non métrise des nouvelles informatiques;
10- Manque d'équipement;
11- Absence d'espris d'équipe;
12- Les pannes;
13- Délais des contraintes;
14- Obsolesance des software;
15- La non incompatibilité entre le hardware et le software;
16- Saturation de l'application a cause d'un faible débit;
17- Risque structurel de la CNEP au cas de changement de directeur qui mène a la non validation de projet;

Actions to be taken for each category



Quality management of the EASY CREDIT project

Meeting of our work team with our client, the working session aimed to explain the quality expectations of the project stakeholders.

- Definition of the quality factors of easy credit
- Identification of criteria related to each factor.
- Set metrics
- Establishment of the quality plan
- Establish audit planning

Factors of project quality

1- Functional:

- Relevance: EASY CREDIT will facilitate the credit application process for individuals and professionals, and the processing of files for banks;
- Adequacy: EASY CRÉDIT adapts to the bank's procedure as well as to the work tasks (application, processing, credit validation);
- The generality: beyond the functionalities EASY CREDIT can be considered as a decision support tool, given the tables and statements at the end of the procedure.

2- Usage:

- Maneuverability: EASY CREDIT is very user-friendly and easy to use with accessible settings;
- Reliability: the system is stable and constant in relation to the credit management procedure;
- Efficiency: consumes reduced memory space, execution time depends on connection
- Confidentiality: access is limited for unauthorized persons;
- Protection of the data code, storage of access.
- Coupling: configured to be adapted to banks' internal platforms and software.

3- Maintenance:

- Maneuverability: facilitates localization and corrected errors,
- Adaptability: updating, improving the system and adding new features can be done easily;
- Portability: quick and easy transfer and installation;

4- Economic:

Given the new regulations ... and the digitalization of the economy, EASY CREDIT will know a great success, which concerns its sale.
Its cost is very reasonable: 2.000.000,00 DA
Expected profit margin: **1.500.000.00 DA * 29 (20 banks and 9 banking institutions) = 43.500.000.00**

The quality criteria of EASY CREDIT

Criteria related to the maneuverability factor:

A- Communication: accessibility to the control very simple,
B- Operability: easy to install (online help, installation CD, training provided for IT specialists and the bank's project manager, on-site assistance during implementation)
C- Ease of learning

Criteria related to the reliability factor:

A- complexity: average size, algorithmic construction,
Number of lines of code: 19800 lines of instruction

B- Fault tolerance:
C- Auditability: ease of finding traces of an operation

COURSE N°7: URBANIZATION AND SERVICE-ORIENTED ARCHITECTURE

Introduction

The cornerstone of IS governance is to guarantee Compliance Governance; to optimize Performance Governance all for the benefit of Corporate Governance, IS governance also consists in questioning how to regain control over information, on the architecture (the economic infrastructure of the IS), in other words, it is the ability to give knowledge and flexibility to a fragmented and heterogeneous IT infrastructure since several servers from several manufacturers are used, This results in additional costs for an organization. It is a question of giving the organization's IT department the means to be able to adapt to changes without denying the past.

Section 1: The concept of urbanization:

This concept first appeared during a presentation in 1989 at the Cerisy conference entitled "The new relationship between IT and business", by Elisabeth Heurgon (head of information systems at RATP at the time).

The term "urbanization" is used by analogy with architectural and urban planning work in a city by comparing a company with a city and its different neighborhoods, areas and blocks.

In recent years, the Information Systems Departments (ISDs) of both the private and public sectors have drawn inspiration from the practices of other disciplines, including the urbanization of cities, to identify methods applicable to IS.

Urban urbanization

The urbanization of cities is defined as the set of coherent plans and actions that allow the optimal organization of spatial, economic, social and environmental functions of territories.

For the urbanization of cities, it is a question of globally analyzing the different topics or points of view:

- energy, water, telecommunications and transport infrastructures, etc.
- Buildings: housing, commerce, business, public service (town hall, schools, police, firefighter, parking, etc.) organized into zones (industrial, commercial, residential, etc.), neighborhoods, and blocks.
- the use cases of these means by city dwellers, i.e. the services offered by infrastructures and buildings.
- regulations on safety, construction, housing, private/public space... But also the organization and functioning of public authorities, companies, shops, etc.

From the 60s, companies have built their information systems by successively adding applications, some started with simple accounting and finance software to which others have added. And the more technology develops, the more we find other automated functions such as customer relations or supply chain.

This application overlay was done without concern for overall consistency and most of the proposals for evolution within the architecture often came from the IT department regardless of the strategic evolution of the company.
The 80s saw the birth of complex architectures called Urbanization approaches, originally French, and Enterprise Architecture, Anglo-Saxon, are two facets of the same currency, in other words a single concept.

Today, urbanization is synonymous with simplification and integration in order to meet the strategic, organizational, and technological challenges of the company.

The urbanization of the IS

"Urbanization represents the action of urbanizing, that is to say, organizing the development of cities. In information systems, the principle is the same. It is a question of replacing the "big bang" constructions with an approach that aims to develop the IS continuously, consistent with the company's strategy and that does not make a clean sweep of the past. (Chelli, 2003)

"Urban planning is defined as the science, art and/or technique of the spatial organization of human settlements." (Bohnke, 2005). It is therefore a technique for organizing the activities carried out.

"Urbanizing means organizing the gradual and continuous transformation of the information system aimed at simplifying it, optimizing its added value and making it more responsive and flexible vis-à-vis the strategic evolutions of the company, while relying on the technological opportunities of the market",[5]

Section 2: The urbanization approach

Over the years, a company accumulates thousands of documents in disparate databases that in most cases include redundancies. More generally, strategic data is generally scattered in the company's information system, even worse, the entire staff or management team is unaware of the existence.

Urbanization is therefore an approach that begins first with the identification and capitalization of all the information on the company's information system (databases, applications, services, etc.), in relation to the functioning of the organization, in order to homogenize them and optimize the company's information capital.

[5] Club URBA-EA, Urbanisme des IS - Enterprise Architecture, an inter-company association governed by the Act
of 1 July 1901, aims to promote this sharing of experiences, these exchanges between practitioners of IS Urbanism and Enterprise Architecture as well as to promote the recognition and organization of these functions. For more information: http://www.urba-ea.org/

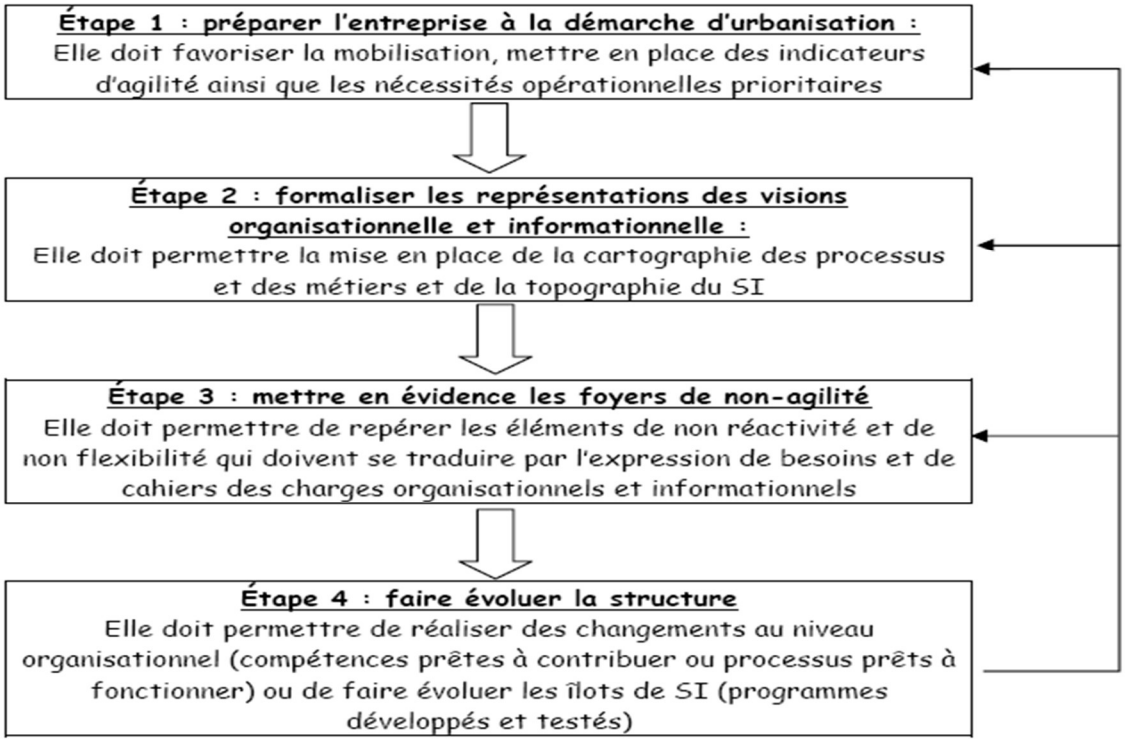


Figure n° 31: Urbanization approach
Source: Chelli 2003

The second step in this process is to highlight the different views of the system.

Infrastructure view: it describes the hardware, or the technical infrastructure: telecommunications networks, Datacenter issues, their implementation and equipment hosting, but also servers, workstations, printers, etc.

Application view: which focuses on the software aspect; the different business applications used, software components, cross-functional tools such as messaging, databases, etc.

Functional view: which consists of analyzing the functionalities and data (in the broad sense: data, documents, information, knowledge) manipulated by computer science

Business view: which consists of repositioning this IT in its business environment: by whom is it used? When? What for? It is then a question of process, activity, users, but also of regulation

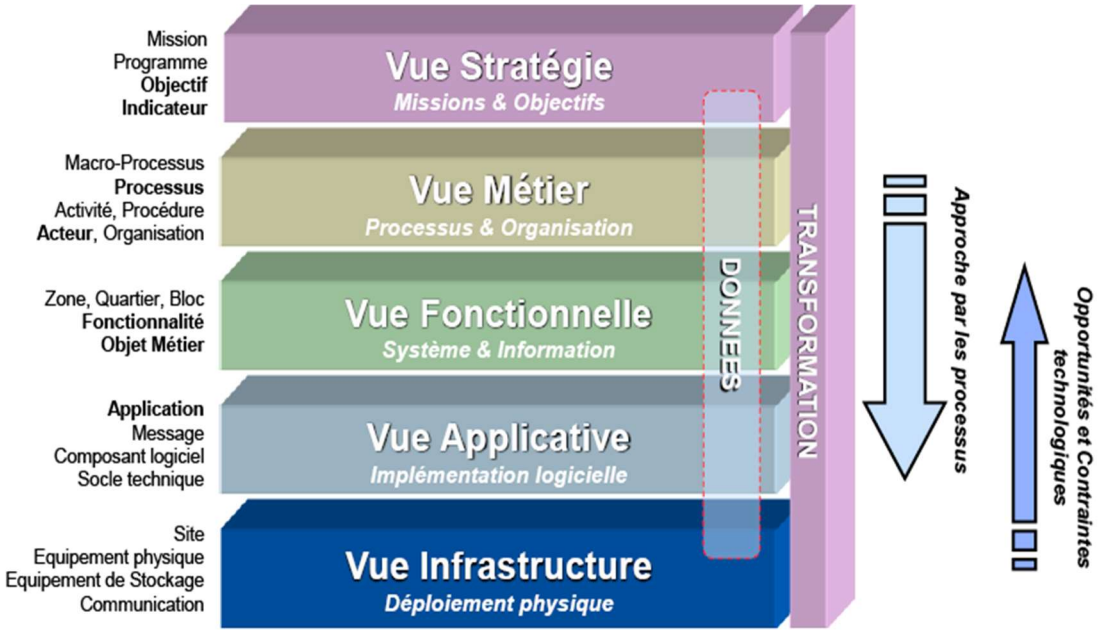


Figure n° 32 : SI views

The principle is first to describe the architecture of current applications, showing the different levels, then to guide an evolution where each application corresponds to a set within which data and processing are strongly linked while reserving a perimeter for future applications to be built, it is necessary that the construction is like an assembly of weakly coupled components: This is the principle of urban planning.

Just as urban planners strive to develop a city by neighborhoods and sectors, computer scientists must build the computer system in a modular way to be able to modify each component almost independently.

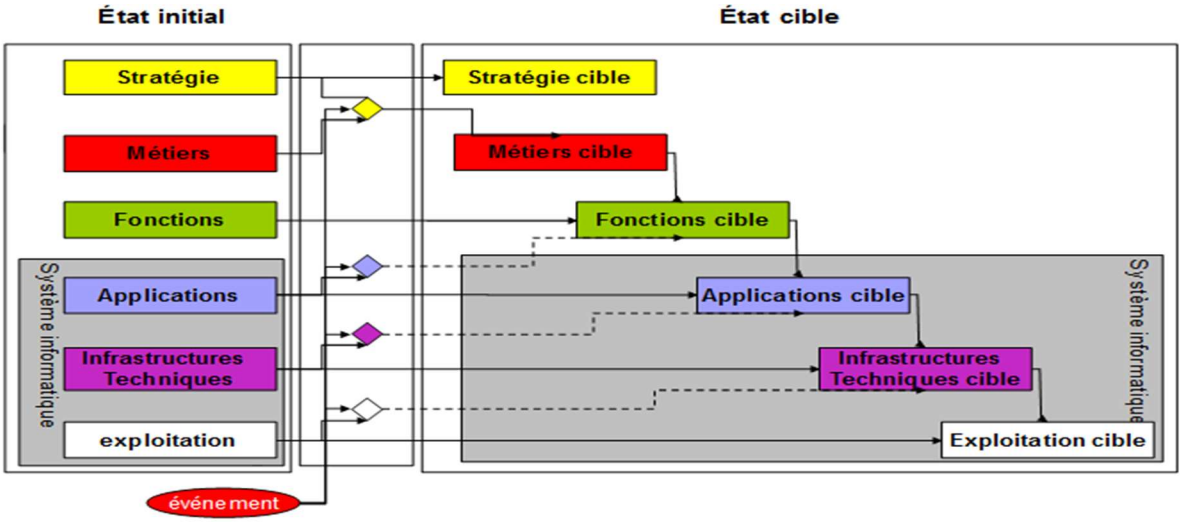


Figure n° 33: the approach

This approach is also used for enterprise architecture design. A "bottom-up" approach can also be achieved, driven by technological advances and the desire for technological and application reorganization, in parallel or independently of the "top-down" approach.

Basic rules

According to Rex, urbanization meets two basic rules:

An application must belong-belong-target-to-one and only one block
Dependencies must respect the notions of Strong Consistency / Weak Coupling

- between applications,
- within an application: between the different modules,
- Within a module: between the different components.

The term -in target- defines the application that one seeks to have *to be*. It is opposed to the existing - the current situation - *As is*. The method to move from *the current as-is to the desired* to-be *is called the* roadmap.

The notion of *Strong Consistency / Weak Coupling* indicates that two applications must communicate with each other in a simple and efficient way, but that the dependency between these two applications is minimal (ideally non-existent). This makes it possible to remove a block to replace it without disturbing the rest of the IS The information system can therefore be compared to the district of a city: if the latter is well built and well *urbanized*, it is possible to raze a building in the heart of the district without endangering the entire sector, and to replace it with or rebuild another building, by connecting this new building to the various exchange networks: access roads, electricity, wastewater disposal, etc. Urbanization is therefore about creating an agile, modular and scalable IS.

It is therefore a question of dividing the IS into autonomous functional modules (following the logic of strong cohesion and weak coupling) of increasingly small size:

• zones;
• neighbourhoods (and blocks if necessary);
• blocks (functional blocks).

Between each module (zone, district, block, block), information exchange zones will be designed to decouple the different modules so that they can evolve separately while maintaining their ability to interact with the rest of the system. These exchange areas are supported by integration concepts and technologies, EAI (Enterprise Application Integration) and ESB (Enterprise Service Bus).

Section 3: IAE

Definition

According to (Linthicum 2001), EAI is: "A so-called strategic approach that makes it possible to link several information systems to each other at both the service and information levels, thus allowing the sharing of both information and processes."

"Application integration includes all the methods and tools that organize exchanges between applications and business processes within or between companies.

Having become a strategic tool for companies, it allows the information system to be truly responsive to business developments and consequently to significantly optimize its costs." (Manworker)

Bordage defines EAI as: "a platform linking heterogeneous IS applications around a common software bus, responsible for data transport"

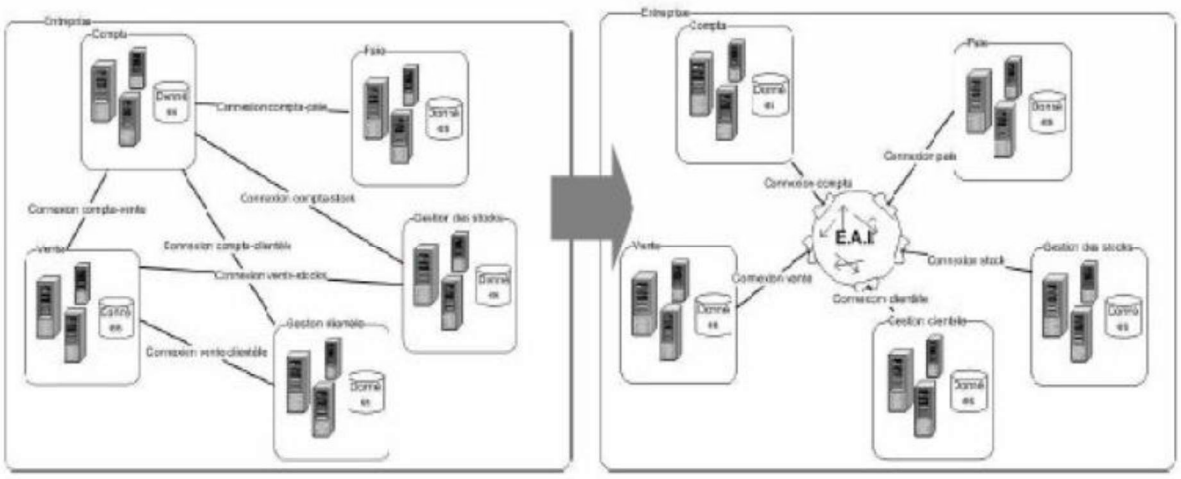


Figure n°34: Company Before and after the implementation of an EAI2
Source: bendekkoum 2009

Principle of operation of the EAI:

The operation of an EAI platform is simple it serves to be the beating heart to which all other functions must connect to benefit from its resources, independently without taking into consideration the recipient application.

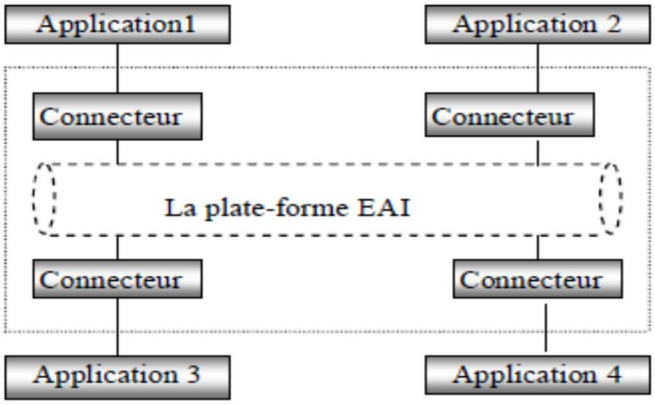


Figure N° 35: Architecture of an integration platform
Source: Bendekkou, 2009

Connectors ensure the transport of messages from the EAI to the applications and vice versa, that is, the extraction from the producing applications or the restitution to the consuming applications.

The core of EAI uses Message *Oriented Middleware* (MOM) as a fundamental means of transporting and transforming messages between different applications. MOMs also

allow incoming messages to be stored in a queue until their recipients are ready to retrieve them (Driouche, 2007).

Section 4: Service-Oriented Architecture

The notion of Service-Oriented Architecture (SOA) has largely imposed itself thanks in particular to the rise of the Internet, first of all the architecture of the IS is a set of significant decisions concerning the organization of a computer system, when we say SOA it means that the set of significant decisions relating to the IS must be guided for the good end of services.

Building a service-based architecture therefore means organizing the way to arrange the sequences, the access rights to these modules, components, functional entities, but also technical, capable of performing a function and reporting on it.

SOA is a style of architecture based on the description of services and their interactions. The main characteristics of a service-oriented architecture are weak coupling, technology independence and scalability, it recognizes the main existing systems, extracts them as services, brings them together in a single domain, and exposes them for use... and reused.

The service

The service is often defined as being the atomic unit of an SOA architecture. An application is a set of services that communicate with each other through MOM or other messages. It should be noted here that regardless of the application it touches, a service can be coded in any language and run on any platform (hardware and software). A service is a processing entity that meets the following characteristics:

Wide granularity:
That said, the operations offered by a service can encompass different functions, they operate on a large perimeter of data.

The interface:
A service can implement multiple interfaces, and multiple services can implement a common interface;

The single instance:
Unlike components that are instantiated on demand and can have multiple instances at the same time, a service is unique. It corresponds to the unique designate

Weak coupling:
Services are connected to clients who may be users or other services through standards. These standards ensure decoupling, i.e. the reduction of dependencies.

The difficulty of SOA design is to identify the right "service granularity", i.e. the ideal mesh that ensures meaning to the treatment in terms of use and where it can be easily

reused and/or adapted in other circumstances, for other needs and possibly other business processes.

The service mesh would then be the ideal mesh that ensures a functional and agile IS for business services; Three logics must be respected when coupling

1. a logic of industrialization of communication channels: the integration infrastructure becomes an ESB, an enterprise-wide integration bus and not limited to an application silo;
2. a data governance logic;
3. a parameterization logic to make the IS more flexible and empower the professions.

The components of SOA:

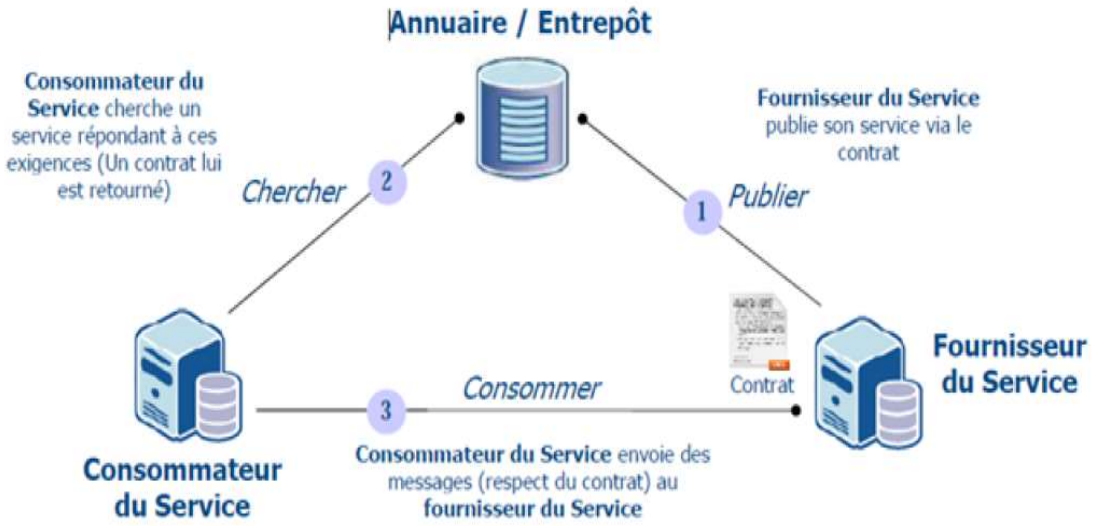


Figure n° 36: the components of SOA

The "publish, search and consume" paradigm as shown in the figure this paradigm allows the consumer of the service (customer) to query a directory for the service that meets his criteria. If the directory has such a service, then it returns to the customer the contract of the desired service as well as his address.

The service consumer

The service consumer is an application that requires a service. It is the entity that initiates the location of the service in the directory, interacts with the service through a protocol, and performs the function exposed by the service.

The service provider

The service provider is an addressable entity over a network, it accepts and executes requests from a client The service provider publishes the service contract in the directory so that it can be accessed by clients

The service directory

The service directory is a directory that contains the available services. It is an entity that accepts and saves the contracts of the service provider and presents these contracts to potential customers

The service contract

The contract specifies how the service client will interact with the service provider. It specifies the format of the request and the response of the service

Case Study No. 4	CASNOS: Study of the urbanization of the IS

Urbanization of [6] the IS of CASNOS

The National Social Security Fund for Non-Employees "CASNOS" was created by Executive Decree 92/07 of 04/01/1992.It is responsible for the social coverage of the professional categories of self-employed workers and their dependants, it is endowed with legal personality and financial autonomy as a result, it seems to us that it is very

[6] Excerpt adapted from the master's thesis prepared by AIT HAMMOUDI Safa and supervised by the author, ESSS Higher School of Social Security

important that it can have an IS consistent with its strategy, in order to improve its performance and improve its quality of services.

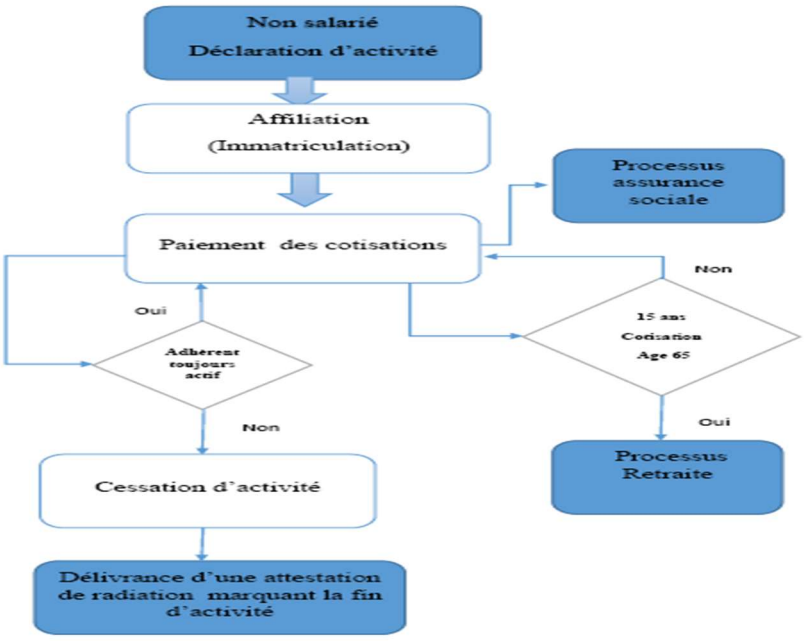
In this research we used three data collection tools: documentation, semi-structured interviewing and observation. Then we cross-referenced these three data sources with the triangulation technique, in order to have a complementarity and diversification of information.

Existing information system and CASNOS business objectives

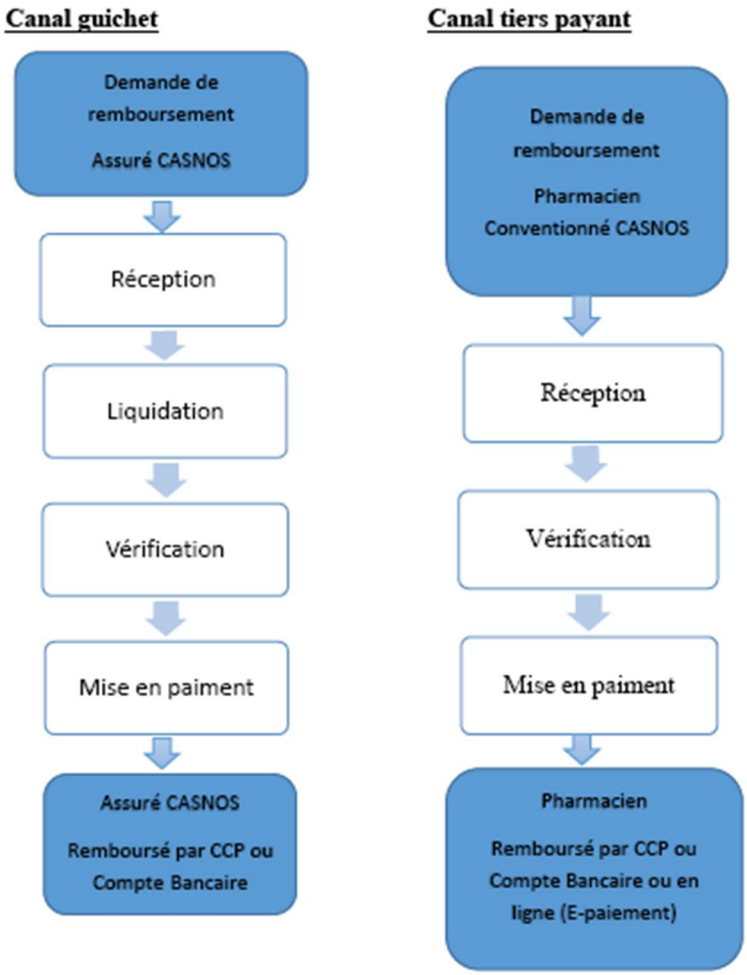
In this section we will present the existing CASNOS information system, its content and usefulness. First we will present the main business processes, as well as the business objectives, in a second time we will move on to the description of the different applications and software, then we will try to identify the gaps and limitations of the current CASNOS information system.

CASNOS' business processes

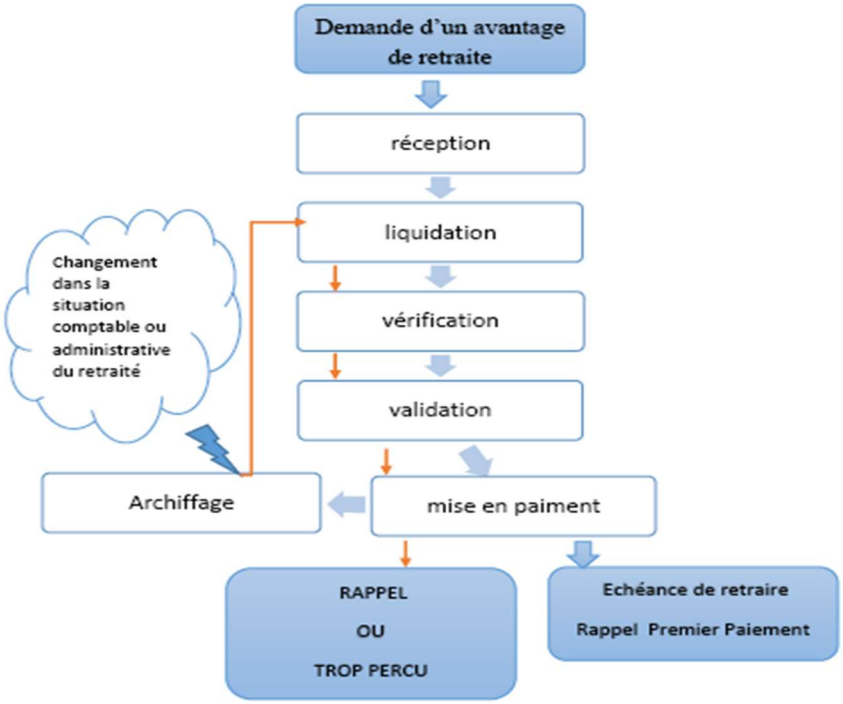
1. Collection Process



2. Social insurance process by channel



3. Retirement Process



CASNOS' Business Objectives:

Through the survey we conducted at the level of the general management of Casnos, and via the interviews we carried out with business managers, we summarized the business objectives of Casnos in the following points:

- Broadening the contribution base through the accession of the full potential of non-employees by strengthening control mechanisms and monitoring litigation.
- Payment of benefits within the deadlines provided for by the regulations in force.
- Improve the quality of service.
- Ensure more proximity with members.
- Simplification of administrative procedures by setting up a service for insured persons This service aims to:
- Introduce the concept of a single file for all risks concerning administrative documents that are in common with them.
- Limit the redundancy of information by centralizing information within a single service, and by setting up a single database to ensure the reliability and consistency of information.
- Reduce paperwork and duplication of archives1.
- of expenditure on benefits through the strengthening of control mechanisms.
- Combat all types of fraud and abuse, such as fraudulent use of the CHIFFA card.
- Ensured the long-term sustainability of the fund by balancing collection revenue and benefit expenditure.

Presentation of CASNOS applications and software

1. the recovery subsystem (SYSCAS):

The SYSCAS Information System is designed to support the administrative and accounting management of Casnos members' files in terms of recovery,

To manage the different modules of the SYSCAS system, an administration module is included, this module allows the security of the system. Security is achieved through the management of users by assigning them access codes and prerogatives, and also by assigning the right to configure the system to the administrator of the information system.

2. The controller application:

It is a web application dedicated to controllers of collection services. The Social Insurance Software Platform was developed to compensate for the shortcomings of the old existing PRESTNOS system and meet the new specific needs of the fund as well as new regulatory procedures (Pharmacy Convention, Doctors, etc.).

3. The SYSRET subsystem:

SYSRET is a subsystem dedicated to the retirement branch, it allows, among other things, the administrative and accounting management of pension files, it has been developed to best meet business needs in terms of retirement, and replaces the old applications deployed in retirement services.

4. Application for payroll management:

Casnos has an application for the payroll management of these employees, with a national database centralized at the level of the general management.

5. Application for accounting:

Regarding accounting services, they have an application (PC COMPTA) distributed through the wilaya agencies.

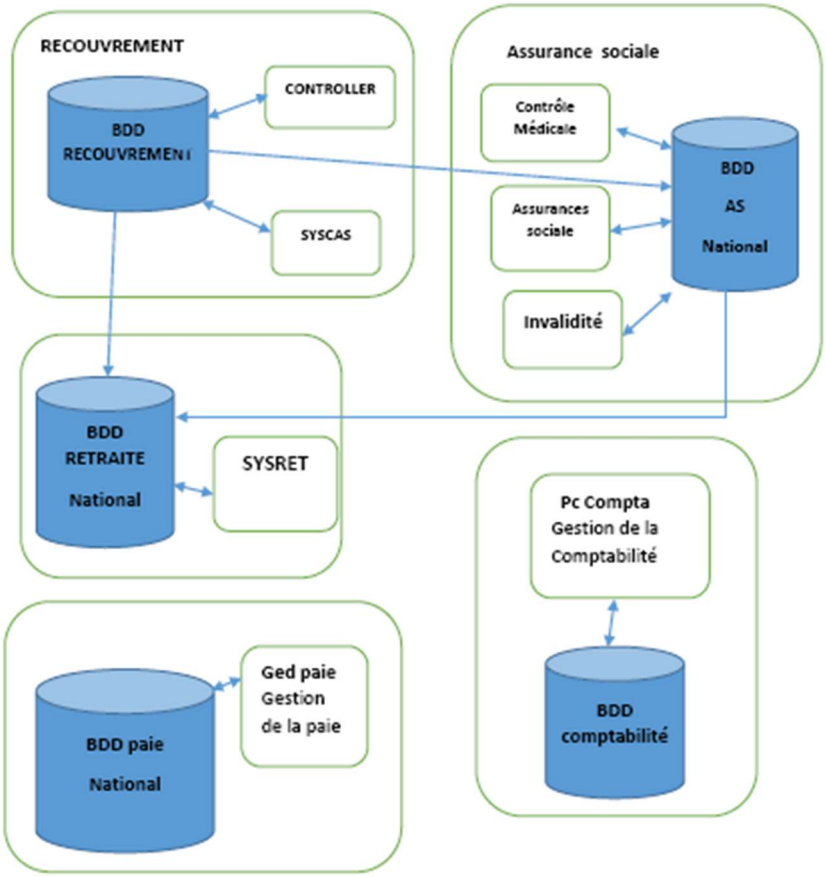
6. The Electronic Service for Insured Persons:

Casnos has implemented an application site accessible via the address: https://eservices.casnos.com.dz/, dedicated to these insured persons, which offers them electronic services. Regarding databases, three central databases at the levels of the general management dedicated respectively to the following professions: retirement, social insurance, payroll service.concerning recovery and accounting these two trades have regional databases at the levels of the 49 wilaya agencies.

An internal messaging OUTLOOK, and an FTP server for the sharing and exchange of large files between the general management and the wilaya agencies.

CASNOS application mapping

The current application mapping of the Casnos shown above shows the different business applications as isolated islands, no link between them is available, which results in a total absence of communication and interactivity between them. This reflects a fragmented and non-integrated information system.



CASNOS application mapping

Problems and weaknesses of the Information System:

Despite the many advantages offered by Casnos' current information system, by supporting the majority of business processes in their organizational context, we still identified some points of weakness and dysfunction through the survey we conducted at CASNOS. At the organizational level, we see a lack of coordination and communication between the different services. Here are excerpts that illustrate our point:

"...Coordination is not normalized, sometimes personal conflicts take over."

«..... No transparency relationships are opaque." "".....coordination between business departments and IT management...it's not ideal, we hope to have more direct contact, and do teamwork".
In terms of coverage of the various business activities, the system is not yet finalized, some activities are not yet integrated into the system. The following statements affirm our observation: ".....the system is not finalized, it does not cover all risks such as hymodyalise, and cardiovascular".

«..... We are still waiting for all risks to materialize in the information system." « ..... The system covers 80% of the activities, 20% remains to be finalized."

On the informational level, the system does not provide a national consolidation of statistics at the level of the general directorate, only regional statistical reports are available at the level of each wilaya agency. To have access to certain information, business managers are assisted by computer scientists through the execution of SQL scripts that query the various databases. Here are the words that corroborate our observation "..... Access to information is not easy, you have to search the different databases. », « .... The system does not offer any restitution of data at the central level, access to information is not easy, it takes the help of a computer scientist to extract it."

Regarding the communication between the different applications, apart from a few connection chains between the business databases, we found a total absence of links, between the different applications, ".....the links are non-existent between the different under information system" "..... Information systems are not usable, the only solution is a
integrated system". ".....there are some gateways, but they are not reliable, what makes it difficult is the heterogeneity of applications."

The lack of link between applications leads to redundancy of information in the various databases, with a high risk of inconsistency, which affects the reliability of the data, and can have significant repercussions on the performance and financial balance of the fund.

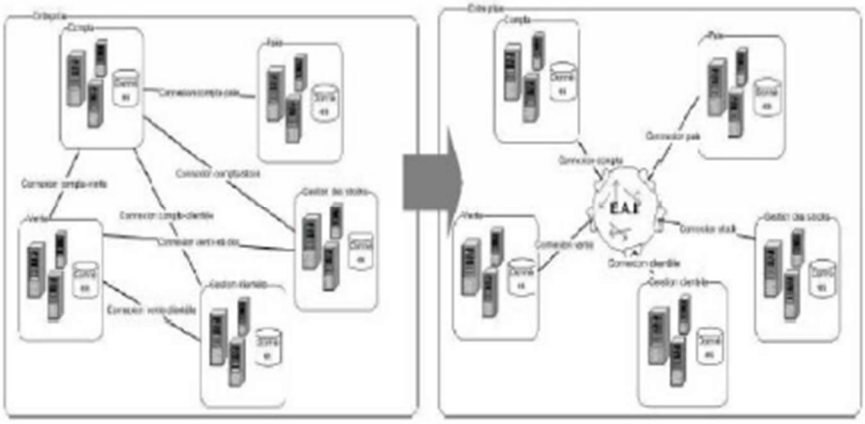
Above we present two examples that illustrate the disadvantage due to the lack of a real-time link between the different applications.

a) the case of a member who dies, and who is declared at the level of collection services, the member is automatically positioned deceased at the level of the SYSCAS application but in the absence of an exchange with the SYSRET application and La Plateforme AS, the pension and social insurance benefits continue to be wrongly paid.
b) In the case of a member whose disability is granted, the status of disabled puts him in the total and definitive incapacity to carry out his activity, and therefore no longer has to pay contributions for theC. The member is positioned invalid in the AS platform, but in the absence of a link with the SYSCAS application this information is not available at the collection department, which puts the collection department in the risk of collecting contributions wrongly.

Proposal for an EAI integration platform

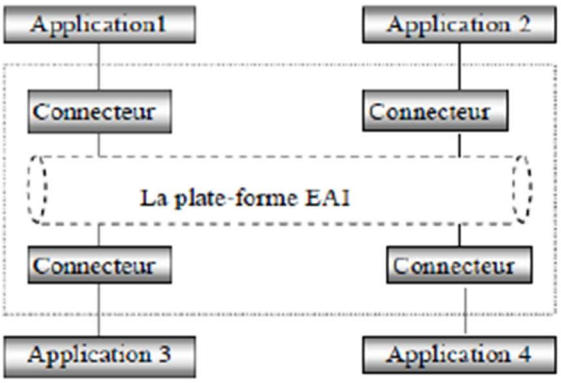
The development of information systems in all companies is characterized by a multitude of heterogeneous computer applications, developed independently and generally incompatible, this situation bursting from the information system poses a real problem for companies, which continues to demand more efficient and more responsive information systems to better support their business strategy. To deal with this problem, companies are using integration platforms. With this in mind and in order to align the casons' information system with the caisse's strategy and these business objectives, we propose the implementation of an EAI integration platform at the Casnos level, this solution seems to us the most appropriate to respond to the shortcomings and problems that we have already noted in the previous section of this chapter.

The EAI represents the process of integrating the different information systems of the same company through a network, whose main objective is to communicate and coordinate the different applications of the company in order to unify its information system.



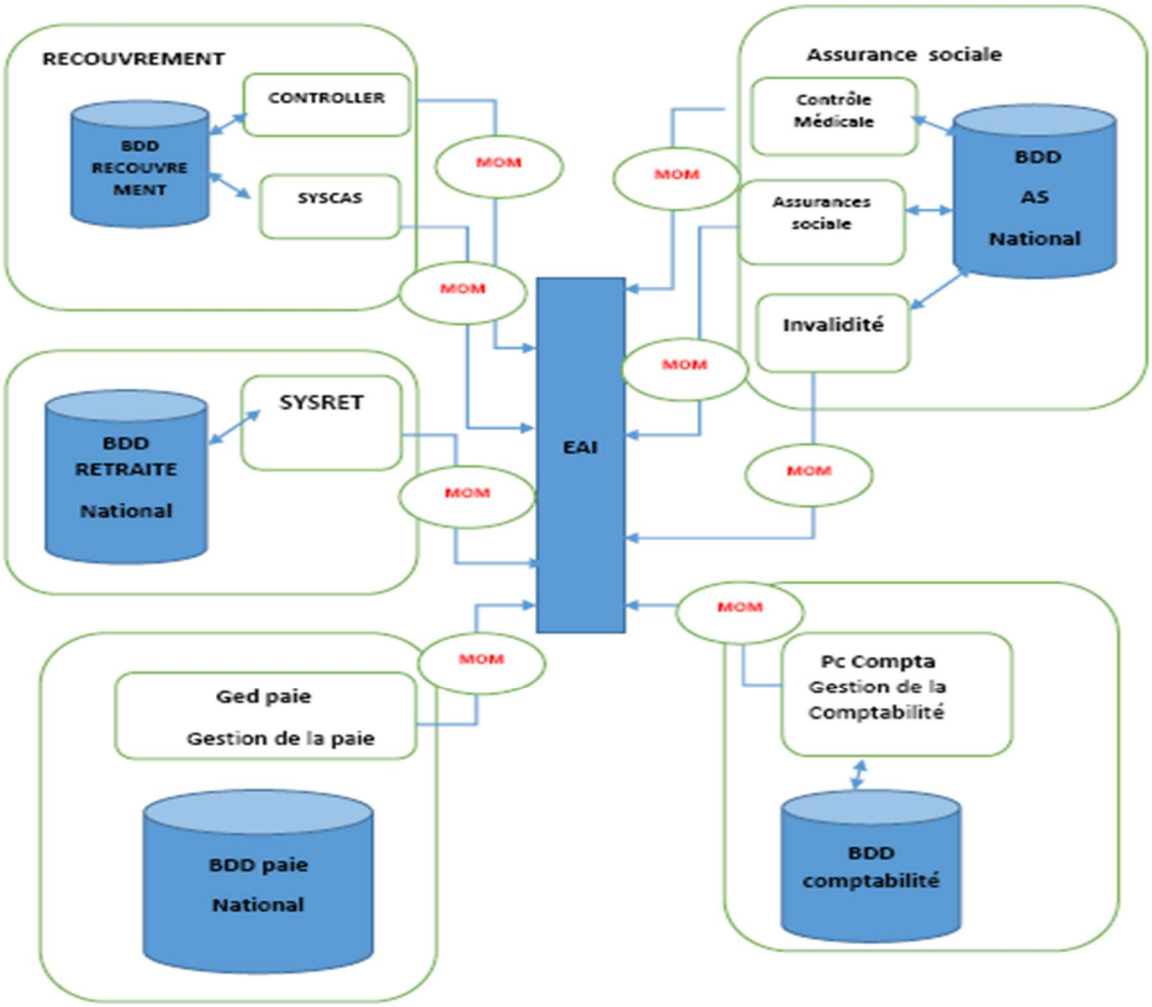
Principles and Functioning of the IAE:

The operation of an EAI platform is similar to the operation of a power strip, each application is connected to the "EAI bus" (the power strip) by a standard connector (the socket), independently without taking into consideration the recipient application.



The connectors will ensure the transport of messages from the EAI to the applications and vice versa, that is to say, the extraction from the producing applications or the restitution to the consuming applications. The core of EAI uses MOMs (Message Oriented Middleware) as a fundamental means of transporting and transforming messages between different applications. MOMs also allow incoming messages to be stored in a queue until recipients are ready to retrieve them.

Application mapping following the implementation of an EAI integration platform



Conclusion

The main concern of CASNOS is to have an efficient information system that is consistent with these business objectives, and its global strategy With this in mind and based on the strategic alignment model of Henderson and Venkatraman (1993), for this purpose, we conducted a study to understand how to align the information system with the business objectives of the fund, study the existence of the main business processes of CASNOS and their objectives, as well as the different applications and infrastructures of the current information system, then we tried to detect the failures and limitations of the information system, from these failures we proposed the implementation of an integration platform to align the information system with business objectives.

In light of the results of our investigation, and as a second step in this work, we proposed the implementation of an EAI integration platform as a solution to respond to the problems detected, and whose purpose is to improve the current information system, in order to best adapt it to the business needs of the caisse, in other words, align it with CDPQ's business objectives and strategy.

COURSE N°8: IS AUDIT

Introduction

Overall, the beating heart of the audit exercise is always control; The IT control devices implemented provide reasonable assurance for the benefit of managers, in order to achieve the objectives related to compliance with laws, the reliability of information and the optimization of operations. Not escaping this logic, the IT audit is mainly interested in the third objective. It is an instrument at the service of the governance of information systems

The IS audit can be triggered at the request of the CEO, the IT Director, the CFO,... and it is the applicant's concerns that will define the approach to be followed

There is, of course, no single approach; But in this area too, references and best practices come from a great help. There are different repositories such as:

- **CobiT:** (Control Objectives for Information and related Technology). It is the main reference for IT auditors;
- **Val IT:** allows you to evaluate value creation by project or project portfolio;
- **IT risk:** aims to improve the control of IT-related risks;

Section 1: General information on the IS audit

Difference between audit expertise and consulting

The IT audit or audit of information systems or English Information Technology audit is a mission carried out by an independent person and external to the IT department (audited object), whose objective is to analyze all or part of it, to detect strengths and weaknesses and especially to issue recommendations for improvement. Risk analysis and assessment in order to improve the control of information systems is the cornerstone of this exercise

From an ethical point of view it is forbidden to combine advice and audit at the same time; You can't objectively audit what you've advised to do
The following table summarizes these different concepts:

Expertise	Audit	Counsel
Specialist Technical analysis Solution and optimization	Generalist approach Process Analysis Recommendation	Knowledge of a domain Process Analysis Areas for improvement

Table 11: Difference between audit, advice and expertise
Source: Rosenthal-sabroux, 2009

The snowflake theory

The snowflake theory states that the differences between the IS environments of each organization are also different, which implies that it is impossible to have an approach or checklist of the IS audit. And so to remain effective, each organization must define its approach to IS auditing and develop specific devices that correspond to the needs of its environment.

IS Audit Objectives

According to (Rosenthal-sabroux, 2009), the audit objectives of IS can be divided into these main types:

- Strategic Alignment Audit
- Security Audit
- Performance audit
- Steering audit
- Cost audit
- Audit of compliance with procedures
- Legal or regulatory compliance audit

Areas		Examples of lines of analysis						
		Strategic alignment	security	performance	piloting	Costs	Compliance with	Legal Compliance
	Governance Organization Strategy and policy Vision and Planning Management procedures							
	Heritage Physical infrastructure Software & Applications Data and repositories Teams and skills Networks and communication tools							
	Projects and changes Application and technical urban plan Project portfolio Project management and change							
	Operations & Support Systems and data administration Operation – production User training and support							
	Business continuity Security Policy Security procedure and infrastructure Continuity Plans							

Table 12: Audit Objective
Source: Rosenthal-sabroux, 2009

Section 2: IS Audit Areas

The IT audit approach applies to all or part of the IT domains such as the IT function, IT studies, IT projects, operations, IT planning, networks and telecommunications, IT security, ... In what follows we will briefly present some of these areas

Audit of the IT function

This type of audit aims to control the management and working methods of the IT function as well as its positioning in the structure and its relations with users, its working methods and several other areas including:

- Level of clarity of IT team structures and responsibilities;
- IT strategy and planning
- Ongoing business planning and maintenance
- Control of the control and measurement device
- The level of skills and qualifications of the staff of the function.
- Control of computer studies

Audit of operations

This type consists of controlling the various computer production centers to ensure their proper functioning and management. In this area, the use of software tools for monitoring production is in high demand: *Openview from HP, Tivoli from IBM, Nagios,...* ; There are several follow-up tracks for this type of audit, including:

- The way in which the function is organized and especially the definition of the definitions of responsibilities
- The use of operating software for incident management monitoring, resource management, work planning, operating procedures,...
- Measurement and quality of the services provided by the IT operation.

Audit of IT projects

This type of audit concerns IT projects whose objective is to control the smooth running in order to achieve a high-performance and operational application. There are several follow-up tracks for this type of audit, including:

- The project management approach;
- Compliance with project management methodology
- Development management

Audit of business applications

This type of audit concerns the control of the efficiency and proper functioning of applications. These audits may be carried out by the External Auditor as part of an audit mission; This is to ensure that the applications implemented are reliable and efficient. Unlike previous audits, which are mainly IT audits, the audit of operational applications focuses more broadly on the information system.
There are several follow-up tracks for this type of audit, including:

- Control of data entered, stored or produced
- Controlling application documentation
- Updating procedures

IT Security Audit

This type of audit, as its name suggests, concerns the control of the level of IT risks. Especially with the proliferation of Internet use There are several ways of monitoring this type of audit, including:

- Continuous monitoring of threats to intangible assets
- Inventory the company's information assets. These are equipment control of IT asset management procedures,
- Identification, evaluation and definition of countermeasures to deal with risks.

Section 3: Conduct of an Audit Engagement

Like any project, the audit mission needs to be well framed. As stated in the 2010 Standard of the IIA (The Institute of Internal Auditors), *"the chief audit executive shall establish risk-based planning*" The first step is to clearly define the scope of investigation, in other words the IT universe that is the subject of the engagement. This results in the establishment of an engagement letter detailing the main points to be audited, it is a document written and signed by the audit requester that serves to identify the list of questions that the audit requester asks. Also, a definition of the audit approach structure of the intervention schedule as well as the definition of the modes of operation and communication.

To carry out the IT audit, it is recommended to follow the following five phases:

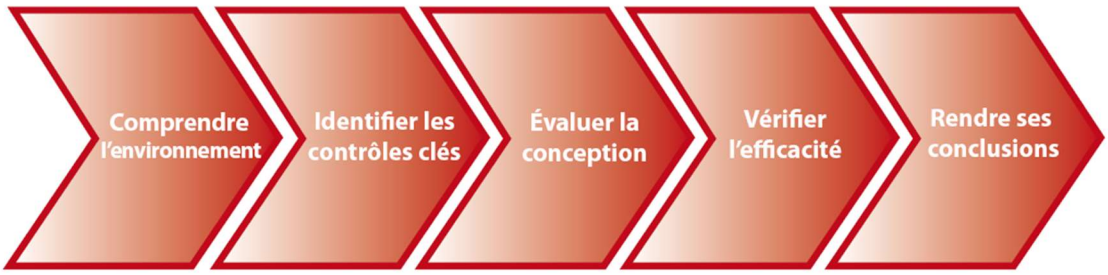


Figure 37: Conduct of an audit engagement
Source: IIA, 2006

Definition of the universe of information systems audit

Defining what to audit is one of the most important tasks of IT auditing, the IT universes are very heterogeneous, they concern a finite and exhaustive set of audit areas, structural diagram of the operational entities and location of the activities carried out by the organization, which represent the audit targets since the audit purpose of IS is to ensure adequate coverage of the areas that represent the greatest exposure to the risk

The definition of the IS audit universe requires an in-depth knowledge of the organization's objectives, its field of activity and the contributions of the IS function.

It is common to understand the organization's IS in the form of layers, each layer presents risks, and requires resource allocation

The main layers are:

1. Management of information systems.
2. Technical infrastructure.
3. Applications.
4. External Connections (IIA, 2006)

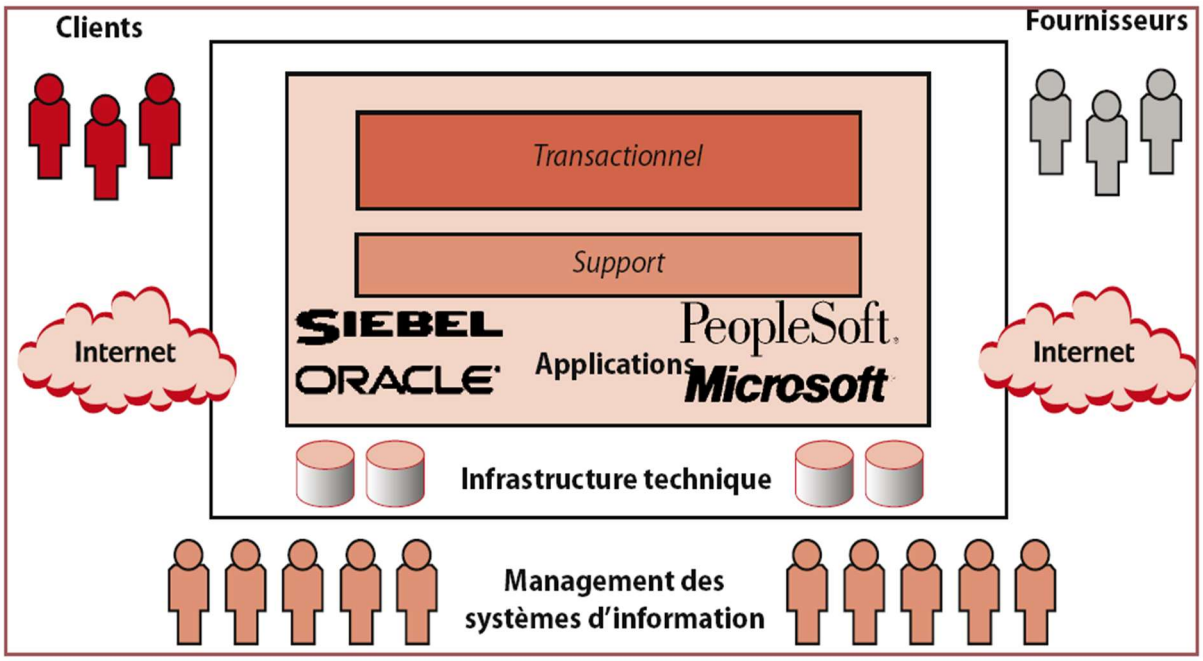


Figure n° 38: IS universe
Source: IIA, 2006

Information systems management layer

This layer covers the people, policies, procedures and processes that manage the IS environment. This layer therefore includes the following elements (IIA, 2006). :

- Systems management
- Programming

- Planning
- Management of external suppliers
- IS Governance

The audit of these functions is very similar to process audits, here it is the individuals and tasks that are put under the magnifying glass the tests of the controls are also different the auditor must demonstrate objectivity and discernment.

Technical Infrastructure Layer

This layer includes the systems that support and enable the operation of core applications These common technological means must be identified and represented in the audited universe, even if they are not directly associated with an application or a business process, these include:

- Operating Systems
- Databases
- Networks

Admittedly, it remains difficult to relate the use of these common technological means to objectives and risks. However, a failure of these services and equipment can prevent the organization from accomplishing its mission.

Application layer

Internal audit services increasingly include business applications in the audited universe, along with the processes they support. Business applications are programs that perform specific tasks related to business activities. They may be included in the IS audit universe, depending on how the audit service operates. They fall into two categories: transactional applications that process and record transactions, and support applications that facilitate business activities and support applications that facilitate business activities.

External connections

The company does not operate in isolation, its network can be connected to many other external networks. The most common is obviously the Internet. But in reality the internet is not the only external network; Some companies are also connected to many other networks. For example: EDI or FedEx. As part of a developed supply chain

Identification, IS risk assessment

The IIA defines risk as "the possibility of an event that will impact the achievement of objectives. Risk is measured in terms of consequences and likelihood." Although it remains necessary to focus on risks that have a direct or indirect impact on the reliability of the financial statements. IS auditors are also responsible for evaluating IT processes and those related to applications. It is therefore absolutely crucial that CIOs periodically take stock of the risks to which they are exposed. These include:

- Risks related to the organization of the IT function,

- Development risks
- Risks related to the commissioning of applications,
- Operational Management Risks
- Security management risks.

Once these risks have been identified and measured, the auditor will need to assess the controls put in place by the company to manage these risks and to infer any residual risks.

Drafting of the audit report and recommendations

The final step in the audit process is to endorse the key moments of the engagement and hand it over to the authorising department. The audit report must contain
The auditor's findings and recommendations. At the end of the audit engagement, the authorising department may ask the auditor to draw up an action plan.

Section 4: Audit Function Highlights

Whatever the audit objective or its field, the essence remains the same, to make a judgment on the management of the information system and the execution of its objectives. In short, it is a comparison between what is done and what should be done, according to a system of references:

The fundamental aspects

According to (Rosenthal - sabroux 2009), the fundamental aspects of the governance of information systems are reviewed during an audit engagement, including:

- Consistency between IT strategy and overall business strategy.
- Consistency between the IT blueprint and business objectives.
- Security of hardware, software and human assets.
- The profitability of investments and projects.
- System performance: effectiveness and efficiency.
- Compliance with good project management and development practices.
- The quality of production and IT support: number of incidents, user satisfaction, etc.
- The procedures and means implemented to guarantee continuity of service in the event of a disaster.

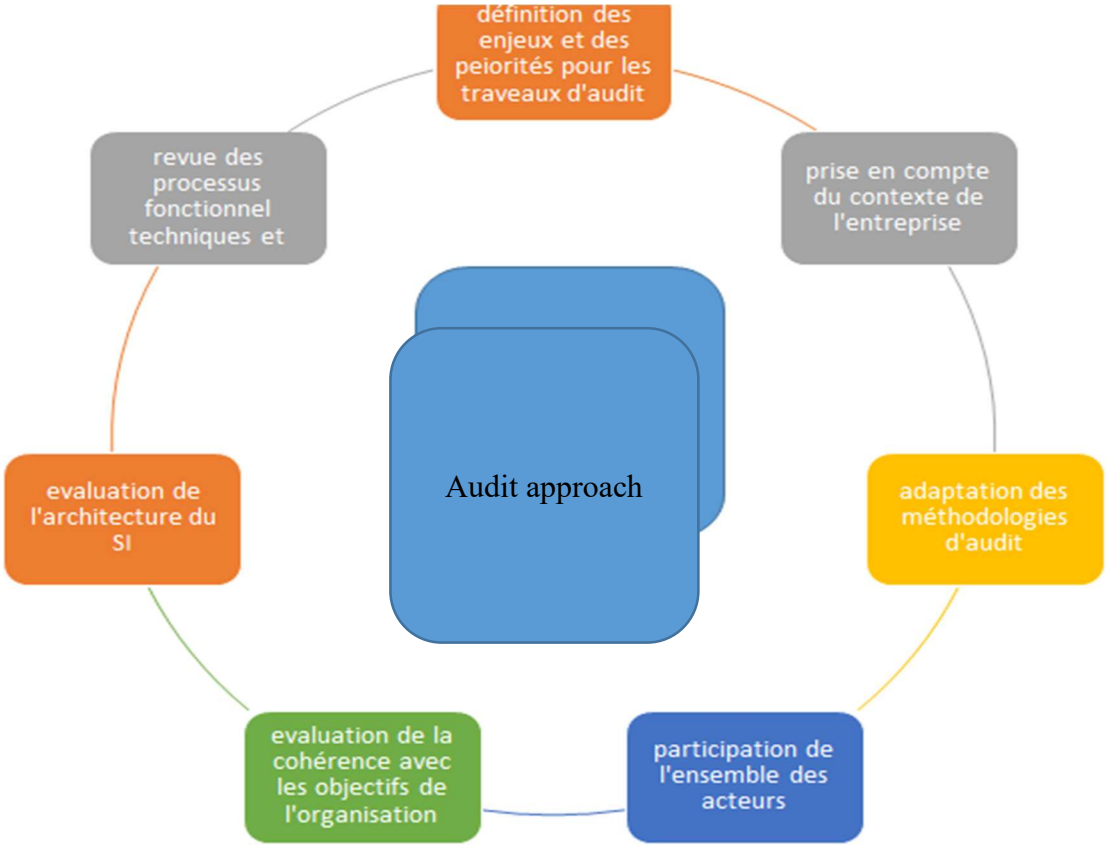


Figure N° 39: key point of the audit approach
Source: Rosenthal-sabroux, 2009

Repositories.

Several repositories are made available to auditors for the accomplishment of their missions. Depending on the type of audit, the standards are of various natures:

- System audit: norms, standards, compendium of good practice
- Process audit or process audit: process sheet, method sheets...
- Product/service audit: technical/service specification
- Procedural audit: procedure, modus operandi ...

These certifiable standards include:

- ISO 9001 (established in 1987). System-type standard (structured according to the Plan-Do-Check-Act cycle). Defines standard rules to be respected for any organization wishing to provide its quality products and services.
- ISO 20000-1. System type standard. Defines standard rules to be respected for any organization providing services and wishing to achieve an excellent level of control of its activities in order to satisfy its customers.
- ISO 27001. System type standard. Defines standard rules for the security (confidentiality, integrity, availability) of information systems to be respected by any organization wishing to guarantee control in the performance of its activities in response to its own internal requirements or those of its customers.

- Cobit, Control Objectives for information and Related technologies (developed in 1996) makes it possible to control the risks associated with information systems & to control investments.
- CMMi, Capability Maturity Model Integrated. A set of best practices for assessing the maturity of an organization or service.
- ITIL, IT Infrastructure Library (20 years of existence and experience), repository of best practices in IT Service Management,

Advice for the Chief Audit Executive

As explained in the IIA, 2006 (The Institute of Internal Auditors) guide, the chief audit executive should consider the following points in defining IS audits:

- The use of overly broad definitions for IS audits (e.g. IS general controls) almost always results in a shift in scope.
- The audit universe for the year should cover all layers of the IS environment.
- IS audits must be structured in such a way as to allow for effective and logical communication.
- IS audits must focus on the right risks.

COURSE N°9: EVALUATING THE PERFORMANCE OF THE IS

Introduction

The concept of performance cannot be apprehended and will not make sense in absolute terms. It is not relevant to judge that an application or an IS is efficient or non-efficient without positioning it in the context that encompasses it and relating it to the major axes that really and fully characterize performance. Especially; the work to be done, the time allocated and the resources used.

Broadly speaking, performance evaluation consists of an iterant process consisting of the following steps:

1. Build the value matrix,
2. Decline operationally
3. Define measurable quantitative and qualitative variables
4. Capture corresponding measurements
5. Set new performance targets

But it should be mentioned that the evaluation of the performance of the IS remains a complex operation, it is the first theme treated in the field of IT research. It is therefore a current, relevant and unavoidable issue.

According to Hirschheim and Smithson (1998), before evaluating the performance of the IS, researchers must decide on a number of questions.

- Define the objective of the evaluation
- Define the level and unit of analysis?
- Define the evaluation duration?
- Define the actors responsible for evaluation

Section 1: General

IS assessment based on economic analysis:

In approaches based on economic analysis, Solow's paradox (Solow, 1987) is a strong comeback, stating that there is a gap between investment in information technology (IT) and productivity gains.

Initially this paradox was observed at a national or sectoral level, but researchers have also applied it at the organizational level. Brynjolfsson and Hitt, 1996; Lehr and Lichtenberg, 1999; Bresnahan et al., 2002, Brynjolfsson (1993,Farbey et al., 1993, Serafeimidis and Smithson, 2000),

This is why other approaches will try to measure the impact of IS on the performance of organizations by adopting a competitive and strategic approach.

IS assessment based on competitive analysis:

A second perspective; that related to the strategy, can be evaluated the contribution of IS to performance. The idea is to estimate the strategic weight of IS, since as we have already seen in the second course; the IS strategy impacts products, processes and even the overall strategy of the organization and therefore the competition itself.

Most studies focusing on the issue of competitive advantages of IS have drawn on Porter's work. Other authors have proposed using approaches in terms of contingency between IS and company strategy.

The following table describes the main research streams in information systems evaluation:

Main issues	Main currents	Contributions and limitations
Approaches to variance		
Measure the contribution of IS to the company's performance (in terms of return on investment, productivity, competitive advantages).	**Assessment based on economic analysis:** The paradox of productivity.	**Contributions:** Quasi-confirmation of an IS contribution to performance **Bounds:** Caution with empirical validations Actors are not taken into account Simple linear relationships that are analyzed
	Competitive analysis assessment:	**Contributions:** Allows to deviate from the accounting problem of the evaluation of IS

	Wider competition. The value chain. Strategic alignment.	Strategic Vision **Bounds:** Measurement problems Actors are not taken into account
Processual approaches		
Understand how IS contribute to performance, open the "black box", i.e. evaluate the performance or success of the IS	**The resource-based approach**	**Contributions:** Light on technological resources Unification of several theoretical fields **Bounds:** Persistent ambiguity on resource definition Poorly invested links between different types of resources Difficult empirical validations Tautological risk
	The structurationist approach	**Contributions:** Overcoming the deterministic vision of technology No superiority of the individual or technology, one over the other **Bounds:** Issues related to the definition of technology and its status Reliability problems and fidelity to Giddens theory Scan level issues
	The socio-technical approach	**Contributions:** Dynamic approach Systems approach The SI can be considered as a sociotechnical entity, which makes it possible to take into account the interactions between the variables of the subsystems and to include the context **Limit:** Poorly defined interactions between subsystems

Table n°13: the different currents of thought
Source: Michel et al, 2014

Factors of complexity of the performance of an IS

Among the main factors that influence the complexity of an IS's performance are the complexity of technologies and the fragmentation of expertise; one is certainly the cause of the other, this complexity is supposed to increase in the future, it concerns the complexities related to the fragmentation of third parties, the interdependence of applications, the speed of evolution and obsolescence of underlying technologies, the introduction of services in SaaS mode, the virtualization of resources... It can also be associated with other complexities related in particular to:

- Lack of benchmarks
- Difficulty detecting problems at the right time which leads to rapid degradation
- The difficulty of anticipation and extrapolation

The IS is a support function

In an organization there are two types of function; production functions and support functions. The latter are made up of a set of resources dedicated to the realization of services for other functions, in particular those dedicated to production. Although it is relatively easy to measure the performance of production functions; It remains complex to measure the performance of support functions.
The main support functions are:

- management control;
- human resources;
- marketing;
- accounting;
- the commercial;
- communication;
- IT;
- information systems;
- logistics;
- legal;
- general services;
- auditing;
- finance;
- international;
- purchasing.

So we see that the SI function is one of them. The IS function is the result of the diffusion of computer technologies in companies, it supports the trades and the management of the organization thanks to the installation and provision of these new technologies. To evaluate this function, it is first necessary to measure these activities, then measure the IS function, without forgetting to measure the resources allocated to it as well as the satisfaction of the clients of the function

Here the functional evaluation model makes it possible to break down into four poles that define the components of a support function. These are: Activities, skills; Organization; Customers

Section 2: The Functional Assessment Model (FEM)

Functional Assessment Model (FEM), is a control model to produce dashboards for support functions, it can be classified in the same category of control models as the balanced Scor card and the Skandia browser. It takes up the logic of the poles that endorse this exercise.

MEF	SKANDIA	BSC

is only interested in transversal functions and activities, positions the notion of performance at the heart of piloting provides the tools of its production with questionnaires, indicators and barometers.	which highlights human management,	is primarily interested in the financial concept.

Table n°14: Comparison between BSC, MEF and SKANDIA

The FEM therefore appears to be a complement to the other two models.

The structure of this model is represented by the following diagram:

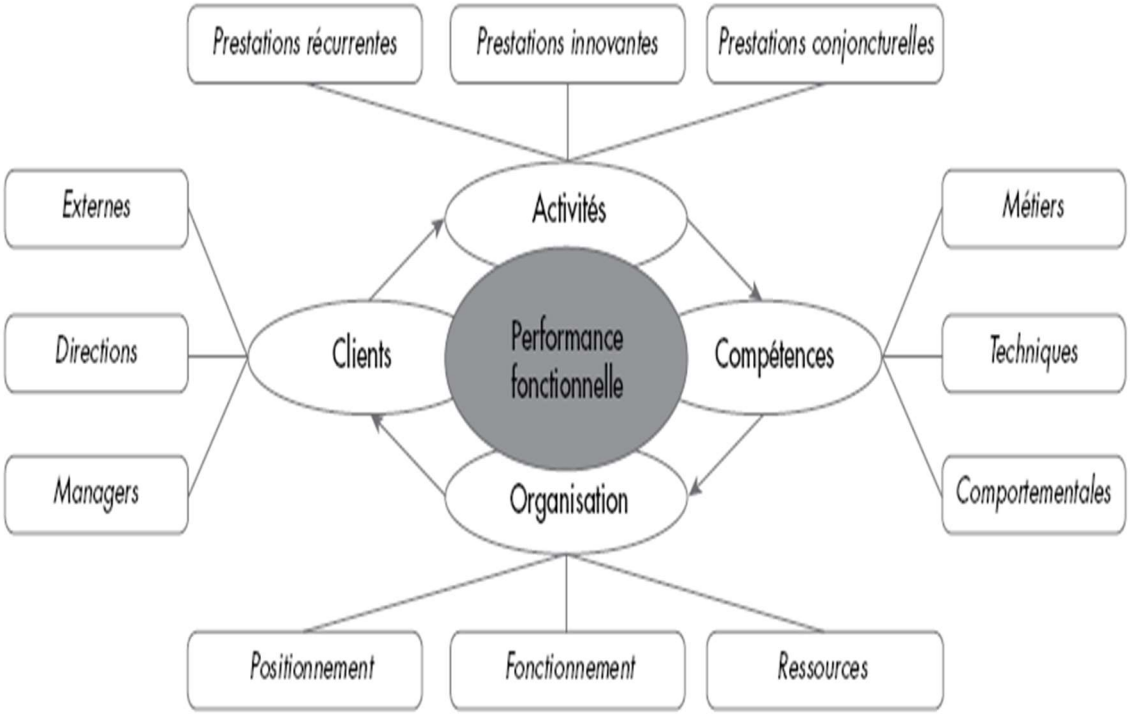


Figure N° 40: the structure of the FEM
Source: Autissier et al, 2008

The activities division

The activities pole as are not indicated defines the different achievements of the function; It is clear that you cannot assess the performance of an entity if you do not know what it is supposed to achieve. In a global way, the following diagram describes these activities

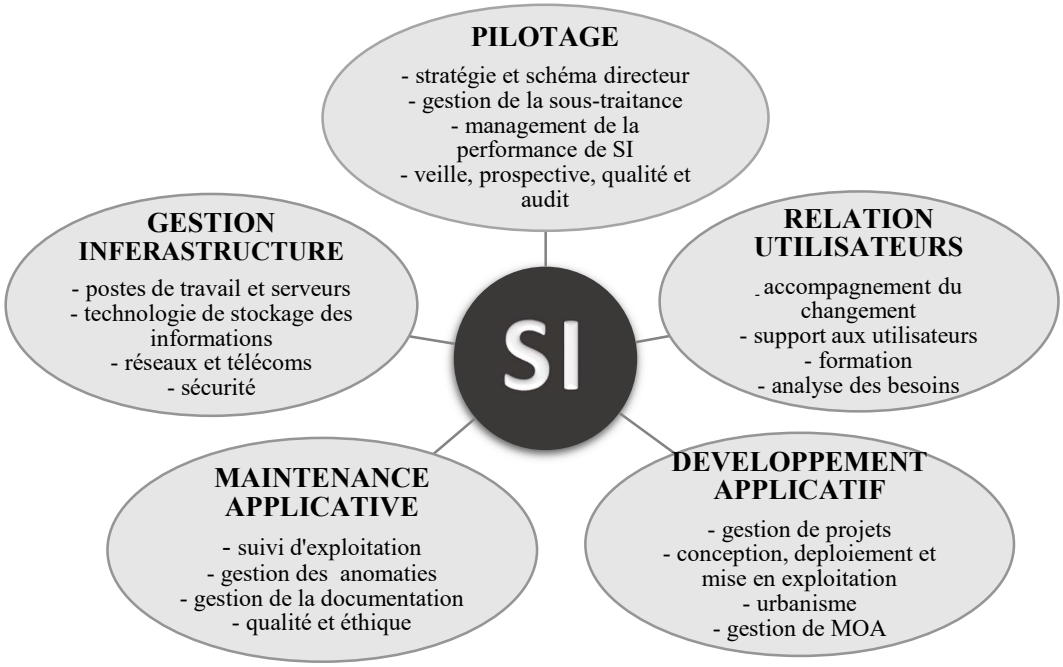


Figure n°41: activity model of the IS function
Source: Autissier 2008

According to the FEM model, we must associate with each of these activities a score that allows us to know if it is carried out or not and also to appreciate its importance for the organization or not.

Activity	Realization of the activity		Its importance in relation to the organization	
	Yes	No	Yes	No
Activity 1				
Activity 2				
Activity 3				

Table n°15: Evaluation grid of the activity division
Source: Autissier, 2008

The skills pole

The skills pole concerns by definition the intrinsic characteristics of the actors of the ISD. The latter must know and master a certain number of skills, it is generally technical, behavioral skills and skills that concern the knowledge of the organization's professions.

The FEM model gives an exhaustive list of these skills where each of them is associated with an evaluation grid:

Technical skills	Behavioural competencies	Skills knowledge of the trade	Points
I master	I master	I know and use it	4

I practice	It can be okay	I know but I don't take it into account systemically	3
I know	I'm having trouble	I know a little	2
I don't know	I can't	I don't know	1

Table n°16: Evaluation grid of the Skills cluster
Source: Autissier, 2008

The organization pole

According to Autissier 2008, the notion of organization is polysemic. It designates as well the organization chart of the function, its management style, all resources (human and material) as the modes of operation, the organization division qualifies and evaluates all the means made available for the realization of the activity. The means have been grouped into three components:

Still according to the same author, the FEM model describes in detail the components of each of the three components which are:

1. **The positioning of the function in the organization chart**: this element concerns the impact of the positioning of the support function on the productions of this same function.
2. **Management** : this element concerns the management style deployed and its impact on the expectations of employees in the function.
3. **Resources** : this element concerns the operating and investment expenses related to the exercise of the function.

The customer division

This division concerns everything related to the customers of the IT department; Who are they and what services or products need to be delivered to them. Like production functions; Support functions also have their own customers; only the latter are much more internal to the organization, the MEF model mentions that this function had mainly five types of customers these are:

1. the general management,
2. the managerial line,
3. project managers,
4. all potential users and
5. the company's external service providers.

The FEM model lists each customer as well as the appreciation scale

The performance rate barometer

After completion of the evaluation of the different poles, the functional assessment model (FEM) determines a level of performance for each of the poles of analysis in the form of a barometer. A performance rate is then assigned, it is a percentage measure

that allows the organization to qualify the analyzed function. Here, we can distinguish four typical management situations as shown in the barometer in the following diagram:

Figure n°42: performance rate barometer
Source: Autissier 2008

1. The Excellent situation: performance rate above 75%. The variables are satisfactory
2. The situation Satisfactory: performance rate ranging from 50 to 75%, the acceptable average.
3. The situation to improve: performance rate between 25 and 50%. Some points in the analysis reveal serious problems,
4. The situation At risk: performance rate below 25%. This situation is qualified as At Risk

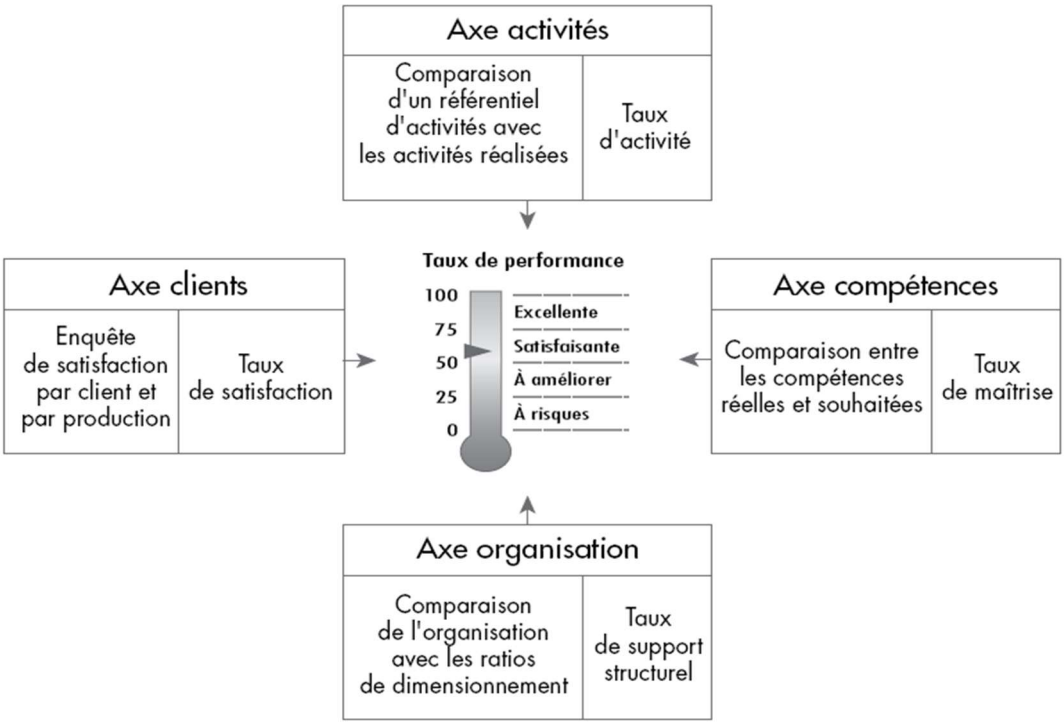


Figure n°43: FEM structure and operation
Source: Autissier 2008

Section 3: IS steering indicators

Like any function, the IS must be controlled through a dashboard containing relevant indicators in order to:

- assess the current and future performance of the function and its proper functioning.
- Anticipate technological developments and the needs of the company's business lines
- identify areas for internal progress
- Manage the different applications
- Operational monitoring
- evolve the IS.

The following table gives an idea of the different indicators used.

IS Objectives	services	Examples of possible indicators
1. Control costs	All services Studies Exploitation User Support Shopping	Costs recorded/annual budget Costs per project Server Utilization Ratio Costs per user Savings targets per contract
2. Verify strategic alignment	Studies	Share of budget dedicated to applications and projects dedicated to the strategic objectives of the company
3. Optimize application management	Studies	Corrective maintenance objectives (share of the study budget)
4. Improve user productivity	Exploitation User Support	Availability ratio per application according to its degree of criticality Average response time Failure resolution rate
5. Improve user satisfaction	Studies Exploitation	Application assessment Service contract implementation rate by application
6. Managing skills	All services	Subcontracting rate by qualification Training and mobility objectives

Table n°17: IS indicators

Source: Rosenthal-sabroux, 2009

Case Study No. 5	SEAAL: Evaluation of the performance of the IS

Evaluation of the performance of the IS[7] with the M.E.F

Presentation of SEAAL

Created on March 1, 2006 The Algiers Water and Sanitation Company (SEAAL), is a public joint-stock company, 70% owned by the Algerian Water Authority (ADE) and 30% by the National Sanitation Office (ONA). In the presentation of the company we will successively reach its history and its evolution, its different activities as well as its sector of activity, its legal nature, the missions and objectives assigned to it.

SEAAL is responsible by delegation of its shareholders, to manage the public services of drinking water and sanitation in the perimeters of the Wilaya of Algiers, from March 1, 2006 and Tipasa from January 1, 2012.

The company is characterized by its various activities as:

- The public drinking water service to ensure the availability of water to Citizens according to authorized standards
- The public sanitation service
- The operation and management of facilities for the production, treatment, transfer and distribution of drinking water, including production and transmission facilities, carried out outside the region

[7] Excerpt adapted from the master's thesis prepared by MEJKANE Amina and supervised by the author, ENSM école nationale supérieure du management

- The collection, collection, transport, purification, disposal and/or recovery of domestic wastewater
- Monitoring the quality of the water distributed and the quality of the wastewater disposal system
- The control of the works and the works of maintenance, rehabilitation, restoration and modernization of the facilities necessary for the realization of its missions
- Billing for services to users
- Collection of invoices

Analysis model:

The analysis model implemented to analyze and solve our problem posed beforehand consists of three phases which are:

1. **Preparation phase**

This is the first step of our analysis and consists in getting acquainted with the host organization, its missions, its objectives, as well as the identification of the four poles to be evaluated which are: the pole activities, organization, competence and customer once the determination of the pole is made.

2. **Implementation phase**

It is a question of administering the questionnaires in order to acquire the information to determine the performance rates of each pole as well as the overall performance rate of the function.

3. **The finalization phase**

In this phase we will submit the various results obtained for analysis and formulate recommendations to improve the performance of processes and function.

Description of SEAAL's customer information system

SEAAL's customer department relies on a customer information system (X7) version 1.2 operational since January 1, 2010, it is a software package that allows to place the computer tool from the beginning to the end of the customer management process of SEAAL, it consists of three modules:

1. Reading and invoicing module:
2. Customer relationship module:
3. Overlap module:

Analysis of the performance of SEAAL information systems

This section aims essentially to evaluate the performance of the SEAAL information system, during this evaluation we will use the FEM functional evaluation model proposed by AUTISSIER and DELAY (2008). To obtain the overall performance rate of the information system, it is a question of determining the different intermediate

performance rates (activity rate, mastery rate, performance rate, satisfaction rate) from the questionnaires adapted by this model.

Analysis of activities:

The questionnaire served us as a reference to develop our study, it includes eighty (80) activities grouped in the form of five (5) headings
First, we calculated the percentage of activities carried out by assigning a point to any activity carried out. Then, a second evaluation which consisted in determining the contingent activity rate that takes into account the importance of an activity by assigning the following coefficients:

1. Activity carried out and considered important is assigned a coefficient 4
2. Activity not carried out and considered important is assigned a coefficient of 3
3. Activity carried out and considered not to be of little importance is assigned a coefficient of 2
4. Activity not carried out and considered not important is assigned a coefficient 1

An evaluation questionnaire of the activities was submitted to the Deputy Director of Information System, the synthesis of the responses gave the results presented in the following table:

Activités	Réalisation	Point
Pilotage du SI	11 activités réalisées dans les 16 activités de la rubrique	11 points
Gestion de la relation avec les utilisateurs	8 activités réalisées dans les 16 activités de la rubrique	8 points
Développement applicatif	9 activités réalisées dans les 16 activités de la rubrique	9 points
Maintenance applicative	10 activités réalisées dans les 16 activités de la rubrique	10 points
Gestion de l'infrastructure	14 activités réalisées dans les 16 activités de la rubrique	14 points

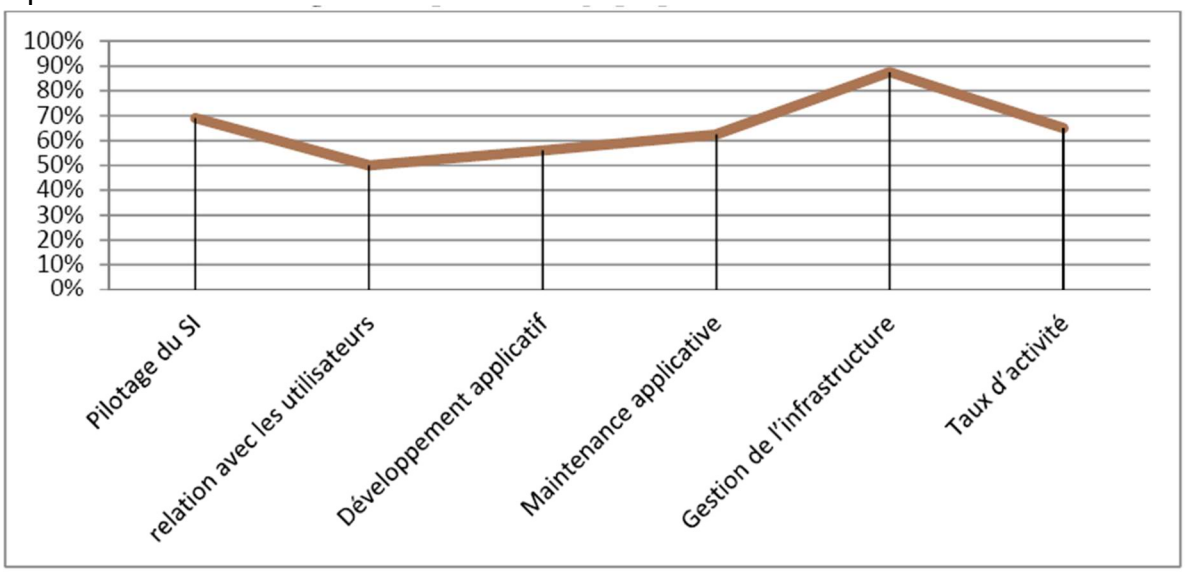
The activity rates of the headings are obtained by assigning the ratio between the number of activities carried out and the number of total activities under the heading.

Activity rate = (number of activities carried out / number of total activities) x100.

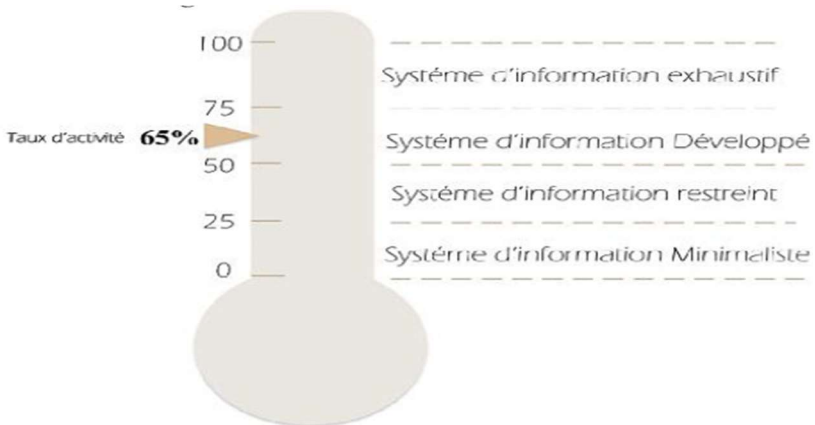
The summary of the different activity rates of the headings gave the following results:

Activités	Taux d'activité	Taux d'activité contingent
Pilotage du SI	(11/16) x100= **69%**	61/80x100 = **76,25%**
Gestion de la relation avec les utilisateurs	(08/16) x100= **50%**	48/80x100 = **60%**
Développement applicatif	(09/16) x100= **56%**	53/80x100 = **66,25%**
Maintenance applicative	(10/16) x100= **62,5%**	54/80x100 = **67,5%**
Gestion de l'infrastructure	(14/16) x100= **87,5%**	60/80x100 = **75%**
Taux d'activité	**65%**	**69%**

For a better illustration of the results we have developed the following graphical representation:



The activity rate allows us to position the information system function on a scale of 0 to 100 with four typical configurations, as shown in the figure



Comment:

The system has a developed configuration (activity rate between 50 and 75%).
This configuration represents services that cover the majority of management, user relations, application development, application maintenance, and infrastructure management activities. Nevertheless, it is worth questioning application development (**56%)** and user relationship management (**50%).** The analysis of user satisfaction will certainly enlighten us on the last point.

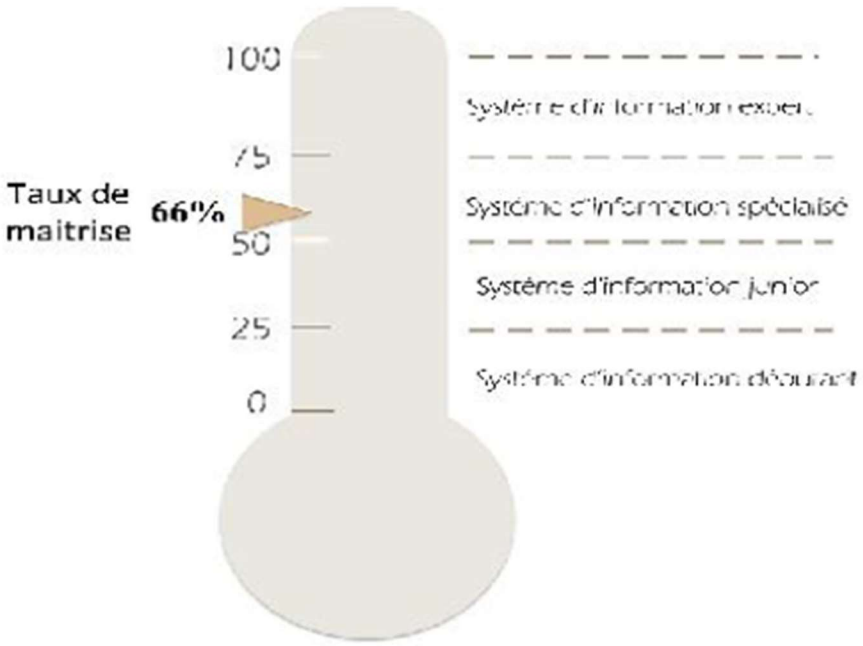
Competency analysis

The objectives of the skills assessment are to measure the level of knowledge and mastery of the company's employees, this assessment was based on a questionnaire (Appendix n°1) which helped us identify the company's behavioural technical and professional mastery rates.

The mastery rate is calculated by taking the sum of the points of the different statements divided over the total and maximum number of statements multiplied by 100 to have the results in percentage according to the following formula
Master's rate= (sum of responses/ maximum of questionnaire) x 100
Our competency analysis was developed with 18 employees, the synthesis of the data collected is presented in the following table:

Taux de maitrise	Nombre de points	Pourcentage %
Pilotage su SI	447	43,65
Gestion de l'infrastructure	540	52,73
Développement applicatif	439	42,87
Maintenance applicative	630	61,52
Relations avec les utilisateurs	586	57,22
Compétences techniques	**2643**	**51,62**
Compétences comportementales	512	**79,68**
Compétences métier	427	**66,71**
Taux de maîtrise global	**3582**	**66%**

The overall mastery rate makes it possible to position the skill level of the information system function on a scale in the form of a barometer from 0 to 100, with four typical configurations, as shown in the figure



Comment:

Overall proficiency rates represent the average proficiency rates for technical, behavioural and trade skills. This overall control rate (between 50% and 75), it thus represents an acceptable level of competence and covering the ordinary management needs of the company. This rate is mainly due to expertise skills in certain technical areas and the complete lack of knowledge and experience for other skills, including behavioural and occupational. This information system does what is asked of it but will not make proposals for changes. It is characterized as a legitimist information system as opposed to the precedent that is described as innovative.

Resource Analysis and Organization

The analysis was based on the questionnaire of the evaluation of the structure proposed by D.AUTISSIER in his book evaluation of the performance of an information system Each questionnaire was evaluated according to the following modalities:

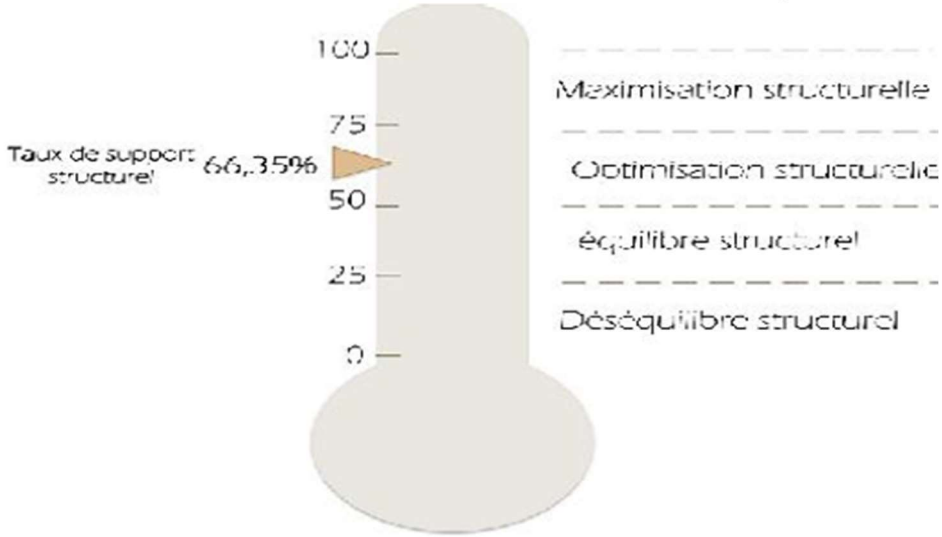
		Points
Positionnement de la DSI	oui tout à fait	4
fonctionnement	oui, en partie	3
Enjeux	non	2
	non, c'est très dommageable	1
Ressources	100%	4
	75%	3
	50%	2
	moins de 25%	1

The assessment of the results obtained from the questionnaires was averaged in order to obtain the different rates of structural support for each heading as well as the overall rate, as shown in the table

Rate for each item = (number obtained from questionnaire / maximum number) x 100
Overall structural support rate = sum of the rates of each heading / 3

Taux de support structurel	Nombre de points	coefficient	Taux
Positionnement	**261**	**1**	**65,25%**
Fonctionnement	**231**	**1**	**72,18%**
Enjeux	**259**	**1**	**64,72%**
Ressource	**253**	**2**	**63,25%**
Taux de support structurel global	**1004**		**66,35%**

The structural support rate makes it possible to draw up an evaluation of the function on a barometric scale as shown in the barometer in the figure:



Comment:

These overall structural support rates correspond to "structural optimization" (performance rate between 50 and 75%). structural optimization means that the various qualified variables are considered acceptable and correspond to the activities of the public treasuries.

Customer satisfaction analysis:

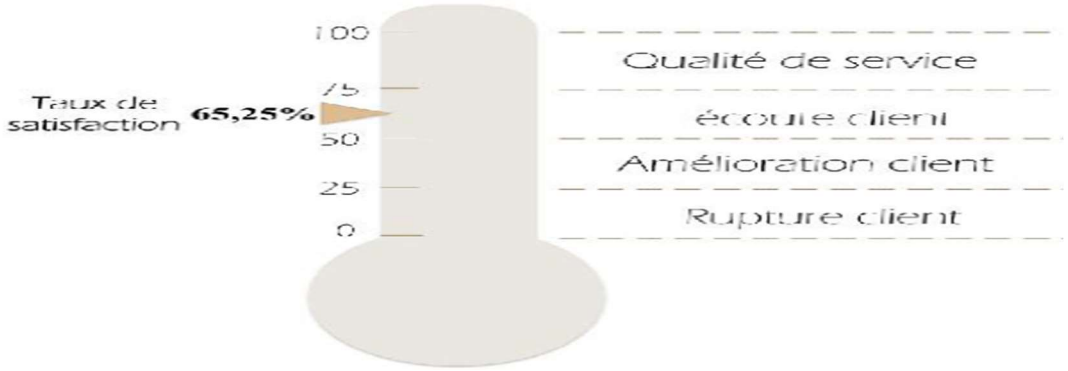
This pole represents the satisfaction rate of the customers providing the IS, The user satisfaction evaluation questionnaires were evaluated individually by giving the following qualitative values:

- 4 for "very satisfied",
- 3 for "satisfied",
- 2 for "not very satisfied",

- 1 for "not satisfied".

The number of points obtained by adding the points corresponding to the answers is divided by the number of questions multiplied by 4. Then, we averaged the individual questionnaires to obtain the overall satisfaction rates. The table below summarizes the performance rates achieved.

Clients	Nombre de points	Taux de satisfaction
Direction générale	165	64%
Management	358	79%
Chefs de projet	429	51%
Utilisateurs	870	67%
Taux de satisfaction global	1822	65,25%



Comment:

Such a performance (overall satisfaction rate between 50 and 75%) reflects an IS "Listening to customers". The IS is attentive to the needs of users without being able to respond to them systematically, because of the weakness of structural means, both in volume and skills.

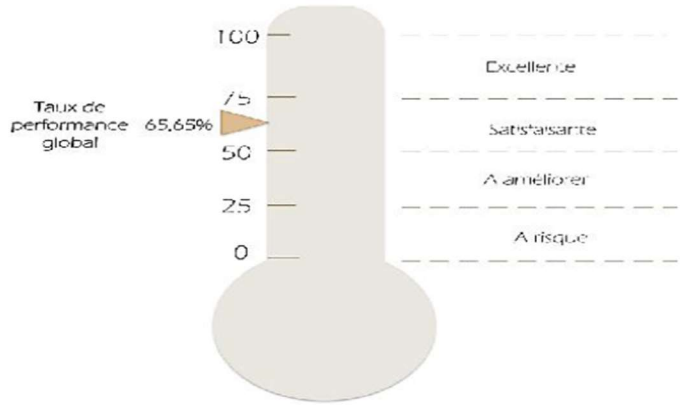
GLOBAL ANALYSIS

Analysis of the results:

The different rates obtained above make it possible to make an overall analysis. The Table combines the four rates to determine an overall performance rate. The different rates in the table are a summary of the rates of the four performance poles developed in the sections above. The overall performance rate is the arithmetic average of the rates of coverage of activities, mastery of skills, structural support, and satisfaction.

Thèmes d'évaluation	Évaluation
Activités pilotage	69%
Activités relations utilisateurs	50%
Activités développement applicatif	50%
Activités maintenance applicative	62,5%
Activités gestion infrastructure	87,5%
Taux de couverture des activités	65%
savoir techniques	51,62%
Savoirs comportementales	79,68%
Savoirs prospectifs	66,7%
Taux de maîtrise des compétences	66%
Positionnement	65,25%
Fonctionnement	72,18%
Enjeux	64,72%
Ressources	63,25%
Taux de support structurel	66,35%
Direction générale	64%
Management	79%
Chefs de projet	51%
Utilisateurs	67%
Taux de satisfaction clients	65,25%
Taux de performance global	65,65%

The rate in the last column represents the arithmetic average of the rates, by heading and overall. As shown in the table above, the average overall performance rate is 65.65% This overall performance rate makes it possible to make an assessment on barometric scales



Comment:

Referring to the functional evaluation model of AUTISSIER we can say that the overall performance of the SEAAL information system is satisfactory.
It is characterized by a performance rate ranging between 50% and 75%. What is achieved by the information system function is done in an acceptable way.

Evaluation Report:

This report consists of making an evaluation and an analysis on the results obtained from the four poles studied at the screen As a first step we will first analyze the results obtained during the evaluation in order to make a synthesis on the strengths and weaknesses of each of these poles as well as on SEAAL information system

The qualitative matrix:

The Strategic Analysis Matrix:

According to AUTISSIER the strategic analysis matrix is a matrix that reports the performance of the information system to its importance, it characterizes the function according to two axes: its performance and its strategic importance

During our interview with the Deputy Director of Information Systems he told us that the strategic positioning of the information system is very important, so the function is in a situation of strategic **alignment**

The multivariate analysis matrix:

This matrix establishes a qualitative diagnosis of the information system. It distinguishes the four poles of performance on the ordinate, and on the abscissa their values. The core value (overall performance rate 50%) distinguishes a performance environment from a underperformance environment. Figure n° presents, for each level, types of the efficient information system and others that require evolution or transformation.

Comment

The multidimensional analysis result of the SEAAL information system is:

1. Structure

The SEAAL information system is dimensioned, it represents that the resources adapted by the information system are in line with the positioning and needs of the company. The resources allocated to it enable it to carry out their mandate.

2. Competence

The SEAAL information system is competent, it shows a good mastery by the team, of the main skills deemed necessary and essential to the achievement of the mission and the activities that are present.

3. Activities

SEAL's information system is extended, which indicates that SEAL's information system function carries out at least 50% of the activity repository and is thus positioned as an information system that is both generalist (which does everything) and specialist (developing certain activities in response to customer needs).

4. Customer

SEALA's information system is customer-oriented, in accordance with customer requests.

Bibliography

- Autissier David Valérie Delaye measuring the performance of the eyrolles information system 20081
- Bennani A., Beldi A. And Baile S. (2004), "Ten years of research in strategic alignment: 1993-2003", proceedings of the 9th AIM conference, EVRY, 26-28 May.
- Chan, E. Y and Reich, H. B. IT alignment: what have we learned? (State of the art). Journal of Information Technology, 2007, n°22, p.297-315
- Chan, Y. E., Huff, S. L and Copeland, d. g. assessing realized information systems strategy. Journal of strategic information systems, 1998, vol°6, p.273-298
- David S. Linthicum, enterprise application integration, ed: Addison Wesley, 2001
- Desq S., Fallery B., Reix R. And Rodhain F. (2002), "25 ans de recherche en systèmes d'information", système d'information et management, vol. 7, n° 3, pp. 5-31.
- Dominique Moisson, COBIT for a better governance of information systems Eyrolles 2009
- Eric Fimbel Pearson Strategic Alignment; synchronizing information systems with the trajectories and maneuvers of companies - Village Mondial – 2007
- Fimbel, E. Strategic alignment: synchronizing IS with business trajectories and maneuvers. Paris, ed. Pearson, Global Village Collection, August 2007, p.360
- Florescu, V, Anica-Popa, L & Anica-Popa, I., governance of information system and audit, conference international_ "The balkan countries' 1'st international conference on accounting and auditing BCAA, 2007 ISBN 978-975-01960-0-3
- Information Technology Audit Practice Guide (GTAG) 4: Information Systems Audit Management, Iia Institute Of Internal Auditors, 2006
- H. Kefi (2011), Organizational processes and information and communication systems: alignment and performance. The Journal of Management Sciences, 251
- Henderson J.C. And Venkatraman N. (1993), "strategic alignment: leveraging information technology for transforming organizations", IBM Systems Journal, vol. 32, n. 1, pp. 4-16.
- Henri Chelli urbaniser l'entreprise et son SI, Edition Vuibert 2003
- Hirschheim R. And Sabherwal R. (2001), "detours in the path toward strategic information systems alignment", California Management Review, vol. 44, n. 1, pp. 87-110.
- Hirschheim R. And Sabherwal R. (2001), "Detours in the path toward strategic information systems alignment", California Management Review, vol. 44, n. 1, pp. 87-110.
- ISO/IEC guide 73:2002, risk management – vocabulary – guidelines for use in standards.
- J.Moskolai, A. Ayissi Eteme, R.Houe Ngouna. "Integration and interoperability of heterogeneous information systems in distributed environments: towards a flexible approach based on the urbanization of information systems".
- Jouirou N. And Kalika M. (2004), "Strategic alignment: determinant of performance (empirical study on SMEs)", proceedings of the 9th AIM conference, Evry, 26-28 May.
- Morely Chantal, management of an information system project, Dunod 2005

- Nesrine Chtourou. Strategic alignment of ERP system uses: emergence of a culturalist hypothesis. Management and management. Conservatoire national des arts et métiers - CNAM, 2012.
- Operationally Critical Threat, Asset And Vulnerability Evaluation (OCTAVE), Carnegie Mellon - Software Engineering Institute, June 1999. http://www.cert.org/octave/
- Oscar Javier Avila Cifuentes, « contribution à l'alignement complet des systèmes d'information techniques », thèse doctorate, école doctorale mathématiques, sciences de l'information et de l'ingénieur, INSA Stratsbourg, n° d'ordre 358, novembre 2009, p5.
- NIST Report 2008 National Institute of Standard And Technology
- Razika Driouche, « proposition d'une architecture d'intégration des applications d'entreprise based sur l'interoperability semantique de l'ebxml et la mobilité des agents » doctoral thesis, Departement Informatique Canstantine ,2007 ,p17 .
- Rota Messager Veronique, project management towards agile methods, Eyrolles ?2006
- S.Bendekkoum, "a process of integration of intra & inter-company applications", thesis presented for the diploma of magister in computer science, defended on: 17 / 05 /2009, p9.
- Sabine Bohnke, modernising her Edition Eyrolles information system
- Sauer C., Southon G. And Dampney C.N.G. (1997), "fit, failure, and the house of horrors: toward a configurational theory of is project failure", proceedings of the eighteenth international conference on information systems, pp. 349-366.
- SEI, CMMI for development version 1.2, software engineering institute 2006, http://www.sei.cmu.edu/pub/documents/06.reports/pdf/06tr008.pdf .
- St-Amant, Gilles (2003) « la gestion des systèmes d'information et de communication » in bédart.m.g and r.miller ,la direction des entreprises. A systemic, conceptual and strategic approach, Montreal Catherière McGraw-Hill
- Sylvie Michel and François Cocula, The evaluation of information systems: a state of the art in the light of variance and processual approaches prospective management ed. | "Management & Future" 2014/8 n° 74 | pages 33 to 51
- Van Grembergen . W, the balanced scorecard and it governance, information systems control journal, n°2, 2000.
- Weill. P, J. Ross, it governance: how top performers manage it decision rights for superior results, Harvard Business School Press, Boston, 2004.

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