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Managing IT debt and obsolescence

Preserving IT agility, security and innovation capacity

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Editorial

Cigref celebrated its 50th anniversary in 2020. What a long way we've come! Through our association of course, but also and above all through our IT systems on which our private and public companies rely on. Over the past five decades, our IT systems have been rewritten several times in line with technological developments, have been considerably enriched with new capabilities but above all have become much more complex. In the last ten years, the digital revolution has profoundly transformed the business units of our companies. It represents a particularly rich period in terms of technological innovations. But while the adoption of these technologies has been instrumental in seizing new business opportunities, it has also made our IT systems more complex and sensitive to much shorter technology life cycles. Therefore, in recent years, we have seen an unprecedented acceleration in what we now call "IT debt and obsolescence".

In order to be able to develop Information Systems, managing this IT debt has become a necessity for IT departments. It is now essential to learn how to qualify, measure, control and reduce it. To do this, levers must be identified in order to integrate this concern into the evolutionary trajectories of Information Systems. Explaining to the Top Management and business units that part of the resources must now be devoted to managing this IT debt takes a great deal of explaining.

I often use the metaphor of the city to explain this phenomenon of aging Information Systems. Indeed, the evolution of a city requires a global vision of all of its districts and infrastructures. There is of course a strong motivation to create new and modern districts in order to attract new populations and expand its territory. But it is also necessary to maintain, modernise and restore the older and even historic districts, which are mostly located at the heart of the city and on its outskirts, because they support a large part of the activity and city attractiveness. Although these renovations are sometimes costly and complex due to the constraints of the existing heritage, they have become absolutely necessary.

Cigref's members are aware of the significant risks that inadequate IT debt management poses to the ability of their IT systems to evolve in the long term. Hence, they met in a working group to share their experience, in order to identify ideas and solutions that would enable them to better control a phenomenon, constantly growing over time.

Franck Denié - Chief Information Officer of Pôle emploi,
Leader of the "Management of IT debt and obsolescence" working group

Executive summary

IT debt, an increasingly strategic issue for companies

In the current context of digital transformation, IT debt and obsolescence in companies is becoming an increasingly strategic issue for IT departments, but also for Top Management and business units. In the face of the threat to the overall level of business agility, these concerns must be known and shared by all players at all levels.

To facilitate this collective awareness, it is possible to highlight, for example:

- the role of IT debt management in meeting new strategic requirements, new business needs and new functionalities.
- the business risk associated with *not* addressing IT debt.
- the control of security issues achieved through effective IT debt management.

Needing to qualify, measure and control IT debt to reduce it

The IT debt management process is recent and still needs to mature in organisations. Measuring assets as IT debt can be difficult due to systems' complexity, incomplete mapping, lack of a public product lifecycle repository and multiplicity of suppliers. Nevertheless, this identification and assessment work is essential for effective IT debt management on the one hand, and can feed into other projects - such as cloud migration - on the other.

Gaining maturity in the IT debt management process

The treatment of debt is sometimes costly and complex due to the constraints of the existing assets, but it is nevertheless absolutely necessary. It is recommended to dedicate a budget, like for cybersecurity projects, in order to have a minimum of financial resources even if other difficulties - particularly those linked to project prioritisation or deadlines - may nevertheless slow down this management. The management of the legacy systems, whether to modernise or replace it, can be done through major programmes but it is advocated to transform it over time.

In this context, one of the major challenges is to improve and sustainably anchor IT debt management by placing it at the heart of the company's processes and by involving all stakeholders.

Main recommendations

In summary, here is a *vade mecum* of recommendations that have been formalised for IT departments in order to best manage the subject of IT debt and obsolescence:

- Adopting an approach that presents the business risks associated with IT debt.
- Leveraging cybersecurity and service continuity issues.
- Formalising an IT map and make IT debt and obsolescence visible.
- Establishing indicators to monitor the evolution of IT debt.
- Building a reference grid or obsolescence matrix for software.
- Developing a pedagogical discourse anchored in the reality of the organisation.
- Raising awareness among Top Management and business units of the challenges of shared control of IT assets.
- Allocating a dedicated budget for IT debt management.
- Decommissioning of the least used applications.
- Integrating the decommissioning of IT elements into transformation projects.
- Using all digital transformation projects as levers to control IT debt.
- Take advantage of cloud migration and available automation tools.
- Balancing the need to maintain the skills required for the legacy systems with the development of the skills required to master new technologies.

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Introduction

Today, we must recognise that it is easier for IT departments to invest in new applications than to maintain the existing IT elements, which often produce less value. Indeed, replacement projects are expensive and potentially risky. In addition, the alignment between software and infrastructure lifecycles can be a barrier to dealing with IT debt, according to several members of the working group.

Nevertheless, with the acceleration of digital transformation, the weight of legacy IT systems is now more and more perceptible. At the same time, awareness is also growing, particularly in relation to the increasing cybersecurity risks on the one hand, and the desire to rationalise IT on the other.

IT debt management is an issue that can no longer be ignored. It has now become essential to control it by involving all of the stakeholders in the company.

Sharing with other IT departments the best practices deployed and the difficulties encountered by others is also a lever for gaining maturity.

This report on IT debt management is based on feedback from Cigref's members. It deals with the questions faced by IT departments in the face of the natural increase in IT debt and obsolescence within their assets (hardware and software). It also highlights the associated challenges in terms of governance and management at the Top Management level.

This report presents the discussions of the working group on the following topics:

- Methods for IT debt and obsolescence management.
- Types of debt: technical debt, application debt, functional debt.
- Risks (operational, non-evolution or security) and opportunities associated with IT debt.
- Approaches to reduce IT debt and limit its generation.
- Ways of empowering the business units.

Cigref intends to pursue this study by looking at the financial valuation and accounting treatment of technical debt based on its intrinsic causes.

1. What is IT debt?

IT debt is the gap between the existing situation and the target, i.e. the targeted state-of-the-art of the IT components (code, software, infrastructure, hardware, skills, etc.). IT debt is intended to be corrected and reabsorbed, for example through rewriting work.

IT obsolescence, on the other hand, is intended to be fully decommissioned, or rewritten (via state-of-the-art functionality rewritten in other components) and then decommissioned.

IT debt and obsolescence affect all organisations, regardless of their size, sector of activity, age or history.

There are several possible causes of IT debt:

- Obsolescence of the language used.
- Obsolescence of the equipment.
- Evolution of the functional need.
- Impact of ecosystem choices (publishers' roadmap).
- Regulatory constraints.
- Scarcity of skills.
- Technological evolution (Moore's law, scope, use).

IT debt involves different types of risk:

- Operational risks (non-functioning, continuity of services).
- Risks of functional or application non-evolution.
- Security risks.

IT debt can also lead to a decrease in the ability to:

- Manage updates.
- Interface applications with each other.
- Deploy the application, scale up and industrialise it.
- Find and train staff on the application/software.

Finally, the repayment of the IT debt constitutes the investment made by the company to enable IT-state-of-the-art. **Dealing with the debt means:**

- Upgrading IT components to a newer target: upgrading components, addressing IT obsolescence, etc.
- Reviewing code that is inconsistent with development standards and practices (cost of non-quality)
- Training technical teams throughout the IT life cycle
- Etc.

There are three types of debt: technical debt, application debt and functional debt.

1.1. Technical debt

Technical debt is characterised by a technological time-lag in the technical environment and in version upgrades (servers, OS, middleware, etc.). This delay can lead to increasing costs and efforts, cause malfunctions in business applications that cannot be corrected, and thus force hardware changes and numerous non-regression tests. Technical debt is generally the sole responsibility of the IT department, in terms of control of components, infrastructure, etc.

1.2. Application debt

Application debt materialises in ageing domains, particularly through a computer language that is used decreasingly or an obsolete architecture that is incompatible with tool version upgrades (which may force, for example, old versions of browsers or other products to be kept on workstations). This debt can also be induced by a loss of skills within the company and its partners, or by the choice to abandon an application (for example, because of what is considered to be an excessive dependence on a publisher's solution).

1.3. Functional debt

Functional debt is made up of systems with complex functionalities that are unused or no longer adapted to meet new business needs. With the evolution of the systems, certain functions may be duplicated. Functional mapping no longer respects urbanisation, which is trying to move towards simplification. This debt must be managed between the IT department and the business units.

Point of view

POLE EMPLOI - Composition of the 3 debts

THE DIFFERENT FORMS OF DEBT AND THEIR IMPACTS

	Functional Debt	Application Debt	Technical Debt
DEFINITIONS	**Complex or unused functionality** - Functionality not used or to be reviewed. - Duplicated functionality or functionality that has been moved to another domain. - Functionality that can no longer evolve.	**Aging estate** - A computer language that is less and less used and far from the current target (Angular, PN&SLD NG) - An obsolete architecture that is incompatible with the inevitable version upgrades of the workstation tools - A lack of skills to be anticipated on the IT side for certain application frameworks - A failure to comply with safety regulations.	**Technological delay** - The technical environment includes any element of the "infra/server" base that is not directly linked to the applications. - This form of technical debt includes all the delays accumulated in the upgrading of major versions of the technical environment.
IMPACTS	- Code bloating. - Unused code in production. - Functional mapping that no longer complies with urbanisation rules.	- Impossibility of rapidly evolving functionalities. Each evolution requires strong impact studies. - Difficulty in upgrading a solution / integration because the technology is obsolete. - Difficulty in adapting to new technologies on the market. - No more support and maintenance in case of incident.	- Updating environments in a constrained manner: the further away from the target, the greater the effort. - Business application malfunctions. - No more support and maintenance in the event of an incident.

Figure 1: The different forms of debt and their impacts according to Pole emploi (enlarged in Appendix 1)

Feedback

AIR FRANCE-KLM - Implementation of a Life Cycle Management approach

Air France-KLM implemented an industrialised Life Cycle Management (LCM) system in 2017, which includes a dedicated budget and monitoring of applications and technical infrastructure components. The company distinguishes between technical debt on software and hardware components and can then assess its impact on applications. An application using an end-of-life component is considered a debt. The product owners are responsible for the LCM product roadmap and the compatibility of the solutions and services with the employees' work equipment. They must therefore be on the lookout for and alert to the risks generated by developments in their products. Projects for new solutions must integrate actions and funding for the decommissioning of previous components.

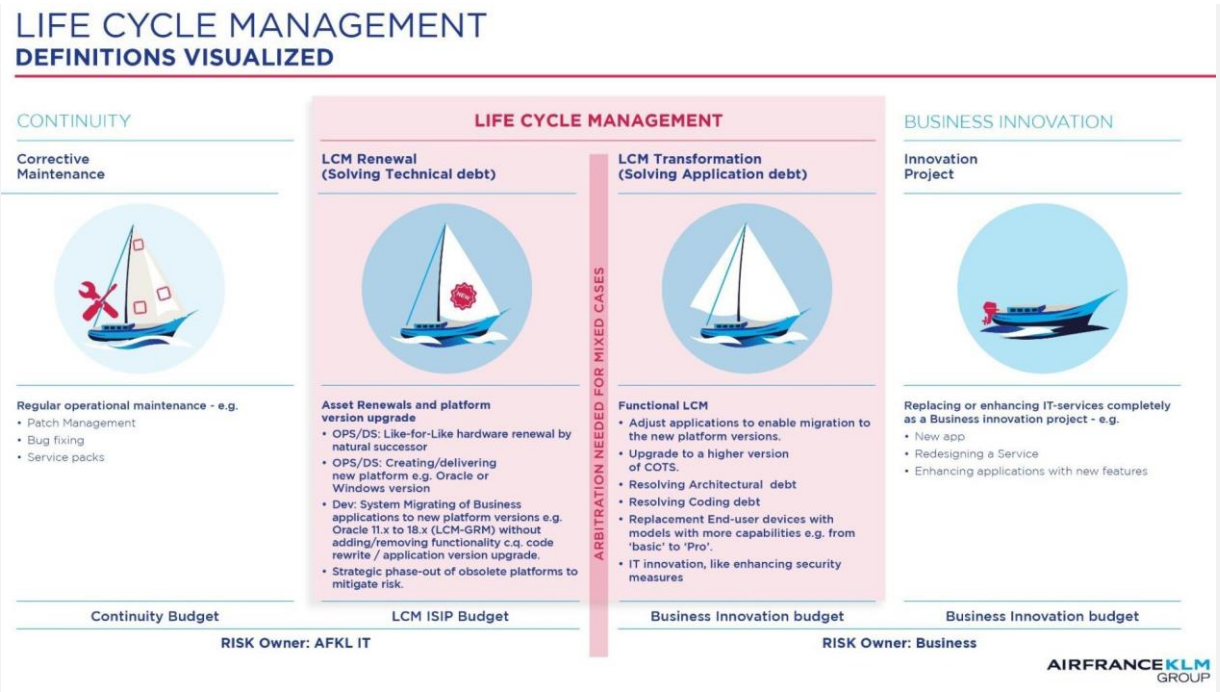


Figure 2: Life Cycle Management approach at Air France-KLM (enlarged version in Appendix 2)

The company has divided the LCM into two parts, which includes LCM Renewal and LCM Transformation, in order to separate the technical debt, which is the responsibility of the IT department, from the application debt, which is a shared responsibility with the business units.

LCM Renewal is the investment made to keep IT solutions up-to-date, without functional change and without significant impact on users, functionalities, tests, interfaces, etc. It therefore relates to technical debt and is included in the IT department's budget.

LCM Transformation refers to changes in functional applications, which are necessary due to the upgrade requested either by the publisher or by the choice of a migration to a new platform, new infrastructure. These changes, which may have a significant impact on the existing system and reduce the application debt, are then included in the IT budget for the business units, called the business innovation budget.

The topic is discussed on the regular agenda in the IT management committee and with the business units in bilateral meetings every three months.

2. Objectives and challenges of the IT debt and obsolescence management approach

2.1. Why deal with IT debt?

The opportunities associated with IT debt and obsolescence management are numerous. In particular, they incorporate reflections on business agility, digital sobriety ambitions and the outsourcing policy. These opportunities are categorised into 7 main areas:

1. **Strategy (business/IT):**
    - Addressing financial and service continuity issues.
    - Meeting cybersecurity issues.
    - Building a roadmap with an associated budget.
    - Refocusing on critical applications and outsourcing non-core applications (SAAS type).
    - Facilitating regulatory compliance.
    - Developing the state-of-the-art of the information systems.
    - Ensuring the protection of user data.

2. **Implementation:**
    - Achieving synchronisation between IT teams and security teams, who have their own strategies.
    - Preventing the increase of incidents with high resolution costs.

3. **Performance/rationalisation:**
    - Leveraging business opportunities to address IT obsolescence.
    - Learning to better identify IT priorities according to business functionalities.
    - Optimising the user experience and removing irritants.
    - Checking the level of use of applications and identifying those that can be phase out, with a view to rationalisation.

4. **Budget:**
    - Enabling a structural reduction in run costs.
    - Reducing the financial costs of support contract extensions.
    - Avoiding the maintenance costs associated with products that are rarely or never used.

5. **Human resources:**
    - Expanding the skills of employees.
    - Improving the quality of life at work for employees.
    - Improving the brand image of the IT department (e.g. by using the latest technologies) and increasing its attractiveness.
6. **Suppliers:**
    - Readjusting the sourcing policy, validating the approach of strategic suppliers and using fewer proprietary solutions.
    - Raising awareness of publishers and manufacturers and making them recognise their technical and financial responsibilities.
    - Taking advantage of IT debt management operations to prepare for migration to the cloud.
    - Facilitating the connection to the ecosystem, in particular through the microservice/API approach.
7. **Digital sobriety:**
    - Replacing equipment with more eco-responsible solutions.
    - Focusing IT developments on real needs.
    - Using low-tech solutions, with the aim of making the information systems sustainable
    - Using the responsible digital charter as a lever (see Cigref's "Digital Sobriety" report).

2.2. How to deal with IT debt?

The IT debt and obsolescence management approach aims to provide a global vision of the obsolescence status, identify perennial and obsolete technologies and build a roadmap for the treatment of IT obsolescence, through 4 major issues:

1. Rationalise and make sustainable the existing IT systems.
2. Move more quickly towards the target architecture.
3. Strengthen the IT security.
4. Reduce IT operating costs.

This approach makes it possible to identify the obsolete IT components and to have a global vision over several years in order to:

- anticipate operational and service continuity problems that may arise due to loss of control and/or IT obsolescence;
- avoid a shortage of skills and resources on technologies that are in IT debt or already obsolete, by maintaining knowledge of the tools or setting up a replacement plan;
- upgrade existing IT capabilities more quickly and/or introduce new ones;
- optimise the financial resources of the IT department.

Feedback

POLE EMPLOI - The work of the Debt Squad

At the beginning of 2020, Pôle emploi's IT department brought together nearly 50 committed employees driven by a common desire to transform the information system. This group, called the "Debt Squad", was tasked with co-constructing Pôle emploi's IT debt management approach through four main areas: methodology, tools, management and communication.

In order to carry out the work on these 4 areas, the Debt Squad organised itself into 7 working groups. Each of the groups had a specific mission: formalise the process of measuring the functional debt, build the debt management application or collect the information necessary for debt management, for example. The fortnightly synchronisation of the working groups ensured the consistency of the work and led, a few months later, to the formalisation of Pôle emploi's IT debt management approach.

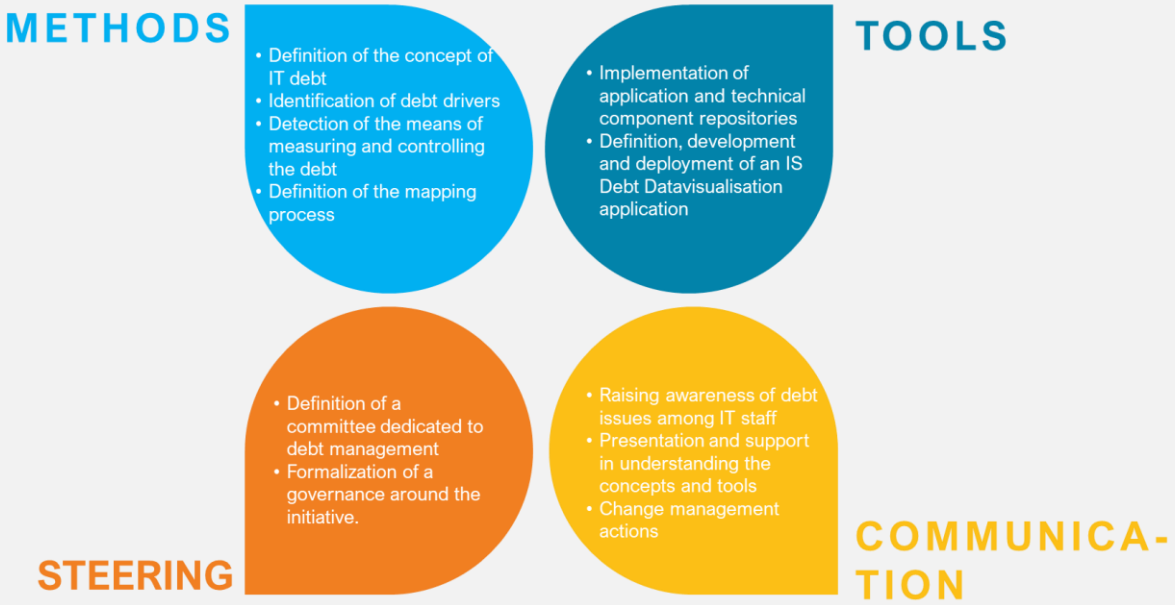


Figure 3: The 4 areas of work of Pôle emploi's IT department Debt Squad (enlarged in Appendix 3)

This approach responds to the four issues mentioned above: rationalise the existing systems and make it sustainable, move more quickly towards the target architecture, facilitate the IT security and reduce IT operating costs.

The IT debt management approach is currently being rolled out to all units across the whole of Pôle emploi's IT department.

2.3. An approach paved with challenges

The members of the working group noted a number of difficulties that could hinder the implementation of effective IT debt and obsolescence management, and in particular:

- Low or no budget specifically allocated to IT debt and obsolescence management.
- Growth of IT debt on all of the IT assets.
- Decentralisation of organisations.
- Market weakness in the supply of tools to manage IT debt.
- Lack of a public repository on products and their life cycle.
- Time management and prioritisation of projects.
- Division of responsibilities between units.
- Existence of shadow IT.
- Incompatibility of software with technical bases.
- Business-oriented purchasing policy.
- Multiplicity of suppliers.

A final difficulty lies in the lack of vision of the enterprise architecture by the Top Management and the business units, and the absence of a shared target. More generally, the lack of awareness of the challenges of IT debt and obsolescence management with the Top Management and business units represents a considerable obstacle to the implementation and deployment of the approach.

3. Measuring IT debt

The major issues in measuring IT debt are the following:

1. Identifying the debt on all of the company's IT assets.
2. Keeping this vision updated over time.
3. Comparing this debt with the risks to the company in terms of security, operational discontinuity and financial costs.

The objective of any organisation, through the mapping of its assets, is to identify all of the versions of components and the technologies used in order to anticipate the emergence of any IT debt. This inventory should make it possible to plan the decommissioning of the elements concerned, ideally before the IT debt and the impacts it may have on the information system appear, and if possible before these impacts are too significant.

In order to carry out this mapping and anticipation work successfully, the IT department must be able to retreive all obsolete elements deployed within its company.

There are three main stages in the implementation of obsolescence measurement:

1. The identification of all technological components and applications.
2. The construction of a reference grid or obsolescence matrix.
3. The formalisation of an inventory and mapping of IT obsolescence.

3.1. Inventory of components and applications

This inventory is based on repositories and tools, the two main ones being the Configuration Management Database (CMDB) and the Architecture Repository.

The CMDB scans environments and retrieves all deployed versions, provides an organised view of the data and allows many of the IT assets to be described. However, the CMDB does not cover all of the IT assets and its repositories must be supplemented by declarative information.

When implementing an IT debt and obsolescence management approach, a good practice is to identify existing or emerging initiatives within the IT department that would effectively complete the coverage of the mapping. Examples include the work of some IT teams in creating specific scripts, automated tests and code reviews (e.g. via the Sonar tool), or the use of middleware traces and logs.

To go further, some IT departments may create specific internal tools - such as Pôle emploi's "Autocarto" - to automatically and centrally collect all mapping information and to enable IT debt projections.

It is necessary to reconcile the various data sources for the production of the inventory. In particular, it can be completed with the automatic analysis of the IT assets with data linked to incidents reported in production.

Finally, the use of a Business Intelligence tool based on the CMBD can make it possible to create a projective view - one, two or three years ahead, for example - and thus to show the evolution of the assets and their IT debt, according to the actions planned and carried out.

References, data, indicators and evaluation guidelines

References used

- Functional and technical reference systems.
- Internal reference systems: CMDB, application components, support/maintenance contracts, enterprise standards.
- External reference systems: end of support and publisher roadmap, risk vision (Gartner type), number of critical flaws in a product (cybersecurity).

Some indicators used

Obsolete software is often considered to be at the “end-of-life”, i.e. no longer supported by the publisher (beyond the end-of-support date).
A component version for which there is no longer any prospect of further development is often considered obsolete.

Gross indicators

- End date of sale of the software.
- End date of support for the application.
- End date of the extended support (support contract with the publisher).
- Number of “end-of-life” technological components.
- Number of “end-of-life” applications.
- Number of infrastructure components managed by the IT department.
- Number of applications managed by the IT department.
- Number of applications per product.
- Number of uses of publisher support.
- Number of incidents on components or applications.
- Number of decommissionings per year.

Cross-referencing of indicators

- Percentage of IT assets under control.
- Number of security breaches found since the end of the support contract.
- Number of years of use of technological components and applications already at the limit of the support contract or at their “end-of-life”.
- Level of obsolescence of systems on a defined scope to date.
- Level of obsolescence of systems on a defined scope at 6, 12, 18, 24 months.

Feedback

NAVAL GROUP - Necessary control of IT assets

Faced with the increase in cybersecurity risks, Naval Group, a historic company that has to manage a substantial legacy system, has implemented an approach for controlling all of its IT assets.

Some applications follow ships life cycle from the time they are built until they are taken out of service. Every ten years, the company integrates a new Product Life Management (PLM) tool with a new technology (GI in 1972, Synergie in 1980, Safran in 1990, Etrave in 2000, etc.). This leads to the existence of complex layers of interdependent software. Some components may date back to the 1970s by necessity. The infrastructure is based on a dozen historical datacentres with these "vintage" technologies.

The objective of the approach is to provide a global vision of the state of IT obsolescence, to define the technologies that are sustainable and those that should be removed from the IT assets, and to build a roadmap for dealing with IT obsolescence (projects, priorities, budgets, planning). The group identified four steps which this report was based on:

1. Identification of all technological components.
2. Definition of IT obsolescence and red/yellow/green classification according to the end-of-life date of technological components.
3. Definition of super-legacy, outside the company's standards or without skills.
4. Reconciliation between the various data sources and production of an obsolescence inventory.

Two main documents were produced:

- State of obsolescence by technology.
- State of obsolescence by application.

This work continues to guide the company in its global vision of the obsolete IT systems.

3.2. Construction of a reference grid or IT obsolescence matrix

The reference grid facilitates the identification of obsolete elements through the use of defined criteria which, in addition to the team's knowledge, help to guide the reflections. It contains information to be checked, such as the end date of publisher support or the end date of the extended support contract, which could indicate a debt.

The IT debt identified is then valued through data that will allow the prioritisation of decommissioning work, in particular by assigning a value to the "risk of not decommissioning" as well as to the "decommissioning complexity". These dimensions include not only the skills and resources required for the work, but also the maintenance costs and the criticality of the impacts of this obsolescence on the rest of the IT systems. In order to effectively value IT debt, some IT departments, for example, consult several units, departments or teams, in order to include them in the process of identifying and reducing IT debt (in particular by valuing and prioritising the decommissioning work to be carried out).

Feedback

AXA GROUP - Complexity index, the IT department's reference grid

The AXA Group has implemented the Complexity Index in response to the need for support in managing its application assets. The aim is to identify pain points and areas of focus in IT assets, as well as to monitor the evolution over time and plan for future legacy management needs.

Methods used:

- Creation of a self-assessment framework to collect input from entities.
- Utilisation of an analysis and visualisation tool (such as PowerBI).
- Definition of Group indicators monitored within the governance bodies.

To identify and evaluate applications in a harmonised manner, grids with criteria are set up in a declarative manner. The use of Gartner's TIME framework makes it possible to qualify the status of applications in terms of IT legacy management.

Tolerate	*Not sustainable but acceptable in the short-term with no action in the current plan. A plan year should be associated referring to when a plan (most probably Migrate or Eliminate) should be considered. Not considered as Tech debt until the plan year is reached.*
Invest	*Target solution in which to keep investing. No associated plan year needed.*
Migrate	*Solution with a plan to reengineer. The associated plan year should correspond to the target end year of the migration plan. Considered as Tech debt.*
Eliminate	*Solution is to be decommissioned. The associated plan year should correspond to the target end year of the decommissioning plan. Considered as Tech debt.*
Retired	*Solution that has been decommissioned (i.e. not running anymore). The plan year should be the one on which the application was stopped.*

3.3. Formalisation of an IT debt map

The objective of having an IT mapping, the debt identification and a reference grid is to establish an inventory of the systems and IT components that no longer correspond to the company's architecture standards, or for which there are no longer any internal or external skills.

Each business application transformation project is an opportunity to increase the coverage of the IT mapping and therefore the identification of IT debt.

All of this work will make it possible to visualise the IT debt for each unit, department, business application, team, etc. Each entity, each manager, Product Owner or Product Manager, can therefore be aware of the IT debt within their scope. This debt mapping and valuation data can be made available via a Business Intelligence (BI) tool, in order to centralise it on the one hand, and to make it easily accessible to those concerned on the other.

3.4. Difficulties encountered in measuring IT debt

The complexity of debt management lies in its identification and valuation, but also in the need to have a precise and up-to-date view of the IT assets. Identifying applications and components requires the implementation of major projects to map IT elements and their debt, as well as the formalisation of clear definitions for each element (components, functionalities, applications, etc.).

The granularity of IT elements tends to be increasingly precise (particularly in the breakdown of components or in the number of framework versions used). Elements are also growing in number.

It is therefore difficult to provide an exhaustive inventory: knowledge of the “end of life” date of components is often based on declarative elements, with decommissioning sometimes carried out without having been indicated and made visible. In addition, without automation processes, the sheer number of applications and softwares in large organisations makes it difficult to map their interdependencies. Other factors, such as shadow IT, also make it difficult to build a complete vision that covers all of the IT assets.

Finally, knowing and integrating the roadmaps of suppliers and editors remains an obstacle in the characterisation of IT obsolescence, as these are sometimes difficult to understand on the one hand, and difficult to obtain on the other.

The measurement methodology must be proven in order to simplify the definition, identification and monitoring of IT obsolescence, while allowing the allocation of the human and financial resources necessary to maintain a near state-of-the-art asset base.

4. Relations with the Top Management and business units

One of the priorities of the IT debt and obsolescence management approach is to raise awareness of the associated issues, firstly by the IT department, and then by the Top Management and business units. It is essential that IT be perceived as a common asset base for the company as a whole, which must be maintained collectively. This way, IT debt and obsolescence could be dealt with, more quickly and efficiently, in an IT resilience perspective.

Top Management and business units must also be involved in IT debt management in order to share their vision and comprehension, according to the issues and risks brought to their attention.

Without this awareness and collective involvement, the IT debt and obsolescence management approach is difficult to establish and maintain over time.

4.1. Raising awareness among the Top Management and business units

The members of the working group mention the difficulties in explaining the following concepts to their Top Management and to the business units: build, run, IT debt and obsolescence. In this context, IT departments need to identify all of the essential educational resources and tools to make them aware of the challenges of managing IT debt and the need to work together to meet them.

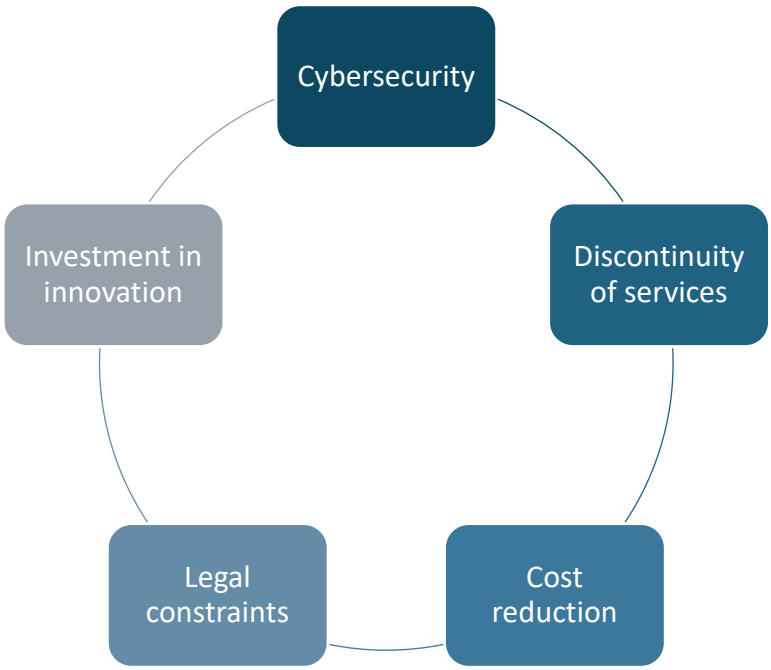


Figure 4: Main arguments for raising awareness of IT debt and obsolescence issues among Top Management and business units - Source: Cigref

Several risks, threats or constraints can be highlighted in order to contribute to the awareness-raising efforts of the Top Management and the business units:

1. **Cyber security risks**, such as OS vulnerabilities or loss of service.
2. **Risks of service failure or discontinuity** impacting business units and users, especially critical services.
3. The **financial credit represented by support extensions**, with often excessive associated costs, which does not contribute to the remediation of IT obsolescence.
4. **Legal constraints**, which are particularly demanding in some sectors.
5. **Preventing digital investments** and deep process transformations.

The approach that focuses on opportunities can also be favoured: indeed, if they are addressed, each of the risks, threats or constraints mentioned above are, in reverse, sources of opportunities.

4.2. Sharing responsibilities with business units

It is not always easy to explain to business units that the *build* in year "n" will increase the *run* costs in year "n+1". Indeed, the creation of new applications in year "n" will necessarily correspond to an increase in maintenance costs in year "n+1". This tendency to launch new projects, without a fundamental awareness and knowledge of the existing assets and future impacts, needs to be rebalanced, in an IT resilience approach.

To ensure this balance, governance must be put in place between the IT department and the business units on the one hand, and within the IT department itself on the other. The main objective of the body bringing together the IT department and business units, is to set annual objectives for each business process in terms of simplification or decommissioning. The aim of the IT department internal body is to share, centralise and coordinate requirements in relation to IT debt management. Each IT product manager is responsible for reporting to this body on its objectives and challenges, and the associated indicators.

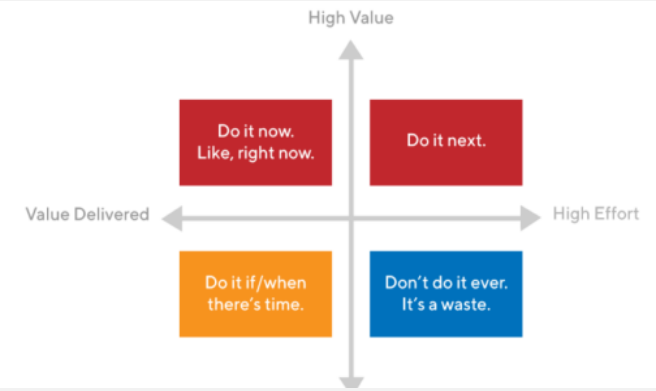
Feedback

SOCIÉTÉ GÉNÉRALE - Implementation of a risk-based approach

Société Générale takes a cautious stance and considers an application to be obsolete if one of its components is obsolete. Société Générale proposes to put into perspective two areas of analysis and their difficulties:

IT debt approach:

The aim of this approach is to have a vision of the obsolescence of the major technologies to date, at 6 months and at 18 months, as well as the investment amounts. This is coupled with a value and effort analysis approach to prioritise important remediation of obsolete technologies. The challenge is to anticipate as much as possible to avoid contracting extended support (cost and durability).

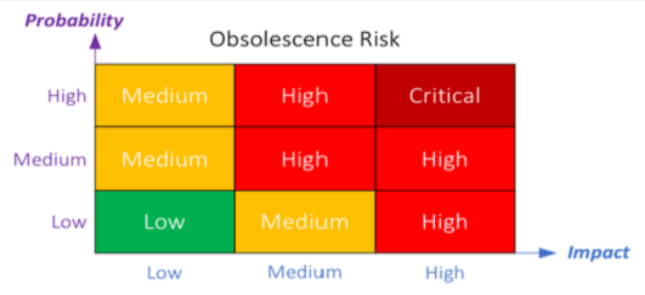


However, this approach has some limitations:

- Essentially a budgetary vision that is not well aligned with the business vision.
- Difficulties to mobilise people not familiar to risk assessment.
- Difficulties in prioritising remedies.
- Tendency to focus mainly on heavy remediation to the detriment of smaller ones.
- Need to have good quality infrastructure repositories and associated mapping, as well as knowledge of technologies and their end of support date.

Risk-based approach:

The IT department first addresses the most business-critical and crucial applications in order to target the major business processes. It contacts the application manager if an obsolescence is identified without a remediation plan within 3 months (annual review). The person responsible for the application enters into a Risk Awareness approach. This allows business managers to be acculturated to IT risks and obsolescence issues. This is more educational than a Risk Acceptance approach - a constraining view for the business.



Again, there are some limitations to this approach:

- Low awareness of IT risks, which are not always a priority for application managers.
- Need to get in touch with application managers.
- High remediation costs for sometimes intangible gains.
- Weak forward-looking vision, with a need to renew the approach every year.

Both approaches have their own advantages and disadvantages, as well as two points in common: on the one hand, the need to have precise and exhaustive inputs (application, infrastructure and technology repositories) and established and up-to-date links between these various elements, and on the other hand, the importance of having a reliable decommissioning process.

4.3. Earmarking a budget for debt and obsolescence

According to Gartner, approximately 14-15% of the IT budget should be spent on debt and obsolescence management. While this budget is certainly substantial, it can at least be a basis for discussion for companies. Comparing the proportion of the IT budget allocated to debt processing with that of other companies in the sector can also reveal an alignment or, conversely, a gap that needs to be closed.

During each budgetary year, the IT department tends to detail the costs that enhance its work and establish its key role within the company, to the detriment of recurring IT costs, which nevertheless represent the majority of the budget. These recurring costs are not detailed, mainly because of the difficulties experienced by the Top Management and the business units in understanding certain technical concepts (build, run, application project design costs, maintenance costs, cybersecurity costs, etc.). For example, it is difficult to explain that the treatment of cybersecurity and IT obsolescence is often integrated into both the build and run budgets, that corrective maintenance is integrated into the run budgets and that application ongoing maintenance is integrated into the build budgets.

Nevertheless, it would be beneficial for the IT department to explain the structure and distribution of its budget in a more pedagogical way, in order to ensure visibility and transparency. This would make it easier for the Top Management and business units to understand the role of IT obsolescence in the budget.

Another challenge for the IT department is the demonstration that the IT budget is relatively constant from one year to the next, due to the constraint on run costs to compensate for increased build costs. Every year, the reduction of run costs is made possible by rationalisation and application optimisation. To do this, the IT department must be able to identify opportunities for withdrawal, or even decommissioning, to limit its run budget.

However, some IT departments have already succeeded in demonstrating the importance of maintaining a budget dedicated to the proper functioning of IT systems, and consequently, have already managed to earmark a budget for remediation along the way. In addition, these IT

departments are able to negotiate additional budgets for the launch of certain large projects (such as networks, telephony, etc.)

The aim is to be able to use this earmarked budget to deal with IT debt and obsolescence on a recurring basis, on an ongoing basis (OPEX), in order to progressively limit major projects (CAPEX), which are much more expensive, with a few major exceptions.

Feedback

TOTAL - Budgetary trade-offs by the Top Management

Aware of the need to manage IT debt following the discontinuation of a critical service, Total's Top Management asked its IT department to estimate its IT debt and to present a plan for reducing it. In light of the proposals made by the IT department, several decisions were made by the Top Management:

- Earmark the IT debt and obsolescence budget (as opposed to a cybersecurity budget previously set at 6%).
- Work within the current and constant IT department envelope.
- Seek optimisations on the run (via mutualisation and rationalisation of applications) to enable the financing of the earmarked budget.
- Potentially consider trade-offs on business projects to participate in the earmarked budget target.

One of the levers therefore lies in the rationalisation of the application portfolio, which nevertheless often remains complex due to the desire of the business units to retain certain applications as a security measure or out of habit. To this end, a repository of applications in service has been developed, integrating various discriminating criteria such as business value or use, annual cost, number of users, etc.

The IT department therefore sought the support of the Top Management from the other units to make certain budgetary trade-offs. For example, some duplicate applications will be decommissioned; applications with few users and less business value will be phased out as well. With these trade-offs validated by the Top Management, it is up to the IT department to build and deploy the operational strategy.

To measure the return on investment of such a budget earmarked for the treatment of IT obsolescence, indicators of its evolution are regularly shared in the management committees.

5. IT debt and obsolescence reduction issues

By taking an inventory of applications and mapping obsolescence, the IT department highlights all of the actions to be implemented to reduce IT debt, but also the way in which it is generated. The definition of an IT evolution trajectory makes it possible to give a vision for the next few years and to initiate the transformation of obsolete components to new state-of-the-art technologies.

Two methods are then possible:

- The launch of large projects (CAPEX), mostly used for application and functional debt management, which include decommissioning.
- Ongoing debt management (OPEX), which can be dealt with via the earmarked budget.

The renovation of the asset base in application obsolescence is sometimes partly addressed by major new application programmes, in particular by the implementation of ERP. The Top Management more easily understands the need for exceptional financing of these major transformation programmes, such as networks, identity management, cloud, or APIsation. However, without a recurrent, earmarked budget allowing for regular developments, new debt is generated year on year.

5.1. The cloud as a means of reducing IT debt and its generation

The migration of many services to the cloud represents a step towards better control of IT debt and obsolescence, but does not completely eliminate the need to manage IT debt.

The cloud strategy of an enterprise is primarily designed and implemented around business benefits such as auto-scaling, time-to-market, automation and unified service management, and not with an IT debt management objective.

However, IT debt management can be effectively addressed through PaaS, SaaS or IaaS, which allow obsolescence issues to be centralised, if not totally outsourced. These mechanisms help to reduce the debt and limit its generation thanks to the tools proposed (use of automation resources, defined and evolving architecture framework, etc.).

Cloud migration techniques

The various cloud migration techniques and their impact on IT debt and obsolescence management:

- Rehosting, equivalent to lift & shift: moving applications without transformation.
  - Does not reduce IT debt.
- Replatforming (lift & reshape).
  - Enables application optimisation and installation on managed services in order to use cloud platform tools to address obsolescence.
- Repurchasing (replace, drop & shop): replacement by SaaS solutions.
  - Allows organisations to delegate IT debt and obsolescence management to the publisher.
- Refactoring (rewriting): rewriting the application on the PaaS, often in a platform-specific language.
  - Allows organisations to completely update an application to the state-of-the-art.
  - Often more complicated than initially envisaged by organisations.

However, moving to cloud solutions is not without consequences for the IT department, and there are multiple issues (notably confidentiality and reversibility) that may reveal hidden costs.

Feedback

VEOLIA - IT debt management through automation and managed services in the public cloud

The IT department of the Veolia Group was heavily impacted by historical suppliers with problems of equipment obsolescence in the datacentres. For 7 years, Veolia has adopted a strong "cloud first" policy and the cloud has become a conviction for the group. The IT department has already migrated about 95% of the IT assets to the public cloud using various migration techniques. The chosen strategy leads to the closure of the last datacentre, scheduled for June 2021.

Some technologies that cannot be migrated to the cloud (mainframe and AX), however, require gradual decommissioning. For historical reasons, an IBM mainframe in production no longer represents more than a small IT scope, even though it covers an important business scope.

One of the key capabilities of the public cloud, which proved particularly useful during the Covid-19 crisis and the lockdowns, is auto-scaling. The public cloud allows more agility and speed thanks to test & learn. It also enables the acceleration of new application deployments, i.e. time-to-market, to meet business needs. It also provides a tool to manage and industrialise IT debt management.

IT obsolescence management through automation

Managing debt through the move to the cloud requires new requirements to be put in place, such as having a Continuous Integration/Continuous Delivery (CI/CD) policy, or imposing secure OSs for all applications. Each time there are new developments, the whole application is rebuilt brick by brick to be updated and hosted in the cloud.

Automation allows deployments to be carried out with minimal impact, aided by the managed deployment solution. This introduces a dynamic of permanently updated layers (stacks), and allows an additional layer of abstraction to be added with a view to systematically reducing the debt.

Multicloud and containerisation

In addition, to free itself of the OS layer, the IT department is investing in containerisation for the orchestration and management of containers. The aim is to design applications for various delivery models and various cloud partners in a multi-cloud logic.

The issue of multicloud is important for Veolia, which works with local authorities and must ensure certain data storage conditions. The IT department tested the inter-cloud compatibility between Google and Amazon. For example, it migrated an application that was completely developed on Google Cloud to AWS France in 4 days.

Reduction of IT debt through a defined architecture framework for private cloud migration

Unlike the public cloud, the private cloud does not allow organisations to free themselves from managing part of their IT debt. On the other hand, its use offers several levers to better control or even reduce it, in particular:

- Mutualisation and globalisation during the implementation process aimed at harmonising practices (tools, processes, architecture patterns, updating documentation and CMDB-type repositories), paving the way for the industrialisation of operations, including the management of future obsolescence.
- Use of up-to-date components (OS/database, hardware infrastructure, security) during the migration, hence harmonising the components used.
- Concentration of investments.

However, this type of migration is a long-term process and must be accompanied by specific IT debt management measures in the datacentres. It is necessary to be able to decommission certain equipment at the pace of the migrations and avoid reinvesting: by grouping applications that have not yet been migrated on a limited number of equipment (CPU rack, network storage rack) for example.

5.2. Need for skills development

Faced with the arrival of new technologies (proprietary or open source), the IT department must support the development of team skills. It must be able to allow employees who wish to do so to develop their skills, to work on new systems or to change direction.

The issue of skills retention is an additional argument for dealing with IT debt. The replacement of some mainframe systems requires highly specialised skills and knowledge of the supervision and administration rules in place. However, these skills may only be held by a few employees, who may retire or leave the IT department, for example. Without this knowledge and expertise, maintaining old systems, or migrating them, is then often extremely complex to implement. The risk of loss of know-how can therefore lead to accelerated decommissioning of old systems, or migration to new systems.

With regard to the development of human skills, the challenge for the IT department is twofold: recruit new employees or train existing employees in the new target technologies on the one hand, and retain and preserve the existing skills necessary for the maintenance and migration of historical technologies on the other.

6. Special situation of the Covid-19 health crisis

The working group's discussions also focused on the place of IT debt and obsolescence in the Covid-19 health crisis. Is this crisis a source of opportunities or risks for IT debt management?

6.1. Impacts of activity variation on IT debt and obsolescence management

For some members of the working group, the Covid-19 crisis has led to a continuation and even an acceleration of work on IT debt and obsolescence, made possible in particular by the provision of workstations and remote access to business applications via VPN.

For other members, on the other hand, projects have been slowed down or even de-prioritised. This is particularly the case for companies whose activity has increased dramatically, resulting in fewer resources available to deal with IT debt and obsolescence.

This is also the case for companies that have been severely affected by a drop in their activity and turnover. As a result of this loss of turnover, the companies involved in the working group aimed to reduce their IT budgets, sometimes drastically. In some cases, these constraints have nevertheless led to the start or acceleration of work on IT debt, in order to integrate the associated costs into arbitration and project re-prioritisation choices.

Finally, despite the lack of budget cuts, some IT departments have limited their developments to security issues, thus reducing the rest of the deployments, in order to benefit from a direct mechanical result: the stability of production, which limits the number of incidents. This is particularly the case for companies that have experienced an increase in activity: priority was given to emergencies (deployment of VPN capacities, for example). At the same time, business needs have been refocused on daily activities.

6.2. Handling of IT debt and obsolescence during the lockdowns

During the lockdowns, the only activities that were maintained for the companies in the working group - even with reduced IT budgets - were product lifecycle management, operational maintenance and security patch management. These activities have enabled these companies to upgrade their technical components and decommission certain applications at the request of the business unit.

In order to adapt to widespread teleworking, remote access to business solutions has been made possible through a process called "extraneting". For applications developed in accordance with standard practice, this opening up of remote access was relatively smooth.

For legacy systems, on the other hand, and more particularly for solutions based on historical infrastructures, implementation has proved to be very complicated from a technical and security point of view. However, in some cases, as this legacy systems could not be decommissioned quickly, it was necessary to implement temporary solutions (remote office, VPN, etc.).

6.3. Opportunities offered by the crisis on the subject

The first lockdown in March 2020, marked by an abrupt shutdown of the vast majority of activities, made it possible to analyse the IT costs supporting the core business of the companies. This analysis includes the nature of the costs, the terms of the contracts and the ratio of hardware to software or of run to projects. It was observed that the weight of the IT debt is predominant within the run costs.

In addition, the Covid-19 health crisis revealed the need to guarantee the agility of the IT systems as a whole in order to respond very quickly to the needs of companies to adapt to the crisis or to have VPN capacities and up-to-date workstations. The crisis has also highlighted the strategic role of IT for the company as a whole.

Finally, the drop in activity and the widespread teleworking induced by the health context have made it possible to highlight a drop in the use of certain applications on the one hand, and the existence of shadow IT applications on the other. Indicators could then be identified and formalised to launch or accelerate certain decommissioning projects.

Overall, it therefore seems that the Covid-19 health crisis has had a positive impact on the management of IT debt and obsolescence, either by giving impetus to its management or by accelerating the work.

Conclusion

A robust and resilient information system is one of the pillars to support business strategy. Its ability to evolve at the right pace is therefore essential to meet the challenges of Top Management and business units.

In the current economic and health context, companies' expectations of their information systems are all the greater, to ensure both continuity of IT activities and continuity of services for users and customers.

The Cigref working group confirmed that the lack of treatment of IT debt and obsolescence was a major obstacle to the evolution of information systems and therefore to company strategy. It has thus defined the following conditions for dealing with IT debt:

1. Control information systems, by mapping IT assets and making the associated debt and obsolescence visible.
2. Assess and share risks with the Top Management and business units.
3. Plan and implement the IT roadmap according to two areas: redesign or migration projects on the one hand, and business opportunities on the other.

The need for companies to manage IT debt and obsolescence is well established. The challenge now is to reduce it and limit its generation, and collectively to succeed in anchoring it in the best practices of IT departments in the long term.

7. APPENDICES

7.1.1. Appendix 1

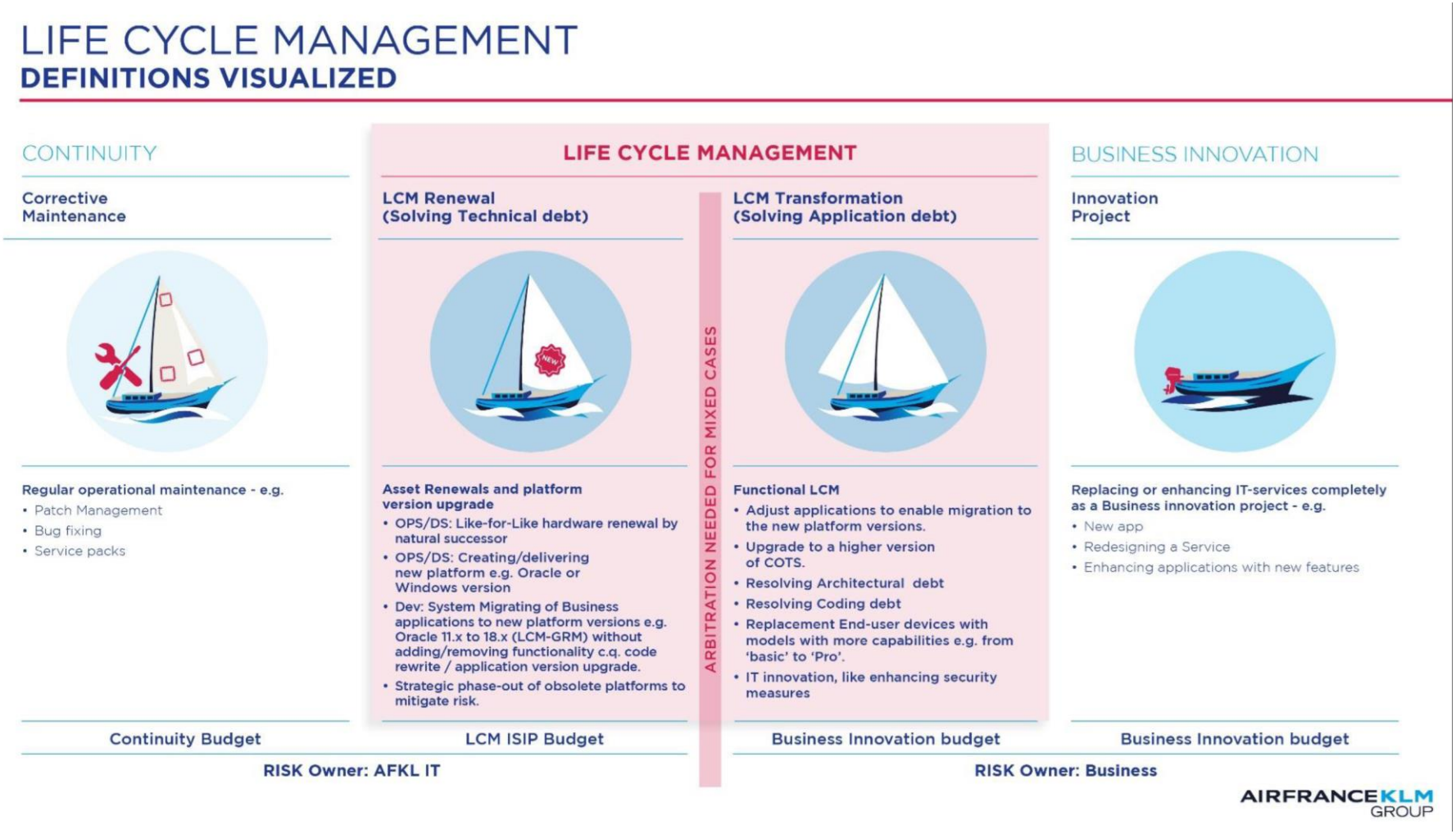
The different forms of debt and their impacts according to Pôle Emploi

THE DIFFERENT FORMS OF DEBT AND THEIR IMPACTS

	Functional Debt	Application Debt	Technical Debt
DEFINITIONS	**Complex or unused functionality** - Functionality not used or to be reviewed. - Duplicated functionality or functionality that has been moved to another domain. - Functionality that can no longer evolve.	**Aging estate** - A computer language that is less and less used and far from the current target (Angular, PN&SLD NG) - An obsolete architecture that is incompatible with the inevitable version upgrades of the workstation tools - A lack of skills to be anticipated on the IT side for certain application frameworks - A failure to comply with safety regulations.	**Technological delay** - The technical environment includes any element of the "infra/server" base that is not directly linked to the applications. - This form of technical debt includes all the delays accumulated in the upgrading of major versions of the technical environment.
IMPACTS	- Code bloating. - Unused code in production. - Functional mapping that no longer complies with urbanisation rules.	- Impossibility of rapidly evolving functionalities. Each evolution requires strong impact studies. - Difficulty in upgrading a solution / integration because the technology is obsolete. - Difficulty in adapting to new technologies on the market. - No more support and maintenance in case of incident.	- Updating environments in a constrained manner: the further away from the target, the greater the effort. - Business application malfunctions. - No more support and maintenance in the event of an incident.

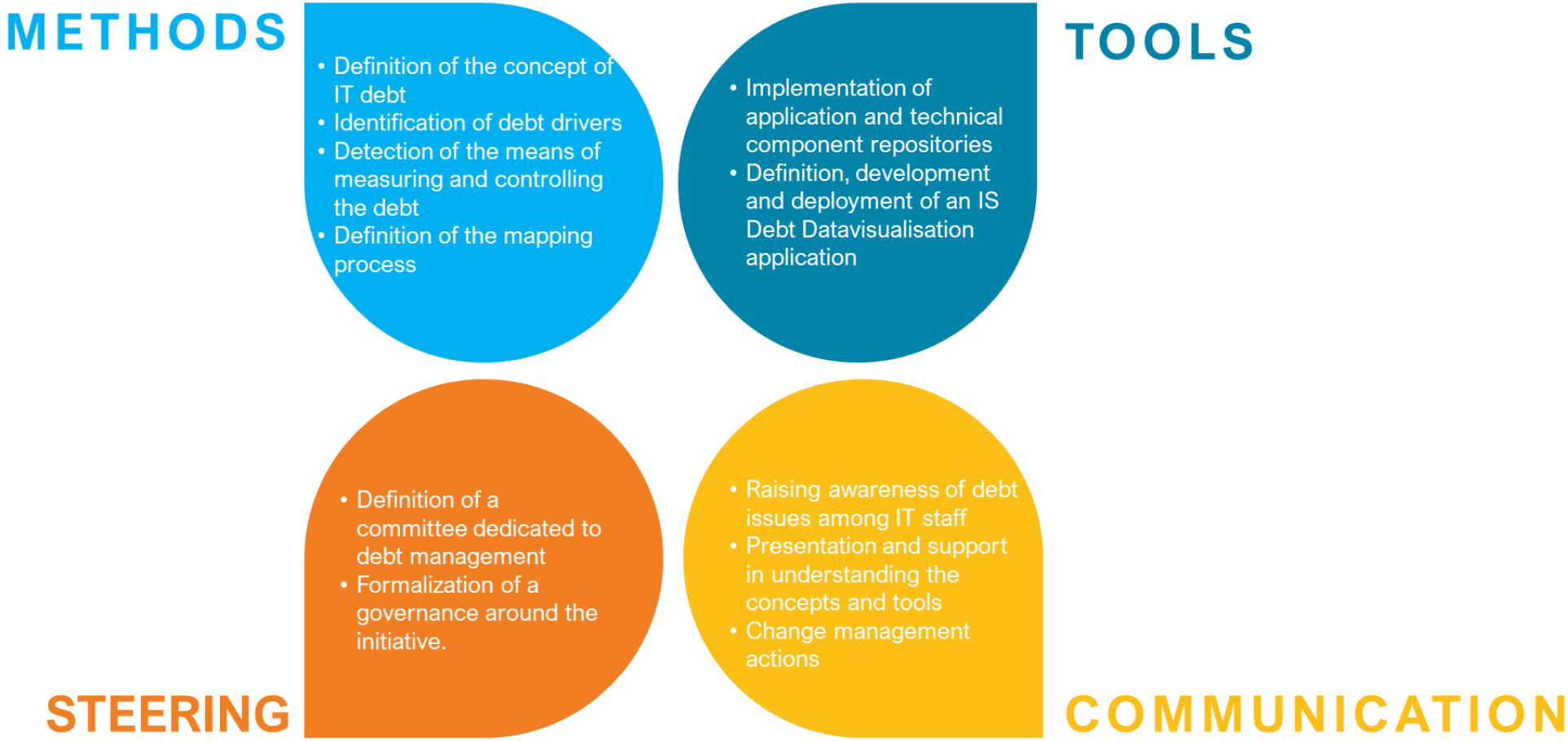
7.1.2. Appendix 2

Life Cycle Management approach at Air France-KLM



7.1.3. Appendix 3

The 4 areas of work of Pôle emploi's IT department Debt Squad



Cigref
SUCCEED
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Achieving digital success to help promote the economic growth and competitiveness of its members, who are major French corporations and public administrations, and users of digital solutions and services

Cigref is a network of major French corporations and public administrations set up in order to develop its members' ability to acquire and master digital technology. It is a unifying player in the digital society, thanks to its high-quality thinking and the extent to which it represents its members. Cigref is a not-for-profit body in accordance with the French law of 1901, created in 1970.

To achieve its mission, Cigref counts on three functions, which make it unique.

1/ Membership:
Cigref speaks with one voice on behalf of major French corporations and public administrations on the subject of digital technology. Its members share their experiences of the use of technology in working groups in order to elicit best practices.

2/ Intelligence:
Cigref takes part in group discussions of the economic and societal issues raised by information technologies. Founded nearly 50 years ago, making it one of the oldest digital associations in France, it draws its legitimacy from both its history and its understanding of technical topics, giving it a solid platform of skills and know-how, the foundation stones of digital technology.

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