Economic and Ecological IT Management Model

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.

EDITORIAL

Cigref has been working on IT cost models for over 20 years. The “IT Cost Analysis and Benchmarking Model” is now an industry standard.

Adopted in France and abroad by many large companies in various sectors of activity – energy, transport, industry, banks – the model nevertheless needs to be regularly updated[1]. it must take into account changes in the IT department's business units and its consequences in terms of economic – and now ecological – management.

After the 2006, 2009, and 2018 versions, the 2022 edition of the “IT Benchmarking and Cost Analysis Model” has changed its name to the “Economic and Ecological IT Management Model”. This new terminology illustrates that the changes in the IT world are being taken into account, particularly with regard to cloud computing/FinOps, Agility and Carbon Footprint – three strategic themes of current importance to companies’ digital issues.

After all, IT departments are faced with powerful organisational changes. With regard to cloud computing and its expansion, and the growing use of solutions operated and delivered in SaaS mode[2] by the main publishers, these dynamics are not without consequences for the financial management of projects, and call for changes in the FinOps function in companies in terms of skills and processes.

Agility, meanwhile, requires a rethink of the IT department's methods, operational activities, structure and offering. Agility therefore has direct implications for the management model, since it has been based on the “Activity Based Costing” method since its creation, making activities central to analyses.

Finally, carbon footprinting is one of the most important issues for businesses and administrations today, and this goes beyond the IT sphere, as the issue relates to adopting and adapting responsible conduct in both public and private sector activities.

For these reasons, it was particularly critical to update the cost model, which should make it possible to answer the questions raised by an ever-changing environment of constraints and opportunities.

It seemed obvious to Cigref that it should partner with the Cost House consultancy, which has been its partner for many years on the subject of economic performance. The work was thus led and conducted jointly with Joachim Treyer, Managing Director and co-founder of Cost House, who has been involved in the development of this tool since its creation, and Steve Gordon, Cost House Partner, former permanent member of Cigref and the writer responsible for this reference framework.

This document is evolving, and is intended to be enriched with the feedback and proposals of user members, in order to remain in line with their needs and to best meet their expectations.

[1] The first version of Cigref's “IT Cost Analysis and Benchmarking Model” was published in 2006, followed by three updates in 2009, 2014, and 2018. Find the 2006, 2009, 2014 and 2018 editions of the model.

[2] Software as a Service.

OVERVIEW

The work of updating the IT Benchmarking and Cost Analysis Model has been structured around thematic workshops, to which not only professionals in the field of cost management were invited, but also specialists in the themes covered by the model. These themes correspond to the main areas of change for the benchmark, namely cloud computing/FinOps, agility, and carbon footprint.

Aware of the fact that operational teams do not have extensive knowledge of the fundamentals of financial management, and conversely, that financial departments sometimes misunderstand the rapid evolution of IT technologies and business units, the group enriched and supported the discussion through its discussions and by sharing specific use cases.

Illustration of the objectives and benefits of the model through use cases

In addition to the practical contributions of this tool to the management of IT costs, the model offers several transverse benefits. For example, it contributes to addressing challenges that go beyond the exclusive remit of the IT department, and thus adds value to the various strategies implemented throughout the company.

History and growth perspectives of the model

More than just an example, the environmental dimension of IT shows the extent to which the model offers solutions for companies. Indeed, the importance of environmental issues (and in fact their urgency, given the current economic situation) has prompted the change in the name of the model, which is now called the “Economic and Ecological IT Management Model”.

Founding principles

As with previous versions, the model is built on founding principles: it is “open” and “public” as the Open IT Costing model, it uses the “Activity based costing” allocation method, and enables an evaluation of the costs of activities (operational view) and services provided by the IT department (customer/business unit view).

Summary of the developments integrated into the model from 2022

The 2022 version of the model incorporates three main areas that have changed significantly over the last three years; namely cloud computing/FinOps, Agility and Carbon Footprint. These new themes call for a new approach, especially in terms of activities, services, and the distribution between capex and opex.

FinOps cloud computing management

The need for this is clear with regard to cloud computing, which impacts both resources and activities (operations, governance), and therefore implies recourse to intermediate technical services in the allocation of expenditure items, which can be adapted according to the context of the company.

Consideration of agility within the model

As with cloud computing, many companies are adopting an agile approach, which affects the offering, methods, activities and structure of the IT department, and consequently the management of costs, which are captured by the ABC method in the model. In addition, agile projects, which give rise to fixed assets, need to be analysed to clearly identify which expenses are "capexable".

Monitoring the carbon footprint of services

The carbon footprint aspect takes into account changes in economies and the concern of reducing IT GHG emissions. While hyperscalers report on the emissions from their ...aaS offerings via "carbon calculators", the IT department is interested in a twofold "€" and "CO2eq" monitoring approach. The greatest difficulty with this aspect is the choice of relevant indicators, which are generally those proposed by the "Life Cycle Analyses" of the equipment or services studied, as these LCAs must be assessed with regard to the actual duration of use of the service or equipment.

Detailed introduction to the model

This model is therefore a tool; and like any tool, it is intended to meet the needs of users. Therefore, feedback and comments on this document will be read with the greatest interest, in order to feed into this model. Similarly, while the points relating to each theme can be viewed in isolation, it is strongly recommended that attention be paid to the chapters relating to the implementation and use of the model. In the first chapter, good practices and prerequisites are specified, as well as potential pitfalls. In the second chapter, the reader will find an implementation model for analysing, monitoring and benchmarking, using either the traditional "€" view or in the "carbon" view, in accordance with the new approach that the model now makes it possible to adopt.

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This document was written by Joachim Treyer, Managing Director of Cost House; Steve Gordon, Cost House Partner; and Elena Silvera, Cigref Project Representative, with contributions from Cigref's permanent staff.

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INTRODUCTION

The development and sustainability of an activity or a company naturally requires that it be economically viable, but beyond this economic issue, a second ecological issue is essential today in terms of sustainable development.

These two challenges, which concern all companies and organisations, obviously apply to all their entities. Due to the accelerated digital transformation of our economies and lifestyles, IT departments find themselves on the front line, facing a twofold challenge:

- While the value created by digital technology is no longer in question, controlling the associated IT expenditure has become a permanent challenge for IT departments.
- In parallel with the exponential development of digital services, their environmental impact must be controlled, particularly in terms of greenhouse gas emissions (GHG), with a view to reducing business needs.

In addition to their digital transformation missions and the increasing quality-of-service and security constraints that accompany those missions, IT departments must also manage their costs and their environmental footprint, particularly their carbon footprint, with the joint objectives of economic and ecological performance.

Cigref's "Economic and Ecological IT Management Model" is a tool available to IT departments in particular, and to companies in general, to help them meet this twofold management objective.

This model sits at the intersection of two business units that provide structure to it:

- Finance: the model is based on an "ABC" (Activity Based Costing) approach for an analytical view that can be applied in line with the "P&L" (Profit and Loss) or "Cashout" (cash costs) views.
- IT: the model is structured both according to the activities of the IT department and the technical or business services it provides.

This document provides a number of approaches to the economic and ecological management of IT. It therefore addresses various expectations, depending on the organisations and their context, but also on the needs of the reader. In other words, the report can either be read in its entirety, or it can be used to shed light on a particular issue for professionals who are considering an approach to adopt in their own company.

Firstly, Chapter 2 sets out the transverse benefits of using the model.

Then, chapters 3 to 8 present **the background and founding principles**, and the 3 topics on which the 2022 version of the model places particular emphasis:

- cloud computing / FinOps
- Agility
- IT carbon footprint

Chapter 9 then explains how the model operates in terms of the reference frameworks it handles and the management rules it implements.

Finally, chapters 10 and 11 provide guidelines for the implementation of the model and illustrate its use in the "€" and "carbon" views.

WHO IS THIS DOCUMENT FOR?

In general terms, this document is aimed at anyone wishing to discover the issues and principles of economic and ecological management of IT.

More specifically, management control teams, IT operational teams and CSR teams in charge of the economic and/or ecological performance of IT will find detailed information for the implementation of such a management model in this document.

1 TRANSVERSE BENEFITS OF THE MODEL

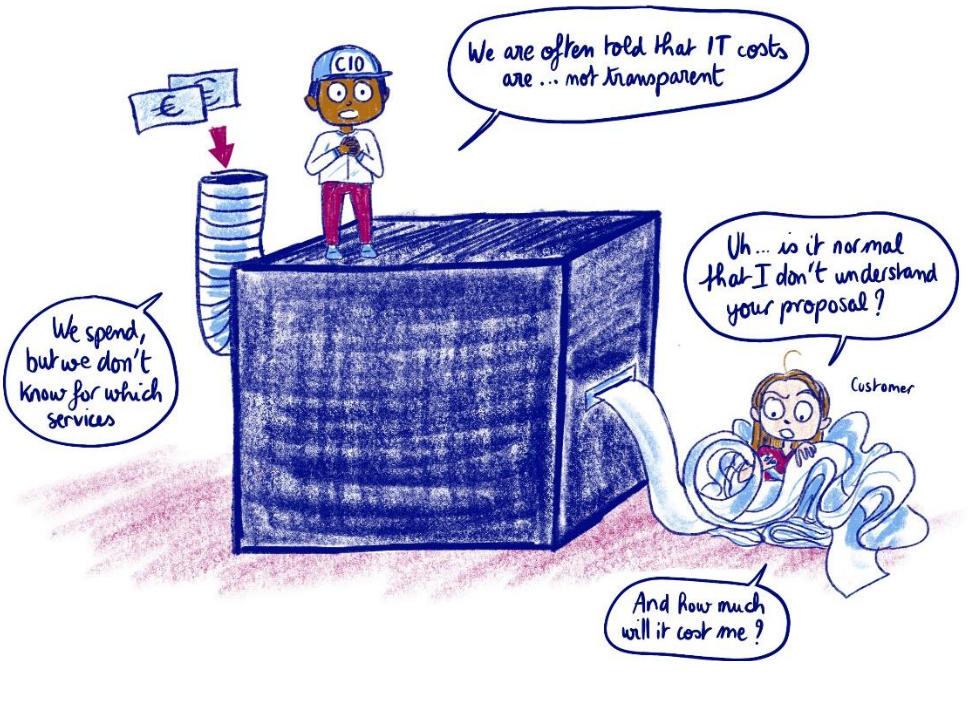
In addition to meeting its intrinsic objectives of costing and monitoring, the "Economic and Ecological IT Management Model" helps to resolve several transverse issues in IT departments. Here is a presentation of the various services rendered (transverse benefits offered) by the use of the model within the IT Department.

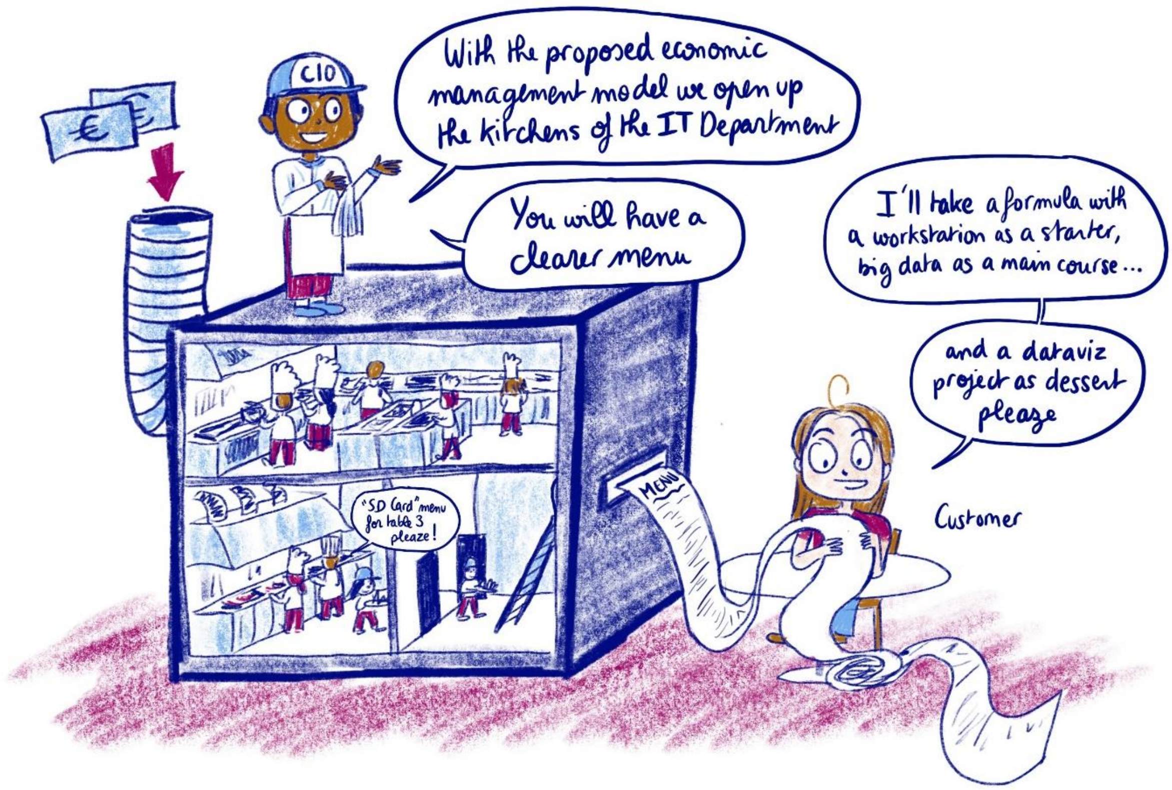
1.1 BREAKING OUT OF THE "BLACK BOX" SYNDROME, MAKING COSTS TRANSPARENT

In many companies, the IT department is still perceived as a "black box" that imposes ever-increasing costs. This positioning of the IT department as an opaque "source of expenditure" is most often due to the fact that its activities are difficult to understand by other departments of the company, which see it as spending money on increasingly complex and expensive technologies.

Ensuring transparency of IT costs requires, first and foremost, adopting a language that can be understood outside the IT department: on the one hand, the IT department must manage a budget made up of "digital" technologies and skills, but on the other hand, it must be able to present this expenditure from a "business" perspective.

To use a trivial analogy: a restaurant customer wants, above all, to have a clear understanding of the menu and dishes on offer and the associated prices without worrying about the utensils used to prepare the dishes. Similarly, the customer "business unit" of the IT department wants a clear view of the "business"-oriented bundle and the cost of each of these services. That customer does not care about the technical systems and activities required to provide these services.





All IT departments know how to analyse what they spend in terms of the type of costs: personnel, services, software, hardware, cloud, telecoms, etc. The challenge will be to enable the business units to understand "what is being done with this money".

For a business function, a view of the cost of technologies is not very relevant. Instead, the aim is to present IT costs in a service-oriented way. However, allocating IT expenditure to services rendered is a tricky exercise insofar as most IT costs relate to infrastructure or activities shared across different departments or different business units. Indeed, how can a management controller allocate a compute or storage expenditure item to a business service? Likewise, how can it allocate the cost of a help desk service to a business unit?

The indirect nature of IT expenditure requires an allocation model that involves technical data on IT activities and infrastructure, which can be provided only by the IT department's operational teams.

The purpose of a cost model is precisely to allow the allocation of expenditure items from their origin (view by kind) to their destination (view by services) by relying on an intermediate stage linked to infrastructure (hardware and software) and (human) activities to represent a consumption pattern: the services rendered consume activities and infrastructure which, in turn, consume resources representing expenditure.

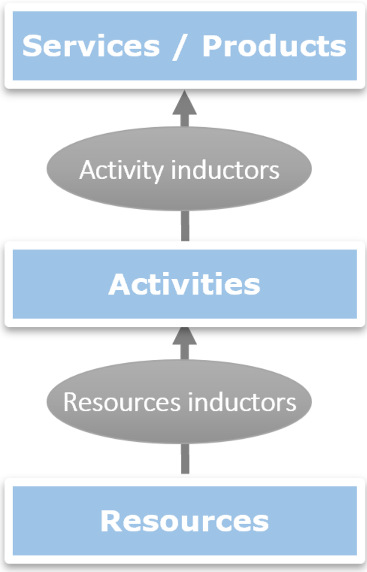


Figure 1 – Principle of resource consumption (expenditure) by activities and then by services or products, using an "Activity Based Costing" approach

Such an allocation model makes the costing of services transparent and understandable. This transparency in the cost structure helps to overcome the "black box" syndrome!

1.2 MAKE ITS LEVEL OF IT ECONOMIC PERFORMANCE OBJECTIVE

IT departments are regularly challenged on their economic performance, especially in a context where IT expenditure is on the rise.

How do you demonstrate that the IT budget is being used effectively?

The use of large ratios, such as IT/sales percentages, is potentially dangerous even when comparing within the same industry: for example, if an IT department's budget, in relation to turnover, is higher than that of other IT departments, does this mean that its expenditure is inefficient... or that it is investing in the future via ambitious transformation projects?

One relevant way to justify your level of economic performance is to rely on objective benchmarks.

To enable comparisons between IT departments, it is advisable to use indicators relating to activities that are common to all IT departments, regardless of the company's sector of activity:

- What is the economic share of the various IT operational activities in relation to the total budget or the IT department's Run budget? What is the share of support or operational activities for the Run, the proportion of administrative management on the total budget, etc.?
- What is the unit cost of these activities? What is the cost of a help desk ticket, a GB of storage, a virtual machine, etc.?

An activity-based cost management model for expenditure allocation provides exactly the right indicators for comparison.

In addition, the fact of relying on an “open” model (the concept of “open costing model”) enables transparent exchanges between the IT departments that have adopted this model. Any deviations can be analysed and explained. We are not restricted to being better or worse than our peers; we can discuss with them to understand the origin of these gaps and identify ways to improve.

To return to the restaurant analogy, the comparison will apply to the preparation of dishes and the management of the restaurant: what are the costs of preparing a pizza? How much time to clean the kitchens? What are the costs of managing the preparation of drinks, etc.? This is a comparison of generic activities!

1.3 ESTABLISH A VIRTUOUS "VALUE VERSUS COST" DIALOGUE WITH THE BUSINESS UNITS

In addition to performance issues, IT departments are being challenged primarily on the value they bring to the business units, which may be at different levels within the company's structure.

The establishment of a virtuous dialogue with the business units, taking into account the value provided by the IT department, requires at least two main prerequisites to be taken into account:

- The first concerns the clarification of the IT department's bundle:
  - Does the IT department have a business unit-oriented service catalogue?
  - Was this catalogue built both “for” and “with” the business units?
  - Is the granularity of this catalogue suited to an economic management issue?

- The second is the “TCO[3]” (or total cost of ownership) of services:
  - Once the bundle has been formalised, it is necessary to know the full cost of each service.
  - The sum of the costs of all the services in the catalogue must equal the total budget of the IT department.
  - The cost of a service must therefore include not only expenditure directly related to it (e.g. the cost of software in SaaS mode) but also all the transverse expenses necessary for the operation of the IT department (security, architecture, management, etc.)

The use of an IT costing model makes it possible to structure the bundle and calculate the full costs. It then becomes possible to engage in a value analysis approach with the business units, which will be able to estimate the “usage value” of the services in relation to the costs they represent.

1.4 DISPLAY THE CARBON FOOTPRINT OF THE SERVICES PROVIDED

In the same way that IT departments will assess their suppliers with regard to the carbon emissions of the services they purchase (for example, with regard to LaaS offers, all hyperscalers offer “carbon calculators” that make it possible to view the CO2eq emissions of their cloud services), they in turn will need to be able to state the CO2eq emissions[4] of the services they deliver to their internal customers.

[3] TCO: Total Cost of Ownership

[4] CO2eq: CO2 equivalent


IT SUPPLIER
Hello! I would like a dozen VMs, how much per kilo please?
DSI
What is their weight in CO_2 emissions?
IS FOODTRUCK
CIO
Hi, I'll take an HR application, a CRM and a data supplement
Customer
Sure, here's the menu
~Menu~
HR Application:
Price: 1000 €
CO_2: 500 kg
CRM:
Price: 1500 €
CO_2: 800 kg

And, in the same way that general accounting data are insufficient to know the full cost of services rendered, neither do carbon footprint data provide us with an insight into the CO2eq emissions per service.

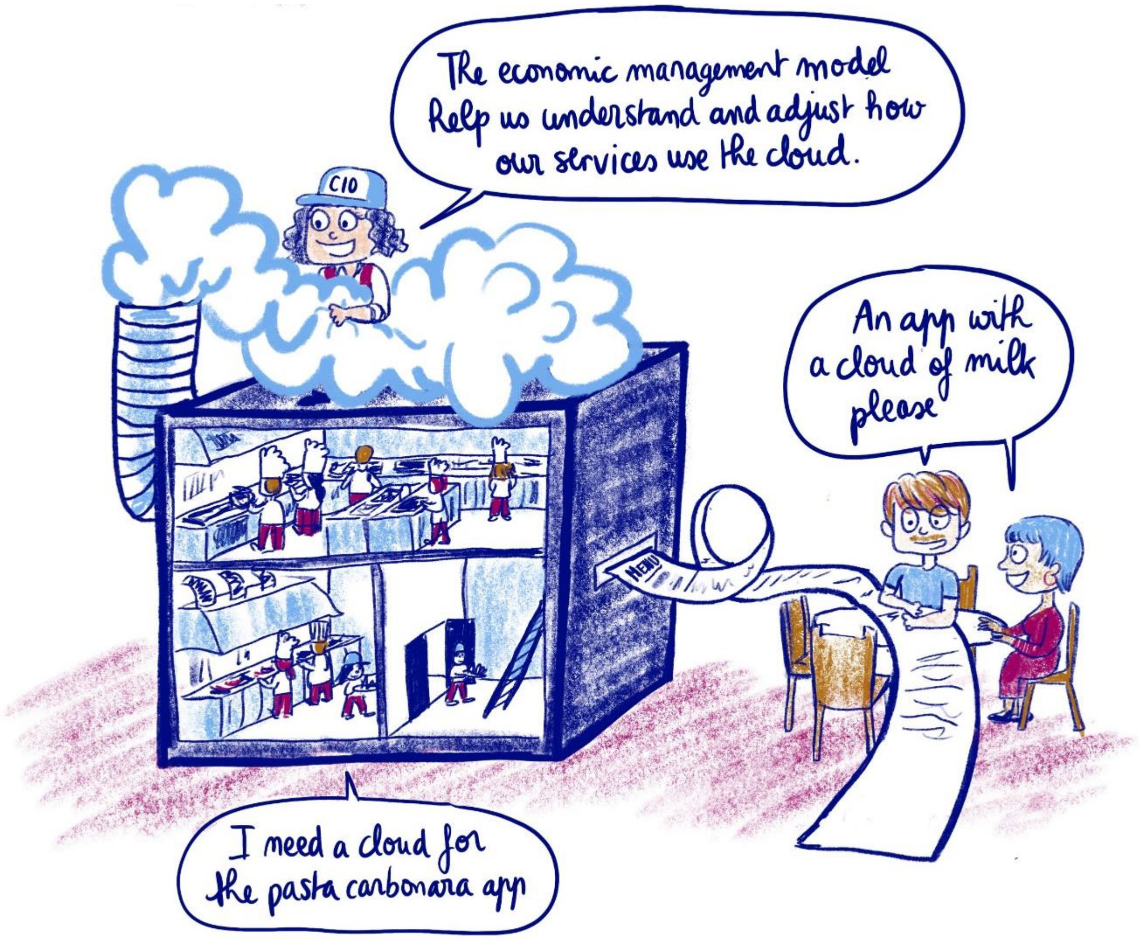
An allocation model based on a consumption principle and on technical IT metrics has the advantage of being able to be applied both to economic management, for the calculation of the full costs of services, and to ecological management, for the calculation of their CO2eq emissions.

Thanks to such a model, an IT department is able to present the full costs of the services it consumes to the business units, as well as the CO2eq emissions they generate.

Economic and ecological management are therefore not mutually exclusive. The “Economic and Ecological IT Management Model”, on the other hand, enables transparency in costs and CO2eq emissions and a search for ways to improve/optimise both.

1.5 ECONOMIC MANAGEMENT OF THE “MOVE TO CLOUD” TRANSITION, FINOPS ROLE

The partial or complete switchover of “On-Premise” infrastructures to “cloud” resources is accompanied by a need for greater economic and ecological management: the promise of public cloud offers of payment per use only makes sense if this use is controlled. If we “turn on the cloud tap” without controlling the flow, the economic and environmental impacts can be disastrous.



This is the reason for the rise of the FinOps function within IT departments. Indeed, this FinOps function does not work in isolation. Like cloud resources, it is part of the IT department's overall bundle, as it facilitates the combined efforts of IT, finance and production teams to work towards a better understanding of cloud costs.

An IT costing model must therefore take into account FinOps issues by integrating them into the overall economic management of IT:

- How do we analyse IaaS, PaaS, SaaS expenditure?
- Which technical cloud services should be implemented in an allocation model?
- How to allocate the costs of these technical cloud services to the business services provided by the IT department?

This model allows for the integration of cloud providers' expenditure and CO2eq emissions into a global allocation scheme that covers both on-premise and cloud environments, with the boundary between the two changing more or less rapidly depending on the “Move to Cloud” strategy adopted by the IT department.

1.6 MANAGING COSTS IN AN AGILE TRANSFORMATION

The agile transformation (sometimes "at scale") of IT departments is accompanied by a promise to streamline and simplify the budget management process.

However, this promise of simplification should not lead to a loss of visibility, or an inability to manage costs.

Yet a capacity-mode budget tailored to a lean/agile approach must not prevent the amounts devoted to value creation (management by value chain) and the amounts devoted to maintaining the existing system in operational condition from being managed.

An IT costing model must therefore take into account the agile/DevOps activities deployed while providing the necessary addition of economic management:

- Operational teams are adopting agile approaches that free them from many constraints.
- The economic model, by combining financial data with management data from agile backlogs[5] (items), provides the elements necessary for the proper financial management of IT.

So just because you are in agile mode does not mean that it becomes "impossible" to financially capitalise the expenditure that was used to create assets that provide lasting value to the business.

This makes the cost model into a tool that allows management control to be fully integrated into the agile transformation of the IT department.

[5] A "backlog" can be translated as a "requirements book". The "product backlog" is considered as one of the Scrum artifacts.

2 HISTORY AND GROWTH PERSPECTIVES OF THE MODEL

The first version of the "IT Cost Analysis and Benchmarking Model" was published in 2006. It was followed by three further updated versions in 2009, 2014 and 2018, preceding this new 2022 version.

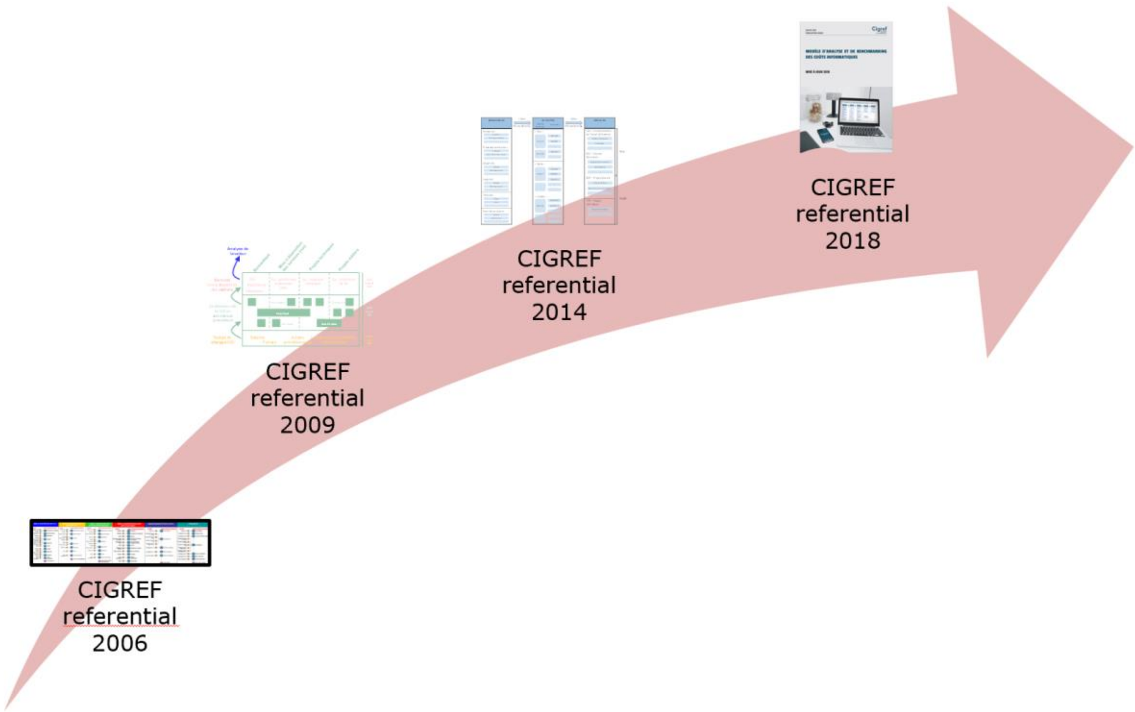


Figure 2 – History of Cigref's work on the IT business model

This IT Cost Analysis and Benchmarking Model has been introduced by several hundred IT departments in France and abroad. It therefore incorporates multiple instances of feedback that ensure its robustness.

The successive versions of the model, which continue to adhere to the founding principles, make it possible to regularly integrate changes in the IT business while maintaining the financial principles necessary to manage economic performance.

The 2022 version of the model focuses in particular on taking into account cloud computing and Agile approaches within IT departments. Above all, it also integrates the "carbon management" dimension of IT, which is an increasingly important issue for IT departments.

The ability of the 2022 version of the model to enable dual "financial" and "carbon emissions" management of IT justifies its change of name to the "Economic and Ecological IT Management Model".

3 KEY PRINCIPLES FOR UNDERSTANDING THE MODEL

The “Economic and Ecological IT Management Model” is based on a number of founding principles that have been adhered to since its earliest versions.

3.1 OPEN MODEL: “OPEN IT COSTING MODEL”

The main objective of Cigref's Economic and Ecological IT Management Model is to provide an “open” and “public” model that can be used by any company or organisation to manage its economic IT performance, and is characterised by:

- A generic principle for allocating IT costs, applied in this new version of the model also to CO2 emissions, in order to capitalise the services, offers or products made available to the business units.
- A reference framework of activities, at the heart of the model, enabling costs and emissions to be properly allocated and benchmarked between different IT departments.
- Management indicators to measure the level of transformation of IT departments in different areas: transition to cloud computing, adoption of agile/DevOps approaches, etc.

3.2 STABILITY

The management of economic or ecological performance is based on comparative analyses over time, which call for a stable reference framework.

One of the major characteristics of the “Economic and Ecological IT Management Model” lies precisely in the stability it provides to the teams responsible for performance or management control: a robust and stable management model that adapts to changes in the IT business, while remaining compatible from one version to another.

This stability is clearly reflected in the activities, service families and allocation rules. The services (which vary from one company to another) change regularly over time.

3.3 DISTRIBUTION / ALLOCATION METHOD

The “Economic and Ecological IT Management Model” is based on the Activity Based Costing (ABC) approach to cost and carbon allocation. This approach provides an “operational” view of IT costs or emissions at the activity level, calculating the full costs or full CO2eq emissions of the services, offers or products made available to the business units by addressing the issue of indirect resources, the proportion of which is becoming preponderant within IT departments.

The Activity Based Costing (ABC) approach is based on three levels:

- The "resources" level is what the IT department spends in € or emits in kgCO2eq.
- The "activities" level equates to the operational tasks and technologies deployed by the IT department.
- The "services/products" level is what the IT department delivers to the business units. Depending on the context, the objects in this third level can be called "services", "offers" or "products".

These three levels are linked to each other under a consumption philosophy: the provision of services/products consumes activities, which in turn consume resources.

Each level represents 100% of the IT department's expenditure or CO2eq emissions.

3.4 CONSIDERATION OF DIFFERENT FINANCIAL VIEWS (P&L, CASHOUT)

The IT department budget is often broken down into an "operating" component and an "investment" component.

This breakdown responds to the different expectations of the actors of the IT department and its clients. Some will want to know the recurrent cost of the infrastructure and applications provided by the IT department, which includes amortisation of hardware, software and capital projects. Others will want to know the capital costs of projects, which include infrastructure and software acquisitions over and above man-days and outsourcing packages.

These different expectations must be addressed through separate financial views: the analysis of recurrent costs is based on a financial view of the "profit and loss" (or "P&L") type, whereas the analysis of investments is based on a financial view of the "cashout" type.

The "Economic and Ecological IT Management Model" incorporates these different views in order to meet the various expectations. The model thus provides two complementary areas of analysis. Consideration of these different views will have a direct impact on the model: in a P&L view, the amortisation share of an infrastructure will be allocated to the provision of a service/product, whereas in a "cashout" view, the total acquisition value of the same infrastructure will be allocated to the project as part of which it was acquired.

For this purpose, activities dedicated to the different views have been defined to take into account respective amortisation or investment costs.

The P&L view provides a "time-smoothed" view (via the amortisation mechanism) of the cost of services/products made available to IT department customers.

The "cashout" view enables the management of investments that lead to changes in the IS. These investments can be considered as projects (business or technical).

Consideration of these two financial views has been built into the 2009 version of the model.

These two financial views are, moreover, applicable both in a context of project management according to a “V-cycle” approach and in a context of transition to agile (at scale), as will be explained in Chapter 7 (Taking agility into account within the model).

3.5 SUITABILITY FOR THE “CARBON” APPROACH

The financial views described above are also fully applicable to the monitoring of CO2eq emissions.

The carbon footprint of an IT service must take into account all CO2eq emissions for the 3 scopes of the carbon footprint.[6] In particular, the carbon footprint should include a proportion of the emissions from the physical infrastructure supporting the service. These emissions can be measured using an LCA (Life Cycle Assessment) approach, which is distinct from the “Carbon Footprint” approach, and which must be smoothed over the actual life of the equipment in order to give an annual carbon footprint that is in line with a “P&L”-type view.

3.6 SERVICE FAMILIES AND RUN/BUILD SEPARATION

The view of IT costs or CO2eq emissions presented to the business units is in terms of services structured into families. The IT department thus establishes itself as a service provider for its business unit “customers”. In addition to the work environment used by the company's employees, the IT department provides a set of services or products that typically correspond to applications supporting the various business processes.

User work environments and applications and the recurring share of products are the two main families of “Run” services provided by the IT department.

In addition to recurring services, the IT department also provides projects or developments requested by the business units: ongoing product development, implementation of a new service, etc. In addition, in order to ensure the sustainability of the services/products it offers, the IT department must carry out technical development projects aimed, at the very least, at avoiding the obsolescence of its systems and infrastructure.

These two families, “business projects” and “technical projects”, make up the “Build”, i.e. the part of the IT department's costs that includes the most “arbitrable” expenditure.

Finally, all the services/products of the IT department, at least the recurrent services, are generally described in a service catalogue.

[6] The 3 scopes of the carbon footprint are: (1) direct GHG emissions generated by the activity, (2) emissions associated with electricity and heat consumption, (3) other indirect emissions. These scopes are described in detail in the section “Taking an IT carbon footprint into account in the model”.

This concept of a catalogue of services is essential in the context of a dialogue with the business units. It should not be confused with other types of service catalogues, such as those that highlight services with a very fine granularity that is not suited to an economic or ecological steering approach.

Even though the model is mainly intended to capitalise services made available to the business units by the IT department, it is also possible to capitalise "technical" services made available to other IT departments, for example (such as the provision of server power or storage).

3.7 INTERMEDIATE TECHNICAL SERVICES

Intermediate technical services play a twofold role in the "Economic and Ecological IT Management Model".

Intermediate technical services are, as their name suggests, services whose costs or CO2eq emissions are reallocated to other services. They are therefore not directly visible to the business units using the services/products provided by the IT department. Examples of intermediate technical services include:

- Non-production platforms: development, testing, acceptance, pre-production, training, validation, etc.
- Virtualisation platforms: platforms providing virtual machines or containers used by application/product services.
- Database systems: systems that bring together the hardware and software components and the human activities necessary to provide the databases used by the application/product services.
- Security systems: "Disaster Recovery Plan" (DRP) or "Business Continuity Plan" (BCP) type platforms.
- The IS for the IT department: all recurring application services implemented by the IT department for its own needs (time tracking tools, incident/request management, application mapping, schedulers, etc.)
- In particular, the 2022 version of the model defines a set of cloud-dedicated intermediate technical services (compute, storage, network, etc.).

These services can naturally be refined, adapted or supplemented by others, depending on the context of each IT department.

Since the 2018 version of the model, intermediate technical services have been grouped into a dedicated "ITS" (Intermediary Technical Services) family of services of the "Run" type.

Role in terms of capitalising the model

The concept of intermediate technical services is primarily used to capitalise the services of the model that are made available to IT department customers (whether in terms of euros or carbon emissions).

In this respect, an intermediate technical service represents an object that consumes activities and is then itself consumed by the services made available to customers.

For example, a non-production platform (typically a development, test or acceptance platform) consumes server, storage or network infrastructure in the same way that application services do. Such a platform also consumes dedicated activities (e.g. dedicated software tools). This non-production platform must then be distributed to projects and application/product services.

Role in terms of analysis and management

In addition to their role in capitalising the services provided to the IT department's customers, intermediate technical services also constitute an analysis, management and benchmarking tool for IT departments.

Non-production platforms, for example, represent very significant costs in most IT departments. It is therefore useful to be able to measure, monitor and compare these costs over time.

Similarly, the “IS of the IT department” can represent a significant economic share in relation to the total cost of the “Run”. It is therefore useful to know this cost, to be able to analyse it and to ensure its control.

If the IT department is required to provide cloud-based technical services to external partners, it will most likely be asked to expose CO2eq emissions in addition to the costs of these technical services.

Adaptability of the model

Intermediate technical services enable the structuring of the implementation of the model according to the technological choices of each IT department.

For example, the approaches taken in terms of server virtualisation can be very different from one IT department to another:

- Virtualisation platforms based on traditional X86 “On-Premise” infrastructures.
- Platforms based on hyper-converged infrastructures.
- Use of IaaS resources.
- Virtual machine versus containerised approach.

The principle of intermediate technical services enables each IT department to define the service or services that correspond to its own technological choices. A “virtualisation platform” intermediary technical service can thus, depending on the case, use “On-Premise” infrastructures or on “cloud” resources and can provide virtual machines or containers that will be “consumed” by the products or services supplied to the IT department's client business units.

3.8 ORGANISATION-INDEPENDENT BUSINESS MODEL

The activity framework for the “Economic and Ecological IT Management Model” must remain in line with changes in IT business. This is one of the reasons why the model is updated.

However, the activity reference framework must remain completely independent of the IT department's organisational structure: the organisational structures of companies and IT departments change regularly, which should not have an impact on the activities that continue to be carried out (in-house or outsourced).

3.9 SEPARATION OF 'GREY MATTER' FROM 'OTHER RESOURCES

By the 2009 version of the model, most of the proposed activities were either “labour” (internal or external) or other resources. However, there were also a number of 'mixed' activities.

This separation principle has been enhanced in the 2014 version of the model, so that there are no longer any mixed activities.

This principle has been maintained ever since, especially in this new 2022 version.

3.10 STRUCTURING OF RESOURCES INTO BUDGET HEADINGS

The 2022 version of the model improves the structuring of resources in the form of headings and sub-headings associated with accounts in the general accounting plan by adding cloud-focused headings.

In addition, the 2022 version of the model proposes a matrix correspondence between these headings and the 3 carbon footprint scopes as detailed in chapter 9.5 “The resource model”.

4 SUMMARY OF KEY DEVELOPMENTS INCORPORATED INTO THE 2022 MODEL

The 2022 version of the model places a particular focus on 3 areas. First of all, cloud computing/FinOps, which requires better management of cloud-related expenditure in the model as part of a FinOps approach, but also the integration of specific activities such as CloudOps or the Cloud Center of Excellence (CCoE). Secondly, agility is the second major area of change for the model. A particular effort has been devoted to improving the incorporation of agile and DevOps approaches in their different variations, and to clarifying the principles of capitalisation (or "capexistation") of agile projects via the model. Lastly, the third area is devoted to the carbon footprint of IT. The aim is to clarify the approach to capitalising the model in terms of carbon emissions, with a view to obtaining a measurement of the carbon footprint of activities and services, as well as to specify the approach to be used to define the emission factors relating to the various resource items in the model.

These three topics – cloud/FinOps, agility and carbon footprint – will be presented in more detail in this chapter.

4.1 CLOUD COMPUTING / FINOPS MANAGEMENT

The "Move to Cloud" strategy adopted by many companies is resulting in public cloud expenditure becoming a significant part of the CIO budget.

As early as the 2014 version of the "IT Cost Analysis and Benchmarking Model", three activities dedicated to cloud computing had been included:

- Software as a Service (EXSAAS)
- Infrastructure as a Service (EXIAAS)
- Platform as a Service (EXPAAS)

The 2022 version of the model offers improved incorporation of cloud computing on the 3 levels of resources, activities and services.

4.1.1 CLOUD COMPUTING RESOURCES

The 2022 version of the "Economic and Ecological IT Management Model" incorporates the following changes in terms of resource categories:

- The "Hardware" and "Software" sections are dedicated to "On-Premise" only.
- A "cloud computing" heading has been added, with "IaaS", "PaaS" and "SaaS" sub-headings corresponding to "Rentals and fees" (associated with accounting accounts 613 or 651).

4.1.2 "CLOUD COMPUTING" ACTIVITIES

Infrastructure activities

In terms of infrastructure activities, the 3 “EXIAAS”, “EXPAAS” and “EXSAAS” activities are retained. All three of these activities are now of the “direct” type, which means that the resources allocated to them must also be directly associated with services.

For the “EXSAAS” activity, the direct allocation of a SaaS expenditure item to a service does not generally present difficulties.

For EXIAAS and EXPAAS activities, the principle is to use the resource tagging mechanisms offered by cloud computing providers to allocate resources not only to activities, but also to technical cloud services.

Human” or “labour” activities

The 2022 version of the “Economic and Ecological IT Management Model” includes two human activities dedicated to cloud computing:

- The Cloud Ops (OPECLO) operational activity, replacing the Operation Infrastructure Automation business, with which it combines. This activity applies to both public and private clouds, and may be allocated pro rata to the technical services for public or private clouds (e.g. virtualisation platform)
- The Cloud Center of Excellence management activity, also including FinOps functions. This activity is of a “transverse” nature (enable), and can go beyond “public cloud” subjects, particularly in the context of implementing a “private cloud”. If this activity is focused on the public cloud, it can be allocated to all services that incorporate cloud resources via an interlinked driver based on the “EXIAAS”, “EXPAAS” and “EXSAAS” drivers. If this activity goes beyond “public cloud” issues, it may be allocated to recurring services on a pro-rata basis.

In addition to these two cloud computing-focused activities, other human activities (such as support, for example) can naturally contribute to the costs or CO2eq emissions of services incorporating cloud resources.

4.1.3 “CLOUD COMPUTING” TECHNICAL SERVICES

In order to be able to manage and allocate cloud computing resources in a relevant way, the intention for the 2022 version of the model is to use dedicated intermediate technical services.

These technical services will receive costs or CO2eq emissions not only from the activities presented above, but also from other activities in the model.

This shows that a technical cloud computing service is not limited to the invoice (or emissions) of the public cloud provider.

Cloud-related intermediate technical services for an IT department could typically be based on the following list, adapted to the particular context of the IT department:

- Compute services:
  - VMs
  - Containers
  - Bare metal

    - Serverless
- Storage:
    - Object
    - Block
    - Archive
- Network:
    - Virtual Network
    - Private Connectivity
    - Content Delivery Network
    - Load Balancing
- Databases:
    - Relational Database
    - InMemory Database
    - NoSQL Database
- Misc:
    - Dev environments
    - Machine learning
    - APIs
    - Data factory
    - Datalake
    - AI

For the re-allocation of these intermediate technical services to business services, the Cloud providers' tagging mechanisms can be used (as for activity drivers): the tagging of Cloud resources must enable them to be allocated to EXIAAS/ EXPAAS activities, then to technical services and finally to business services (typically application services).

4.2 CONSIDERATION OF AGILITY WITHIN THE MODEL

Companies in general, and IT departments in particular, are adopting agile transformation approaches to varying degrees and at varying speeds. Many find themselves in a hybrid situation that will potentially continue in the longer term.

Moreover, moving into agile mode has important impacts on several aspects of the IT department:

- The IT department offering:
    - Does the IT department still handle (agile) projects, or does it now only deliver products?
- Methods and framework:
    - Scrum, XP, SAFe, LeSS, etc.
- The operational activities of the teams:
    - Sprints / iterations, product backlog management, etc.
- The organisational structure:
    - Scrum teams, feature teams, tribes made up of squads in charge of products, chapters, guilds, etc.

The “Economic and Ecological IT Management Model” is based on an “Activity Based Costing” (ABC) approach. This therefore covers:

- What is made available to the business units;
- The activities required for production.

However, an ABC model should be independent of the organisational structure, and not directly involved in methods or “operational” management. Therefore, it is not appropriate to try to implement all the agile aspects in the model.

4.2.1 THE “SERVICES” DIMENSION

Depending on the case, IT departments continue to carry out projects (in “agile” and/or “V-cycle” mode) or have switched to “Product” mode.

In the first case, the “Economic and Ecological IT Management Model” offers a traditional management approach to the project concept. In the second, the model offers a “Product” vision equating to the consolidation of the “Run” and “Build” components of the product. The model thus makes it possible to manage the different situations: agile, V-cycle or hybrid in cases where the IT department manages both V-cycle projects and projects or products in agile mode.

In terms of operational management, this “Run” / “Build” product permutation may not be a priority. However, it remains important in terms of economic management. The “Run” / “Build” product permutation must therefore be one of the contributions made by the model.

Depending on the maturity levels and agile frameworks deployed, a product or project can be broken down in various different ways, such as:

- Product → Theme → Epic → Feature → User Story

Generally speaking, although the intermediate levels (themes, epics, features) vary according to the approach, the “User Story” concept is adopted by most IT departments to structure their “Product Backlog”[7]. The Backlog lists all the features, functions, requirements, improvements and fixes that constitute changes to be made the product in future releases. The Backlog is made up of “items” that will play an important role in the capitalisation of the “Economic and Ecological IT Management Model”.

4.2.2 THE “ACTIVITIES” DIMENSION

In an agile approach, detailed time tracking by teams is not appropriate. Teams are not generally able to allocate their time to evolutionary or corrective work, for example.

The principle is therefore to adopt a reduced set of 'macro' activities for time entries, which will include:

[7] Scrum Artifact.

- Sprints or iterations (all the time spent by the teams on development, testing, corrections, etc.) It should be possible to attach prints or iterations to a product (or project) in the time entry;
- Initializing the Backlog;
- Day-to-day management of the Backlog;
- Continuous integration and deployment with a DevOps approach.

In terms of time tracking and economic management, it is not necessary to identify specific activities for tasks such as "PI Planning" or "RTE". These tasks can be combined with the previous 'macro' activities. The general approach is thus to break down agile activities as little as possible in terms of time tracking.

4.2.3 CAPITAL MANAGEMENT OF AGILE PROJECTS

In terms of economic management, it is necessary to distinguish between expenditure that has contributed to the functional enrichment of the IS and costs that have served only to maintain it in operational condition (this 'cost/value' analysis equally applies to ecological management).

Even in a "capacity mode", it is useful to monitor the share of the budget that has created value.

From the point of view of capitalising the costs of creating a software asset, it is therefore necessary to identify which costs come under "Build" and which come under "Run".

The "Economic and Ecological IT Management Model" should therefore break down the "Sprints/Iterations" into 2 activities:

- Iterations / Evolutionary Sprints;
- Iterations / Corrective Sprints.

The financial capitalisation of a development refers to the construction of an asset that will produce economic value for the company in the long term, hence the need to identify the costs that actually contributed to the construction of such an asset.

The rules for capitalising or "capexing" developments in a company must be independent of the project management mode ("V cycle" or "Agile"). The general principles for activating project expenses are as follows:

- A beneficial contribution to the company must be seen in economic terms.
- The technical feasibility of the project must be proven.
- The managers of the project must be confident of its success.
- The development phase (or configuration of an application) allows the asset to be created. Its cost must be capitalised (recorded as an asset on the balance sheet).
- The "post-implementation" phase concerning deployment does not add value to the asset, and should not be capitalised.

In terms of the "capexisation" of agile projects, the Economic and Ecological IT Management Model" thus makes it possible to identify the expenses to be capitalised via the "Iterations / Evolutionary sprints" activity.

Other activities (initialisation and backlog management or ongoing integration and deployment) are not generally eligible for capitalisation.

The breakdown of the operational activity (in a time tracker) of “Sprints / Iterations” into two activities “Iterations / Evolutionary Sprints” and “Iterations / Corrective Sprints” in the model does not have to take the form of an implementation of these activities via a time tracker tool.

This breakdown must be based on operational management tools for agile approaches, typically by analysing the “items” within the backlogs (“user stories” or “bugs”, for example): it must be possible to identify each “item” as “evolutionary” or “corrective”.

The costs of sprints/iterations capitalised via time tracking (or external services) can thus be split between “evolution” and “correction” according to the proportion of items of each type. To go further, this distribution can take into account the number of items of each type weighted by the “story points” of each item measuring the effort required for their implementation.

The principle described above makes it possible to capitalise new assets regularly, at each project start-up or at the end of a set of product iterations (every quarter for example), as a practical representation of value creation.

The Lean Portfolio Management approach, adopted by some IT departments, enables initiatives to be prioritised within backlogs and work to be scheduled on a quarterly basis. This approach makes it possible to determine the “capex” and “opex” quotas in the forecast. The “Economic and Ecological IT Management Model”, via the review mechanism for the backlog items described above, makes it possible to determine the “capex” and “opex” quotas for the work done and thus to proceed with the capitalisation of the assets created.

4.3 MANAGING THE CARBON FOOTPRINT OF SERVICES

Control over environmental footprint is becoming a major issue for most companies.

IT departments have a special role to play because of the greenhouse gas emissions associated with their activities, but also because of the positioning of digital technology at the heart of the company.

4.3.1 THE PARALLEL BETWEEN ECONOMIC AND ECOLOGICAL MANAGEMENT

In economic terms, worldwide IT expenditure represents just under 5% of global GDP.

Furthermore, by 2022, it is estimated that the carbon / greenhouse gas (GHG) footprint of the digital sector will account for between 4 and 5% of total global greenhouse gas emissions.

We can therefore see that, from a very macro point of view, IT has more or less the same share in terms of “economic” and “GHG emissions” (without there being any causal link between the two).

The digital transformation of our economies is accompanied by the ever-stronger influence of IT technologies, and therefore by a significant growth in overall expenditure on IT.

This global trend underlines the urgent need to reduce IT-related GHG emissions on a “like-for-like” basis. Most technology manufacturers have committed to significant reduction approaches, and are being encouraged to do so by their clients, who include “carbon footprint” as one of the important selection criteria in their calls for tender.

Hyperscalers are starting to offer “carbon calculators” that show the emissions linked to IaaS, PaaS, etc. (with varying coverage scopes depending on the player).

In the same way that IT suppliers are being challenged in terms of the carbon emissions of their products and services, IS departments are being, or will be, challenged on the same subject by their “customers” (the company's business units or external entities to which they make services/products available).

In the same way that they must be able to present the full costs of their services, IT departments will have to present the “full” CO2eq emissions associated with those same services.

This demonstrates the parallel between 'economic' and 'ecological' management.

The allocation model for allocating expenditure on services according to a consumption mechanism remains relevant for carbon emissions, and can be directly transposed to allocate the CO2eq emissions of a carbon footprint to the services provided by an IT department.

Cigref's “Economic and Ecological IT Management Model” thus allows for a coherent twofold management of “€” and “CO2eq”, as illustrated in the diagram below:

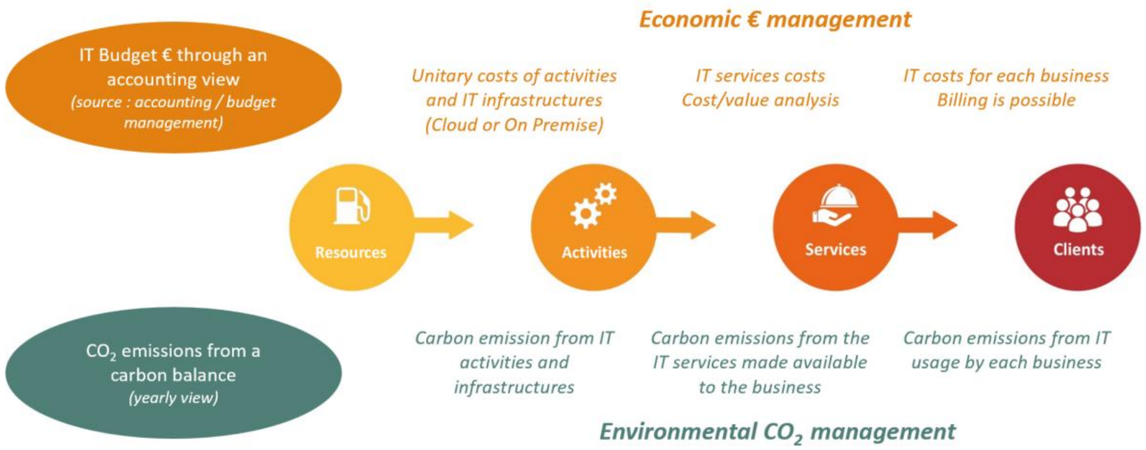


Figure 3 – The twofold management of € and CO2eq (credit: Cost House)

4.3.2 CONSIDERATION OF AN IT CARBON FOOTPRINT IN THE MODEL

Using an “analytical allocation model” approach, the “Carbon Footprint” corresponds directly to the “resources” stage. However, integrating these data requires a number of adjustments.

The 3 carbon footprint scopes applied to IT

A carbon footprint is structured in line with 3 scopes:

- Scope 1: direct GHG emissions generated by the business activity:
    - In the case of an IT department, this is mainly diesel for the backup generators for the data centres.
- Scope 2: emissions associated with electricity and heat consumption:
    - In the case of an IT department, this concerns the electricity consumption of the data centres and administrative premises.
- Scope 3: other indirect emissions:
    - In general terms, this concerns the purchase of products and services, fixed assets, waste, upstream freight, business travel, commuting, upstream leasing assets, etc.
    - In the case of an IT department, this includes hardware, software, telecoms, services, payroll, business travel, commuting, etc.

The "IT Carbon Footprint" thus equates to the subset of the company's "Carbon Footprint" for resources dedicated to the IT department. Consequently, internal staff should also be included in the IT Carbon Footprint.

The choice of appropriate emission factors

To calculate the emissions of a carbon footprint, emission factors are used that convert "units of activity" into GHG emissions measured in kgCO2eq (CO2 equivalents).

For example, in France, 1 kWh of electricity emits 60gCO2eq, i.e. an emission factor of 0.06 kgCO2eq/kWh.

Monetary emission factors are used to convert €1 of a good or service into kgCO2eq.

When collecting "IT carbon footprint" data to inform the management model, it is advisable to choose the most relevant emission factors possible with regard to the resources used by the IT department, avoiding limiting oneself to monetary emission factors that are often too imprecise. However, the "Economic and Ecological IT Management Model" does not require the use of a particular basis for the emission factors (different bases are available, depending on the countries involved in the introduction of the model).

The reprocessing of LCAs

In order to incorporate emissions linked to the hardware equipment and/or digital services consumed (workstations, "On-Premise" servers, etc.), it is necessary to use the "Life Cycle Analyses" (LCAs) for this equipment or services.

As defined by Ademe, "whether it is a good, a service or even a process, all the stages in the life cycle of a product are taken into account for the inventory of flows, from cradle to grave: extraction of the energy and non-energy raw materials necessary for the manufacture of the product, distribution, use, collection and elimination towards the end-of-life channels, and also all the transport phases. "

However, the LCAs proposed by the suppliers need to be reprocessed in order to be included as resources in the "management model":

- LCAs are composed of a "manufacturing" component, a "usage" component and an "end-of-life" component. The "usage" component represents the emissions related to the electrical consumption of the equipment or service over its lifetime. This share must be adjusted to at least take into account the energy mix of the place of use, which differs greatly from one country to another, and the actual electricity consumption of the equipment or service (the theoretical usage of a manufacturer's LCA must be replaced by the actual usage).

- In addition, the emissions from LCAs must be smoothed over the actual useful life of the equipment, in a similar manner to an amortisation approach, in order to integrate them into a "P&L" view of the management model, which will provide "relatively stable" IT service emission data over time, regardless of the dates on which the infrastructures are renewed. The alternative approach of taking into account all the LCAs related to the year's purchases allows the model to be capitalised in a "cashout" view.

5 DETAILED INTRODUCTION TO THE MODEL

5.1 GENERAL ARCHITECTURE OF THE MODEL

The general architecture of the model shows the different stages of cost allocation (or kgCO2eq emissions), from resources, through activities and services, to customers.

To use the restaurant analogy, this architecture sets out the overall operation that provides a clear menu to customers, requiring resources (staff, ingredients, etc.) and activities (all the operational tasks of preparing the food).

The general architecture of the “Economic and Ecological IT Management Model” is shown in the diagram on the following page.

The first three steps – “Resources”, “Activities” and “IS Services” – correspond to the traditional allocation principles of the Activity Based Costing approach.

“IS Services” are classified into five families, two of which (“Intermediate Technical Services” and “Technical Projects”) correspond to technical services that must be reallocated to the other three.

After this reallocation, in the “Business Services” stage, the three remaining families represent the services made available to the IT department's “client” business units.

Finally, an additional (optional) 5th step makes it possible, if necessary, to provide a consolidated “Run/Build” view of the costs of the services or products made available to the business units. This 5th stage involves a family of “PRD” (Products) services which represent the products (or the consolidation of application services and projects) made available to the business units. As this is only a consolidation of services from the “Business Services” stage, the capitalisation of these products can also be obtained by using a “product” attribute associated with “business services”, thus avoiding a dedicated reallocation stage.

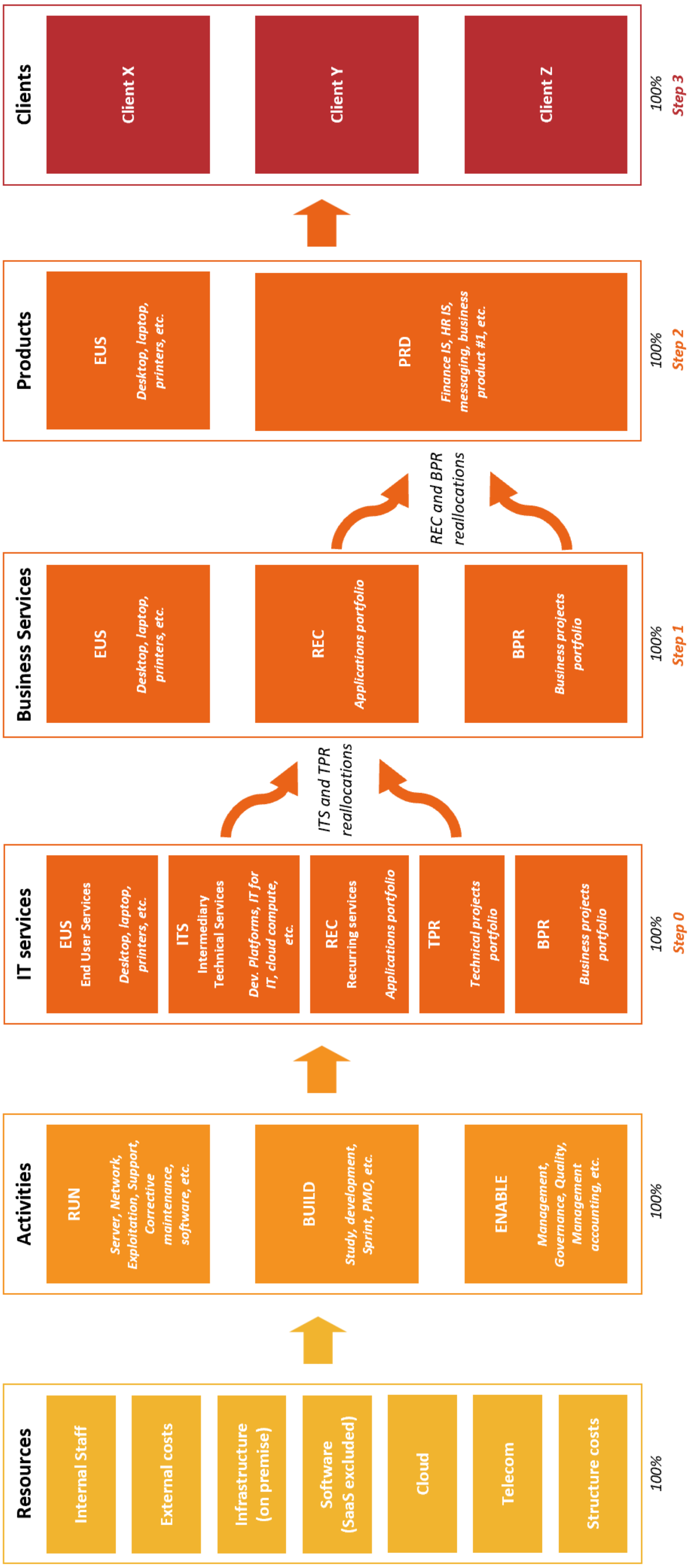


Figure 4 – General architecture of the model

5.2 SERVICE FAMILIES

The 2022 version of the model is an exact implementation of the 5 families of services defined in the 2018 version. These five families are:

- User Work Environments (hereinafter referred to as “UWE”);
- Recurrent services (REC);
- Intermediate Technical Services (ITS);
- Business Projects (BPR);
- Technical projects (TPR).

UWE **– User Work Environments**

The UWE (User Work Environments) family of services includes services corresponding to equipment made available “locally” to users (i.e. in an environment physically close to the users).

Services in this family may typically include the following:

- Fixed or mobile PCs;
- Smartphones;
- Tablets;
- Landline telephones;
- Printers.

The services in this family do not embed application services from the REC family. As such, the capitalisation of a service such as the provision of a PC will equate to the “bare” PC.

However, it is of course possible to combine such a PC provisioning service with business application services from the REC family in order to present the full cost of a “workstation” package.

Furthermore, the provision of a virtual PC should be seen as the consolidation of two services of the “UWE” and “REC” families:

- “Light terminal” service of the “UWE” family which only concerns the provision of the terminal;
- “Virtual Office” service of the “REC” family which concerns the provision of a virtual PC image; This service consumes infrastructure, software and network, like the other services in the “REC” family.

REC **– Recurring services**

The purpose of the REC (Recurring Services) family of services is to provide a recurring set of services or products to IT department customers.

These services typically equate to the applications made available by the IT department. However, the concept of “service” goes beyond the strict framework of applications and also includes the concept of commodities. The provision of a file server for sharing documents, for example, can thus be considered as a service made available to users, the clients of the IT department. Similarly, “telephony” is also a service of the REC family.

The application services of the REC family can be structured into 2 groups or sub-families:

- Business applications specific to the precise environment of each company;
- Facilitating tools (or enablers) such as messaging, collaborative tools, corporate social networks, etc.

It should be noted that emerging services such as IoT, Blockchain, AI, VR, etc. are a natural fit for the REC family.

ITS **– Intermediate Technical Services**

The ITS (Intermediary Technical Services) family of services includes the technical services required to supply services or products to the business units. They are therefore not directly visible to the business units using them.

In order to take better consideration of cloud resources in the model, it is proposed to include a list of intermediate technical cloud services from the following examples:

- Compute services:
  - VMs
  - Containers
  - Bare metal
  - Serverless
- Storage:
  - Object
  - Block
  - Archive
- Network:
  - Virtual Network
  - Private Connectivity
  - Content Delivery Network
  - Load Balancing
- Databases:
  - Relational Database
  - InMemory Database
  - NoSQL Database
- Misc:
  - Dev environments
  - Machine learning
  - APIs
  - Data factory
  - Datalake
  - AI

The technical cloud services to be considered will naturally depend on the precise circumstances for each IT department.

BPR **– Business projects**

The BPR (Business Projects) family of services covers projects, ongoing maintenance or product developments made available to the business units.

The project sponsor belongs to a business department. The IT department can also manage business projects on its own behalf: for example, a project to implement an “IT costing model” constitutes a business project for the IT department and for the Finance department.

The BPR family can thus be broken down into sub-families:

- Business projects (including projects for which the business unit is the IT department itself);
- Regulatory projects;
- Ongoing maintenance.

In an agile approach, the “business projects” and “ongoing maintenance” sub-families can be replaced by a “Products – Build” sub-family, which corresponds to the “Build” aspect of the products made available to the business units.

TPR **– Technical projects**

The TPR (Technical Projects) family of services covers projects and technical developments aimed at upgrading the infrastructure and the IT system; for example, to avoid the risks of technological obsolescence. The sponsor of these projects is the IT department.

5.3 PRODUCTS

Products (PRD) can optionally provide a consolidated view (“Run” and “Build”) of the costs or CO2eq emissions of the products made available to the business units.

5.3.1 “RUN/BUILD” RATIO

As shown in the general architecture diagram of the model above, the activity stage does not determine the “Run/Build” ratio of IT costs, due to the existence of “Enable” activities (transverse “Run/Build”).

However, the “IS Services” stage of the model allows the “Run/Build” ratio to be determined insofar as the first 3 families of services (UWE, REC, ITS) are of the “Run” type and the last 2 (BPR, TPR) are of the “Build” type.

It should be noted that the concept of “arbitrability” cannot be used as the sole criterion for distinguishing between “Run” and “Build”. There are indeed expenditure items that are not arbitrable, e.g.: in the resources dedicated to the projects. Similarly, “enable”-type activities are often “non-arbitrable” and yet are partly distributed over the projects that make up the Build.

5.3.2 THE BUSINESS MODEL

The overall synopsis for the activity model shows the 3 types of activities – “Build”, “Run” and “Enable” – and also offers grouping by macro-activities. The “human” nature of the activities is represented by a dedicated ⚥ pictogram.

Activities specific to agile/DevOps approaches are shown in a separate colour so that they stand out clearly.

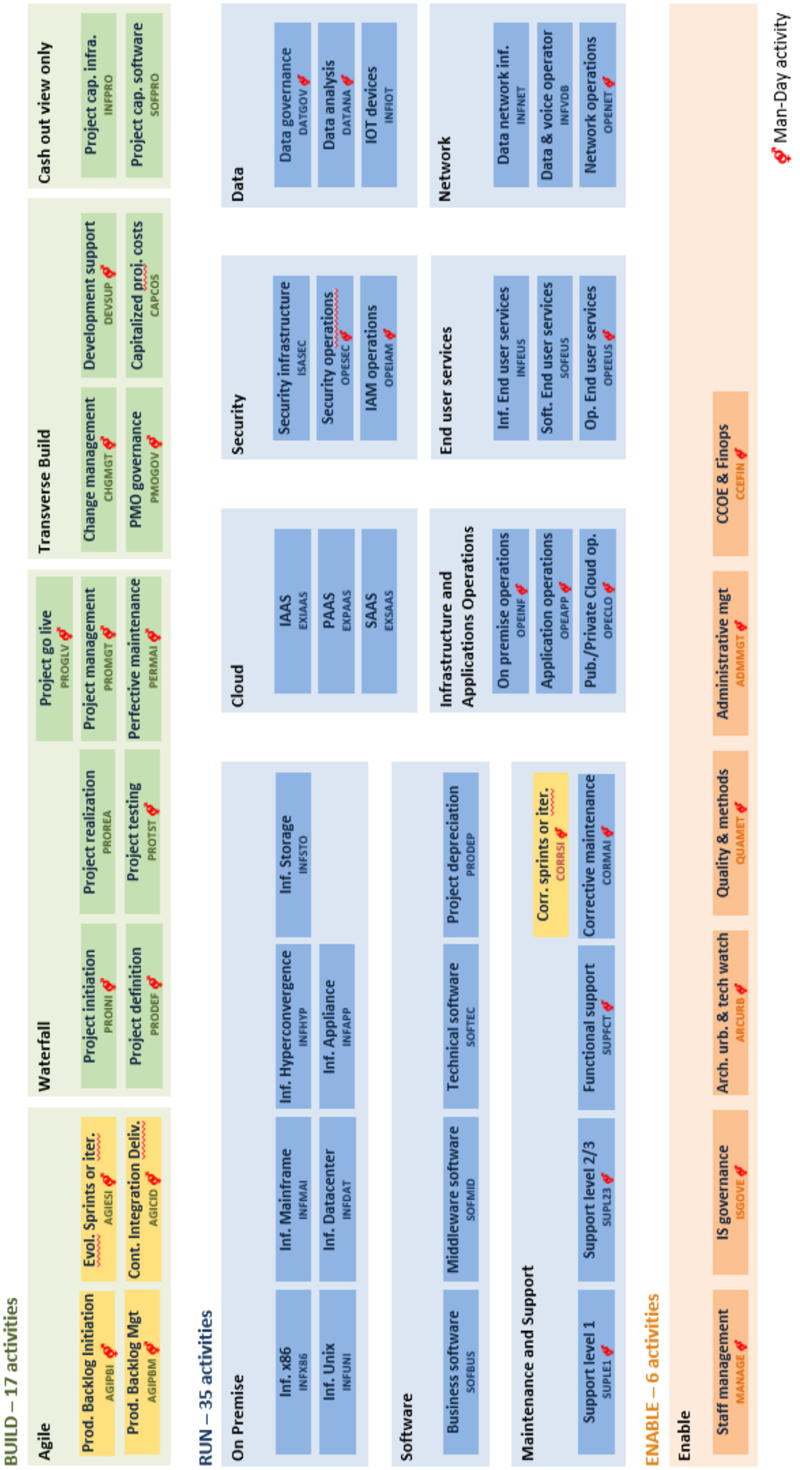


Figure 5 – Overview of the activity model

These different categorisations of activities are formally represented in the model via dedicated attributes:

- "Type" attribute:
    - Build
    - Run
    - Enable
- "Human activity" attribute:
    - Yes/No
- "DevOps Activity" attribute:
    - Yes/No
- "Macro-activity" attribute:
    - Agile
    - Cloud computing
    - Data
    - End User Services
    - Infrastructure and Applications Operations
    - Maintenance and Support
    - Network
    - On-Premise
    - Security
    - Software
    - Transverse
    - Transverse Build
    - Waterfall

The 2022 version of the model introduces some changes to the activity reference framework. These developments are shown in the paragraphs below. This activity reference framework must be tailored to the specific circumstances of each IT department, typically according to the technologies implemented.

However, maintaining consistency with the proposed activity reference framework is important to enable benchmarking with other IT departments that have adopted the model.

Cloud activities

In addition to the existing activities dedicated to IaaS, PaaS and SaaS, two new activities are included in the reference framework:

- Operation of public or private cloud resources (OPECLO): this activity relates to the administration of cloud resources (public or private) and the management of workloads running on cloud infrastructures. It includes the "infrastructure automation" (OPEAUT) activity which was in the 2018 version of the model.
- Cloud Centre of Excellence, integrating FinOps functions (CCEFIN): this activity concerns cloud management, also integrating FinOps functions. It can go beyond "public cloud" issues, particularly in the context of implementing a "private cloud". The tasks related to this activity were included in the "Administrative Management" (ADMMGT) activity in the 2018 version of the model.

Agile/DevOps activities

The structure of the agile/DevOps activities has been reviewed and revalidated in the 2022 version of the model. The only adjustment concerns the names of two activities:

- Evolutionary sprints or iterations (AGIESI) to replace the evolutionary sprints (AGIESP) activity, to clarify that this activity concerns sprints or iterations depending on the agile approach adopted.
- Corrective sprints or iterations (CORRSI) to replace the Corrective Sprints (CORSPR) activity, to clarify that this activity relates to sprints or iterations depending on the agile approach adopted.

As explained in Chapter 7, "Consideration of agility within the model", the existence of two "*Iterations / evolutionary sprints*" and "*Iterations / corrective sprints*" activities in the model does not mean that teams are expected to allocate their time to these two activities. In terms of time entry, a single "Iterations/Sprints" activity will generally be used.

Other changes

The "Archiving Infrastructure" (INFARC) activity in the 2018 version of the model has been merged with the Storage Infrastructure (INFSTO) activity in the 2022 version. It is of course possible to maintain a breakdown into two activities, "storage" and "archiving", in an implementation of the model, but these two activities are grouped together for the purposes of benchmarking.

Activities dedicated to the capitalisation of projects

When project expenditure items are "capitalised", the corresponding expenses are "capitalised" and are therefore removed from the company's income statement.

Design, development or testing expenses for a project may thus no longer appear. To avoid a reading of the costs that is not easily understood by the operational staff responsible for the projects, the model proposes to leave the capitalised expenses in the associated activities but to assign a corresponding product (negative expense) to the "CAPCOS" activity created for this purpose. This "CAPCOS" activity only makes sense, of course, in the context of the capitalisation of a model in the P&L view.

This principle is shown in the diagram below:

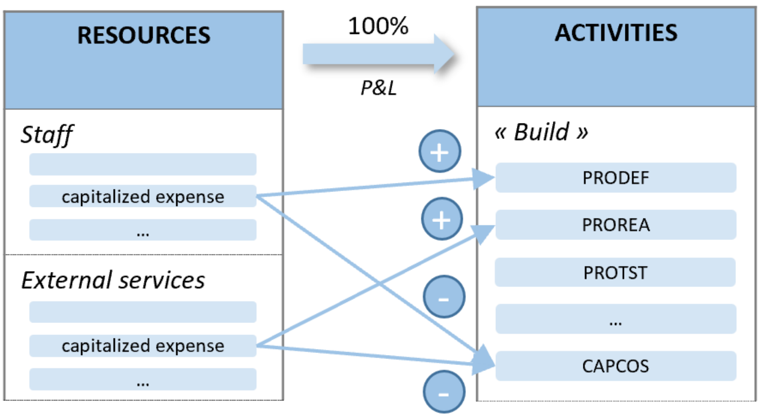


Figure 6 – Principle of allocation and cancellation of capitalised expenses

Amortisation on the capitalised projects will be charged to a dedicated "Run" activity (PRODEP).

Activities dedicated to financial views

Most of the activities in the model can be capitalised in both the P&L and cashout views. However, there are some exceptions:

- Activities dedicated to the "P&L" view:
  - CAPCOS: Capitalised production cancelling out capitalised project expenses (activity valid only in P&L view);
  - PRODEP: Amortisation corresponding to capitalised production.
- Activities dedicated to the "cashout" view:
  - INFPRO: Full costs of materials invested in the projects;
  - SOFPPRO: Full costs of software invested in the projects.

Drivers

Activity drivers allow the costs or CO2eq emissions of activities to be allocated to services according to the principle of consumption of activities by services.

The choice of activity drivers is pivotal for the capitalisation of services:

- An inductor should be as representative of the consumption of activities by services as possible.
- As such, it must be chosen or validated by the operational manager for the activity to which it applies.
- It should be clearly defined and measurable in the same way over time.

The proposed drivers represent typical cases of operational implementation. However, they must naturally be adapted to the specific circumstances of each IT department.

"Run" activities are those that are mainly associated with technical drivers requiring measurement elements at the infrastructure level.

The "k€ per service" or "kgCO2eq per service" drivers correspond to a direct allocation of expenditure to services by "passing through" an activity. For example, expenditure or carbon emissions for business software are directly allocated to the departments concerned while passing through the "SOFBUS" activity (business software).

"*Pro-rating*" drivers are where the cost (or carbon emissions) of the activity concerned is *pro-rata* to the costs (or carbon emissions) already allocated to the services via the other activities. A pro rata distribution is a default choice. The number of activities using such a distribution should therefore be kept to a minimum.

Furthermore, it should be noted that, while the allocation model based on a consumption principle applies to both CO2eq emissions and €, some drivers may potentially need to be modified to switch from a "€" capitalisation to a "kgCO2eq" capitalisation. This is particularly the case for hybrid drivers combining several metrics. For example, the recommended driver for the "X86 Infrastructure" (INFX86) activity combines the "number of cores", "GB RAM" and "GB storage" metrics. The weights to be applied between these metrics for a "€" capitalisation will potentially not be the same as those to be applied for a “kgCO2eq” capitalisation: the relative shares between these metrics are not the same in € and CO2 emissions.

The table below presents a summary of the “Run” activities

Macro activity	Activity Code	Activity Wording	Direct / Indirect	Driver proposal
Cloud computing	EXIAAS	Infrastructure as a Service	Direct	Cloud resources tagging use
	EXPAAS	Platform as a Service	Direct	Cloud resources tagging use
	EXSAAS	Software as a Service	Direct	k€ or kgCO2eq per service
On-Premise	INFX86	X86 server infrastructure (Linux / Windows)	Indirect	Number of cores, RAM (in GB) and storage (in GB) weight by service. The weight needs to be adjusted between the costing model and the ecological model. For instance, the following inductor is relevant for the costing model, but not for the ecological model: “number of cores + GB RAM / 4”.
	INFUNI	Unix server infrastructure	Indirect	Core, logical partition, tpmc or specInt count per service
	INFMAI	Mainframe server infrastructure	Indirect	MIPS / MSU count per service (MIPS / MSU peak or MIPS / MSU-hour)
	INFSTO	Storage infrastructure	Indirect	GB count / service (total disk space)
	INFHYP	Hyperconverged infrastructure	Direct	k€ or kgCO2eq for each technical service
	INFAPP	“Appliance” infrastructure	Direct	k€ or kgCO2eq per service
On-Premise	INFDAT	Datacentre infrastructure	Indirect	Nested inductor: distribution by technology according to the space used in the datacentre (or better to the KWh consumed) and then distribution to the services according to the infrastructure inductors previously collected for each technology

Macro activity	Activity Code	Activity Wording	Direct / Indirect	Driver proposal
Software	SOFBUS	Business software	Direct	k€ or kgCO2eq per service
	SOFTEC	Technical software	Direct	k€ or kgCO2eq per intermediate technical service (“IS of the IT department”, “Development platforms”, etc.)
	SOFMID	Middleware software	Direct	k€ or kgCO2eq per intermediate technical service
	PRODEP	Project depreciation	Direct	k€ or kgCO2eq per service
Infra and App Operations	OPECLO	Public or Private Cloud resources operations	Indirect	Pro-rata allocation to technical services corresponding to public (e.g. compute services) or private (e.g. virtualisation platform) clouds
	OPEINF	Operation and administration of "On Premise" infrastructures (server, storage and archiving)	Indirect	Nested inductor based on underlying infrastructure activities (pro rata to the cost of these activities)
	OPEAPP	Applications operation	Indirect	Share per service to be defined
Data	DATGOV	Data governance and data protection	Indirect	Pro rata distribution
Data	DATANA	Data analysis	Indirect	Pro rata distribution
	INFIOT	IOT devices infrastructure	Indirect	Number of devices per service
Security	ISASEC	Security infrastructure	Indirect	Pro rata distribution

Macro activity	Activity Code	Activity Wording	Direct / Indirect	Driver proposal
	OPESEC	Security operations	Indirect	Pro rata distribution
	OPEIAM	Identity and access management	Indirect	Pro rata distribution or number of identified users per service
Network	INFNET	Data network infrastructure	Indirect	Bandwidth use or direct allocation to “Voice Network” and “Data Network” services
	INFVDB	Data / Voice subscriptions and consumption	Indirect	Bandwidth use or direct allocation to “Voice Network” and “Data Network” services
	OPENET	Network (voice and data) operation and administration	Indirect	Bandwidth use or direct allocation to “Network” and/or “Telephony” services
Maintenance and Support	SUPLE1	Level 1 support	Indirect	Level 1 tickets count per service
	SUPL23	Level 2 & 3 support	Indirect	Level 2 and 3 tickets count per service
	SUPFCT	Functional support	Direct	k€ or kgCO2eq (man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
Maintenance and Support	CORRSI	Corrective sprints or iterations	Direct	k€ or kgCO2eq (man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	CORMAI	Corrective maintenance	Direct	k€ or kgCO2eq (man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)

Macro activity	Activity Code	Activity Wording	Direct / Indirect	Driver proposal
End User Services	INFEUS	End user services infrastructure	Direct	k€ or kgCO2eq per service
	OPEEUS	Desktop operation, mastering and deployment (on a continuous flow basis), including MDM	Indirect	Share per service according to IMAC (Install, Move, Add, Change) for instance
	SOFEUS	End user services software	Direct	k€ or kgCO2eq per service

The table below presents a summary of the "Build" activities

Macro activity	Activity Code	Activity Wording	Direct / Indirect	Driver proposal
Agile	AGIPBI	Product Backlog initiation	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	AGIPBM	Day-to-day management of the "Product Backlog"	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	AGIESI	Evolutive sprints or iterations	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	AGICID	Continuous Integration / Continuous Delivery	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
Waterfall	PROINI	Project initiation	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	PRODEF	Project definition and design	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	PROREA	Project realization	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	PROTST	Project testing and quality assurance	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	PROGLV	Project go live and deployment	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	PROMGT	Project management	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)
	PERMAI	Perfective maintenance	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)

Macro activity	Activity Code	Activity Wording	Direct / Indirect	Driver proposal
Transverse Build	PMOGOV	PMO and projects governance	Indirect	Pro rata distribution on all "projects" belonging to the the BPR family
	DEVSUP	Development support	Indirect	Share per project to be defined
	CAPCOS	Capitalized projects costs (negative charge)	Direct	k€ or kgCO2eq per service
	INFPRO	Projects capitalized hardware	Direct	k€ or kgCO2eq per service
	SOFPRO	Projects capitalized software	Direct	k€ or kgCO2eq per service
	CHGMGT	Project training and change management	Direct	k€ or kgCO2eq (Man days converted to k€ or kgCO2eq via Average Daily Rates or emission factors, or k€ / kgCO2eq of fixed rates)

The table below summarises the "Enable" activities

Macro activity	Activity Code	Activity Wording	Direct / Indirect	Driver proposal
Transverse	ISGOVE	IS Governance	Indirect	Pro rata distribution
	MANAGE	Supervisory staff and management	Indirect	Distribution over all services according to the "man-days" contribution from the distribution of other activities
	ARCURB	Architecture, urbanization and technology watch	Indirect	Pro rata distribution
	QUAMET	Quality, methods, audits s	Indirect	Pro rata distribution
	CCEFIN	Cloud Center of Excellence, including Finops functions	Indirect	If this activity is focused on Public Cloud: nested inductor based on the following activities inductors: EXIAAS, EXPAAS and EXSAAS. In case this activity goes beyond "Public Cloud" topics: pro rata on recurring services
	ADMMGT	Administrative management and administrative costs	Indirect	Pro rata distribution

5.3.3 THE RESOURCE MODEL

The 2022 version of the model evolves the structuring of resources into headings and sub-headings in order to better identify Cloud-specific resources:

- Creation of a new “Cloud” section and three associated sub-sections:
    - IaaS rentals and fees (CLO01)
    - PaaS rentals and fees (CLO02)
    - SaaS rentals and fees (CLO03)
- Clarification regarding the “Software” section to indicate that it concerns only “non-SaaS” software
- Clarification concerning the “Equipment” section to indicate that this section concerns only “On-Premise” equipment
- Clarification regarding the “Services” section to indicate that it concerns only labour.
    - In particular, the sub-heading “Purchase of services” should only contain labour-related services.

The table below provides a summary of the resource headings

Budget headings	Subheadings	Sub-heading code	Description	General Accounts Plan accounts
Staff	Salaries	HRC01	Wages, salaries, allowances, bonuses, gratuities for internal staff. Provisions for risks and expenses on salaries. Profit sharing, participation	641 ; 6815
	Social security expenses	HRC02	All cost elements related to payroll taxes (payroll taxes, pension, provident fund, mutual insurance, etc.)	631 ; 633 ; 645 ; 647
	Training received	HRC03	All training received by employees, excluding specific skills transfers related to projects, the cost of which will be charged to a project activity.	633 ; 625
	Expense reports	HRC04	Travelling expenses, assignment expenses, meals, internal staff	625
	Other staff costs	HRC05	All other cost elements related to personnel costs (recruitment costs, occupational health, meal tickets, transport allowances, etc.)	621 ; 628 ; 648
	Service / company vehicles	HRC06	Maintenance and rental of transport equipment, transport equipment insurance	
External services (labour)	Fixed price packages	ECC01	Outsourcing of operations, development packages, 3PM, etc. Cost elements for IT outsourcing in fixed price mode	611
	Purchase of services	ECC02	Subcontracting, other external services	611 ; 618 ; 628
	Technical assistance (contracts with duty of best efforts)	ECC03	Cost elements for Studies, IT subcontracting, external assistance, mission expenses for external individuals.	611
External services (labour)	Consultancy fees	ECC04	Consultancy fees (legal, IT consultancy, audit, etc.)	611 ; 622

Budget headings	Subheadings	Sub-heading code	Description	General Accounts Plan accounts
Hardware (On-Premise)	Purchasing	HAR01	Purchases, amortisation of IT equipment (office equipment, servers, workstations, etc.)	6811 ; 624 ; 675
	Maintenance	HAR02	Maintenance, servicing and repair of computer equipment	615
	Rentals	HAR03	Rental, leasing of computer equipment	612 ; 613
	Purchase of small equipment	HAR04	Maintenance and small equipment, computer supplies	606 ; 618 ; 605
	Consumables	HAR05	Consumables for computer equipment (cartridges, CDs, etc.)	606
Software (excluding SaaS)	Purchasing	SOF01	Purchases, amortisation of software (office automation, servers, workstations, etc.)	606 ; 681
	Maintenance	SOF02	Maintenance of computer software	615
	Rentals & fees	SOF03	Computer software rentals & fees	613 ; 651
	Small software purchases	SOF04	Small software purchases	606
Cloud computing	IaaS rentals and fees	CLO01	IaaS-type Cloud expenditure	613 ; 651
	PaaS rentals and fees	CLO02	PaaS-type Cloud expenditure	613 ; 651
Cloud computing	SaaS rentals and fees	CLO03	SaaS-type Cloud expenditure	613 ; 651
Telecom	Data	TEL01	Data communication network, network equipment	626
	Voice	TEL02	Consumption of voice telephone communication, telecom equipment, PABX	626 ; 613

Budget headings	Subheadings	Sub-heading code	Description	General Accounts Plan accounts
Structural costs	Premises excluding machine rooms	OVE01	Expenses relating to rent, amortisation of buildings, fixtures and fittings, rental charges, maintenance of premises, water, energy, etc.	613 ; 614 ; 615 ; 628 ; 610 ; 681
	Machine rooms	OVE02	Expenses relating to rent, amortisation of buildings, fixtures and fittings, rental charges, maintenance of premises, water, energy, etc.	613 ; 614 ; 615 ; 628 ; 610 ; 681
	Non-premises insurance	OVE03	Comprehensive insurance, transport, etc.	616
	Local insurance	OVE04	Premises insurance	616
	Non-premises taxes	OVE05	All taxes other than on premises	635
	Taxes on premises	OVE06	Taxes on premises	635
	Others	OVE07	Subscriptions, entertainment costs, etc.	625
	Services provided by other internal entities	OVE08	Services provided to the IT department by other internal entities (HRD, Management Control, Purchasing, Legal, etc.) when the IT department does not have such functions itself	N/A

Link between resource items and CO2eq emission factors

For each resource heading, ad hoc emission factors must be used. The diagram below illustrates proposed emission factors for the different resource categories. These proposals are, of course, to be adapted to each IT department and to the evolution of the available emission factors.

Methodologies for choosing emissions factors are implemented as part of the greenhouse gas emissions assessment (BEGES) by the IT department and CSR teams. This is a joint effort that must be carried out in order to comply with the regulatory framework.

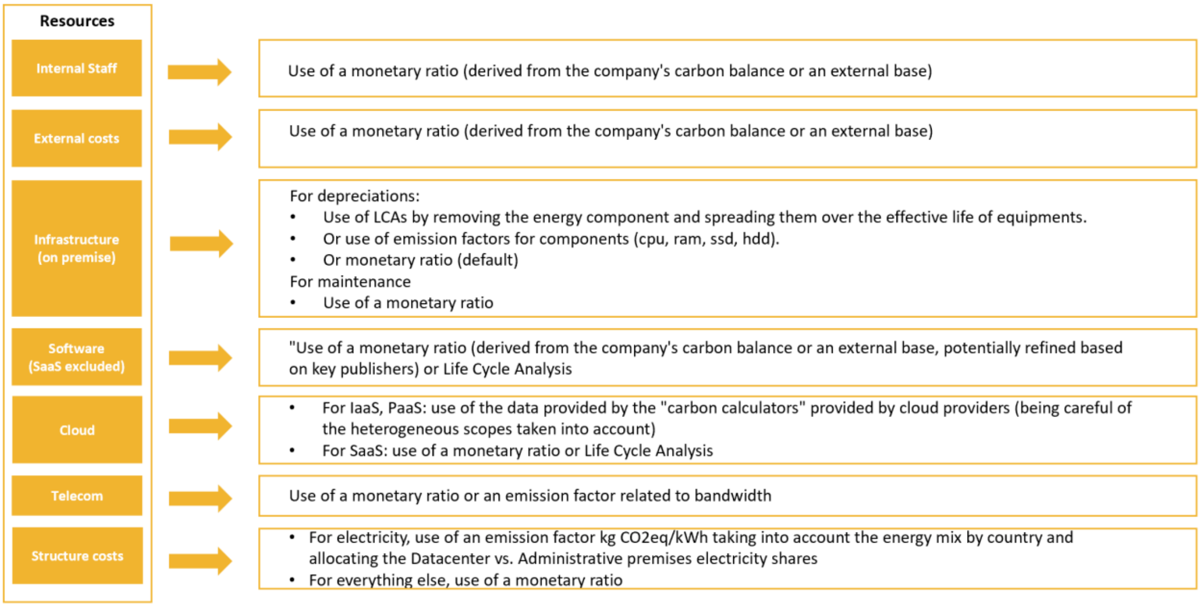


Figure 7 – Emission factors by resource heading

5.3.4 THE PRINCIPLES OF REALLOCATION BETWEEN SERVICES

The “Economic and Ecological IT Management Model” offers several levels of “services” as shown in the diagram below:

- IS Services
- Business Services
- Business Services – Product View

See diagram on next page

Regardless of the number of service tiers implemented, each tier (resources, activities, services) must consolidate 100% of the expenditure.

The proposed reallocation rules for moving from one stage of the model to another are as follows:

IS Services to Business Services:

- Technical projects (RTP) are reallocated to the UWE, REC and ITS families.
- Intermediate technical services are reallocated to the UWE, REC and BPR families.

Business Services to Product View:

- The Build (BPR family) and Run (REC family) components of the products are consolidated in the PRD (Products) family.

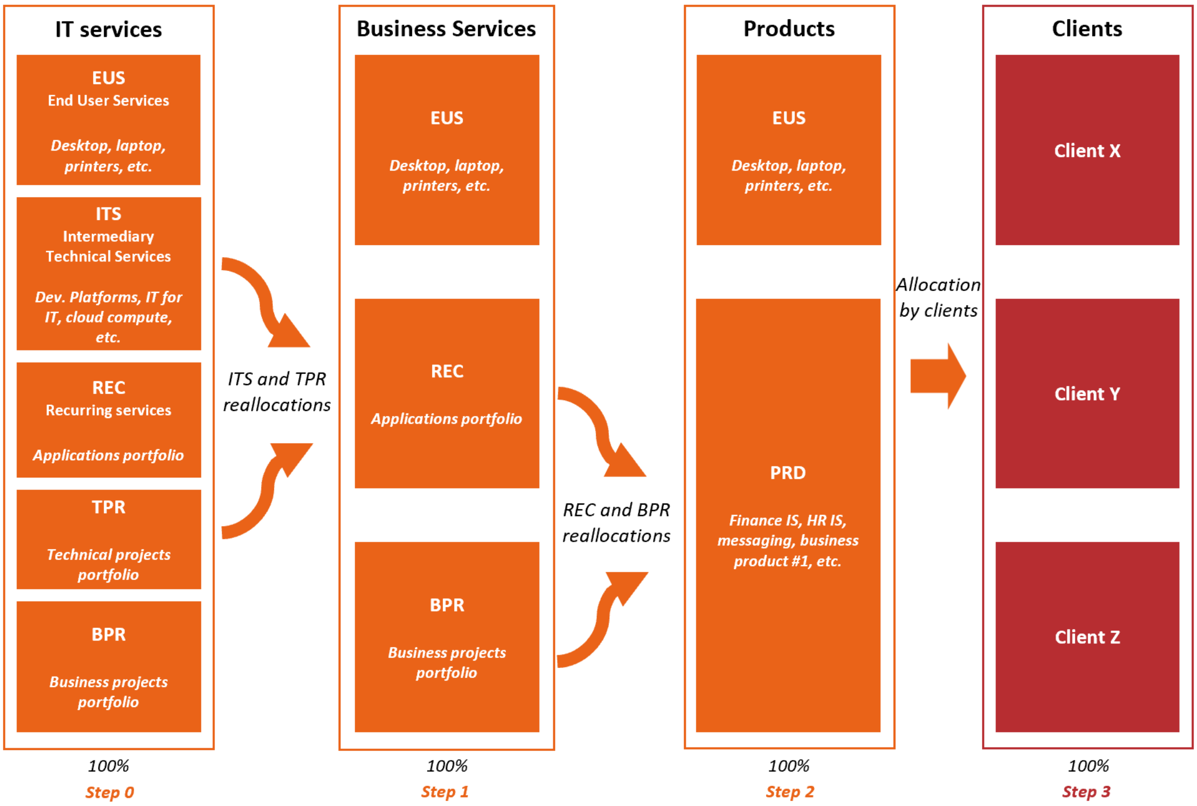


Figure 8 – Service levels of the model

6 IMPLEMENTATION AND DEPLOYMENT OF THE MODEL

The introduction of the “Economic and Ecological IT Management Model” within a company should be seen as a project in its own right. As with any project, the success of such a deployment depends on a number of prerequisites being met and certain pitfalls being avoided.

6.1 GOOD PRACTICES AND PREREQUISITES

One of the first prerequisites is the clear and shared definition of the objectives of the deployment of the “Economic and Ecological IT Management Model”:

- “€” and / or “carbon” capitalisation,
- Knowledge, analysis and management of costs or CO2eq emissions,
- Benchmark,
- Billing for services,

Other good practices include:

- The appointment of a project sponsor, who may typically be the CIO,
- For a capitalisation in €, the formation of a mixed “Management Control” and “IT Operations” team. The deployment of the “Economic and Ecological IT Management Model” must indeed be considered as a “technical-economic” project.
- The same applies to the capitalisation in kgCO2eq, with the creation of a mixed “CSR” and “IT Operations” team.
- The adoption of an agile approach for the deployment of an initial version of the model in the form of an MVP.
- The definition of a clear resource scope.
- The selection of one or more financial views to be capitalised.
- Validation of the structure of the model deployed and capitalised in € before valuing it in CO2eq emissions.
    - The levels of uncertainty associated with the emission factors make it more difficult to validate the model solely in terms of kgCO2eq.
- Creation of a plan for the industrial implementation of the model during its design.

6.2 PITFALLS TO BE AVOIDED

The most common pitfalls to be avoided when introducing the “Economic and Ecological IT Management Model” are as follows:

- Launching the project without the joint support of the IT department and the Finance department or the CSR department.
- Choosing a level of granularity in the service catalogue that is not suited to the issues at stake.

- Embarking on an overly ambitious model in which the first results will not be available for many months. It is clearly preferable to adopt an “agile” approach in “time boxing” mode, requiring an initial capitalisation of the model (MVP) after a few months. Although this capitalisation is not perfect, it will provide a baseline for further development and improvement of the model.
- Deploying the model to a subset of the IT department.
- Having the project implemented solely by the Management Control or CSR teams, for carbon capitalisation, without the involvement of the operational teams (or vice versa).
- Tasking operational teams with the collection of data (drivers, etc.) without providing them with feedback on the model.
- Defining the reports to be produced by the model without specifying them according to the stakeholders for whom the model is intended to be an aid in terms of management.
- Embarking on the choice of a tool prior to having designed and structured the model.

7 HOW DO YOU USE THE MODEL TO ANALYSE, MANAGE AND BENCHMARK YOUR PERFORMANCE?

The “Economic and Ecological IT Management Model” is first and foremost a performance management tool.

7.1 USE IN “€” VIEW

Budgetary control enables an IT department to monitor what it spends.

The “Economic and Ecological IT Management Model” enables an IT department to manage **the proper use of its expenditure**.

This question of the proper use of expenditure should make it possible to ensure the economic performance of the IT department by examining each of the different levels of analysis of the model, as illustrated in the diagram below:

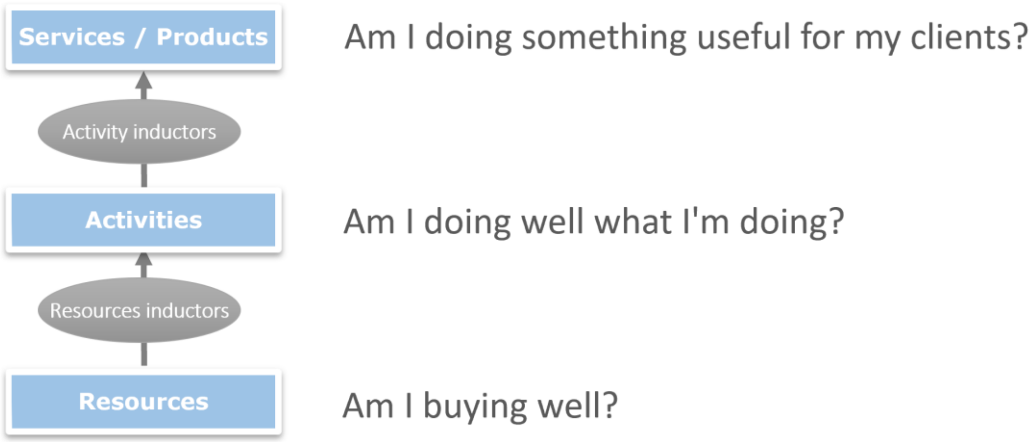


Figure 9 – The different levels of analysis of IT economic performance

These three levels of examination can be illustrated by a practical example, such as the Help Desk managed by an IT department:

- The first issue, at resource level, is purchasing performance. The "Economic and Ecological IT Management Model" can help to answer this question through comparisons/benchmarking with other IT departments by analysing the ADRs (average daily rates of use) of resources (internal or external) in charge of the Help Desk.
- The second issue, at activity level, is operational efficiency. The answer to the first question may be a positive one, but the unit cost for the "Level 1 Support" activity for the Help Desk may be low (and the reverse is of course also possible). At this level, the model will enable the unit cost of a Help Desk ticket to be calculated and compared with a ticket from other IT departments.
- Lastly, the third question should not be neglected, even if the first two have received favourable responses. What is the use for a business client of the IT department in knowing that the unit cost of a Help Desk ticket is very low, if the volume of tickets to be processed is abnormally higher than average? A comparison of the volume of tickets per million euros of "Run" against peers will provide an answer to this third question.

It is clear that the management of IT economic performance cannot be understood by answering only a portion of the questions posed above.

The "Economic and Ecological IT Management Model" provides answers to these three levels of questions, making it an essential tool for the economic management of the IT department.

7.2 USE IN "CARBON" VIEW

In the "carbon" view, the "Economic and Ecological IT Management Model" is primarily used to present the CO2eq emissions of the services provided by the IT department.

The same analysis philosophy as for the “€” view can be applied, but above all, a dual “€” and “carbon” capitalisation of the model makes it possible to calculate and manage monetary ratios at the various levels of the model:

- Monetary ratios for the various infrastructure activities (hardware or software);
- Monetary ratios for intermediate technical services;
- Monetary ratios for business services provided.

The “Economic and Ecological IT Management Model” provides “kgCO2eq” answers in addition to the “€” capitalisation, thus creating an overview that takes into account the environmental impacts according to the data available to date. This is a first step in raising awareness of the challenges of environmental transition.

It is, however, important to note that the model is not a substitute for an LCA, which is the only internationally recognised environmental impact analysis tool (ISO 14040-44).

8 CONCLUSION

With the 2022 version, the “IT Cost Analysis and Benchmarking Model” is changing its scope by embracing both the “economic” and the “ecological” component, fully justifying its name change to the “Economic and Ecological IT Management Model”.

This model thus aims to provide IT departments with a coherent and consistent analysis and management tool for these two components. Regarding the “economic” component, the model allows for effective management of the financial performance of the IT department. Regarding the “environmental” component, the model offers macro analysis options to be accompanied by internationally standardised methodologies.

9 ANNEX 1 – TABLE OF ACTIVITIES FOR THE 2022 MODEL

The table below details the activities of the 2022 version of the model.

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
Build	Agile	AGIPBI	Product Backlog initiation	Opportunity study and initial expression of needs for the initial construction of the "product backlog" in the context of agile developments.	Direct	TPR, BPR	Yes
		AGIPBM	Product Backlog management	Tasks to regularly update the product backlog during a project.	Direct	TPR, BPR	Yes
		AGIESI	Evolutive sprints or iterations	Sprints / iterations contributing to the functional enrichment of the product as part of an agile development.	Direct	TPR, BPR	Yes
		AGICID	Continuous Integration / Continuous Delivery	Testing process and deployment of services / products in an agile and automated way.	Direct	TPR, BPR	Yes
	Waterfall	PROINI	Project initiation	Opportunity study, pre-study (may not result in a project): ● Analysis of a need, ● Feasibility study, ● Study of various different scenarios to meet the need and selection of the optimal scenario in light of the issues at stake.	Direct	TPR, BPR	Yes

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
Build	Waterfall	PRODEF	Project definition and design	Studies, design and specifications: ● Definition of a functional reference for the application, ● Definition of the general and detailed architecture for the associated system, ● Drafting of documentation (specifications) to enable the coding of the application, ● Design of the test strategy and test plans for the acceptance test.	Direct	TPR, BPR	Yes
		PROREA	Project realization	Coding and unit testing tasks to validate the compliance of each software module against the specifications. Also includes correction tasks in the acceptance phase.	Direct	TPR, BPR	Yes
		PROTST	Project testing and quality assurance	Qualification, acceptance, integration and pre-production: ● Validation that the application complies with the requirements (independently of the rest of the IS), ● Validation that the application functions correctly within the IS, in a pre-production environment: VABF (operational acceptance testing), VABE (user acceptance testing) and VNR (final validation), ● Stress tests. The corrections linked to the acceptance process are an integral part of the "Implementation, development and unit testing" (PROREA) activity.	Direct	TPR, BPR	Yes
		PROGLV	Project go live and deployment	Production start-up and deployment: ● Production start-up as part of projects and ongoing maintenance ● Installation of the application in a production environment, ● Possible pilot site, ● VSR (in-service testing), ● Widespread implementation and deployment.	Direct	TPR, BPR	Yes

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
Build	Waterfall	PROMGT	Project management	Tasks related to project management: ● Governance tasks (including participation on bodies) and risk management, ● Planning monitoring and control tasks, ● Tasks for monitoring reports and associated indicators, ● Budgetary monitoring tasks for the investment plan, ● Tasks related to project communication.	Direct	TPR, BPR	Yes
		PERMAI	Perfective maintenance	Perfective maintenance: ● Tasks corresponding to ongoing maintenance that cannot be broken down into "project" activities. ● The production implementation of ongoing maintenance work resulting from this activity is handled by the "production implementation and deployment" activity (PROGLV).	Direct	TPR, BPR	Yes
	Transverse Build	PMOGOV	PMO and projects governance	Project portfolio governance, Project Management Office (PMO). Relations with the business units for projects (creation and life of the portfolio).	Indirect	TPR, BPR	Yes
		DEVSUP	Development support	Design and development support: ● Support to developers for languages, development tools, frameworks, etc, ● Drafting of good practice guides, ● Transverse tasks for training developers.	Indirect	TPR, BPR	Yes
		CAPCOS	Capitalized projects costs (negative charge)	Capitalised production cancelling out capitalised project expenses (activity valid only in P&L view).	Direct	TPR, BPR	No

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
		INFPRO	Projects capitalized hardware	Full costs of materials invested in the projects ("cashout" view only).	Direct	TPR, BPR	No
	Transverse Build	SOFPRO	Projects capitalized software	Full costs of software invested in the projects ("cashout" view only).	Direct	TPR, BPR	No
		CHGMGT	Project training and change management	Project-related training, communication and change management: ● End-user materials (training, communication, documentation), ● Tracking results of pilot operations, experiments and tests, ● Coordination of the support mechanism.	Direct	TPR, BPR	Yes
Enable	Transverse	ISGOVE	IS Governance	Tasks related to IS governance and strategy, roadmap, etc.	Indirect	EUS, REC, ITS, TPR, BPR	Yes
		MANAGE	Supervisory staff and management	Supervision and management tasks: ● Time spent by managers coaching their teams, ● Individual interviews, ● Information meetings for managers and employees (meetings focusing on operational topics should be allocated to the corresponding activities).	Indirect	EUS, REC, ITS, TPR, BPR	Yes
		ARCURB	Architecture, urbanization and technology watch	● Tasks related to the urban development and architecture of the IS: ● Technical and business urban development, ● Enterprise architecture and technical architecture, Time spent by architects on projects or the Run must be allocated to the relevant activities. Only time spent on "transverse" architectural tasks should be charged to this activity.	Indirect	EUS, REC, ITS, TPR, BPR	Yes

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
Enable	Transverse	QUAMET	Quality, methods, audits es	Administration of production reference frameworks (reference framework for services and applications in production, reference frameworks for technical objects, etc.). Production and manufacturing process management. Tasks related to quality, standards, audits.	Indirect	EUS, REC, ITS, TPR, BPR	Yes
		CCEFIN	Cloud Center of Excellence, including Finops functions	Cloud governance, also incorporating Finops functions. This activity can go beyond "public cloud" issues, particularly in the context of implementing a "private cloud"	Indirect	EUS, REC, ITS, TPR, BPR	Yes
		ADMMGT	Administrative management and administrative costs	Administrative management: ● Management control, ● Human resources, ● Purchasing, ● Legal, ● Tasks by assistants, ● Pro-rata costs for support functions provided, ● Etc. Administrative costs (insurance excluding premises, taxes, etc.), management structure costs.	Indirect	EUS, REC, ITS, TPR, BPR	Yes
Run	Cloud computing	EXIAAS	Infrastructure as a Service	Costs of infrastructure as a hosted service outside the IT department.	Direct	REC, ITS	No
Run	Cloud computing	EXPAAS	Platform as a Service	Costs of platforms as hosted services outside the IT department.	Direct	REC, ITS	No
		EXSAAS	Software as a Service	Costs of SAAS-mode service offerings, hosted outside the IT department.	Direct	REC	No

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
	On-Premise	INFX86	X86 server infrastructure (Linux / Windows)	Amortisation / leasing and maintenance of X86 servers (Linux / Windows) and associated OSs.	Indirect	REC, ITS, EUS	No
		INFUNI	Unix server infrastructure	Amortisation / leasing and maintenance of Unix servers and associated OSs.	Indirect	REC, ITS	No
		INFMAI	Mainframe server infrastructure	Amortisation / leasing and maintenance of mainframe servers and associated OSs.	Indirect	REC, ITS	No
		INFSTO	Storage infrastructure	Amortisation / leasing and maintenance of storage infrastructure. The storage infrastructure may include software components.	Indirect	REC, ITS	No
		INFHYP	Hyperconverged Infrastructure	Amortisation / leasing and maintenance of hyperconverged infrastructure	Direct	REC, ITS	No
		INFAPP	Appliance infrastructure	Amortisation / leasing and maintenance of combined hardware and software appliances.	Direct	REC, ITS	No
Run	On-Premise	INFX86	Datacentre infrastructure	Hosting costs: ● M² of machine rooms, ● Energy, ● Fluid costs, ● Etc.	Indirect	REC, ITS	No
	Software	SOFBUS	Business software	Amortisation / leasing and maintenance of business software packages (software that can be associated with one or more business functions).	Direct	REC	No

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
	Software	SOFTEC	Technical software	Amortisation / leasing and maintenance of technical software: ● Remote distribution tools, ● Remote control tools, ● Schedulers, ● CMDB tools, ● Ticket management tools, ● Etc.	Direct	REC, ITS, EUS	No
		SOFMID	Middleware software	Amortisation / rental and maintenance of middleware (database, ETL, transactional monitors, hypervisors, etc.)	Direct	REC, ITS	No
		PRODEP	Project depreciation	Amortisation corresponding to capitalised production.	Direct	REC	No
	Infra and App Operations	OPECLO	Public or Private Cloud resources operations	Administration of (public or private) Cloud resources and management of workloads running on Cloud infrastructures	Indirect	ITS, REC	Yes
Run	Infra and App Operations	OPEINF	Operation and administration of "On Premise" infrastructures (server, storage and archiving)	Administration, operation and maintenance of “production and non-production” infrastructure (servers, storage, archiving, etc.) and middleware, as well as the management and supervision of infrastructure and applications. Includes global batch planning and scheduling.	Indirect	REC, ITS	Yes
		OPEAPP	Applications operation	Functional operation tasks for applications: ● Production monitoring and any data adjustment tasks, ● Analyses and explanations of the results of the treatments carried out, ● Analysis of alerts, logs, performance, etc.	Indirect	REC	Yes

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	Data	DATGOV	Data governance and data protection	Tasks to ensure data availability, integrity and security, particularly with regard to compliance with regulations	Indirect	REC	Yes
		DATANA	Data analysis	Tasks related to data analysis: ● Data mining, ● Business intelligence, ● Analyses entrusted to Data Scientists.	Indirect	REC	Yes
		INFIOT	IOT devices infrastructure	Costs of smart devices / IoT	Indirect	REC, ITS	No
	Security	ISASEC	Security infrastructure	Amortisation / leasing and maintenance of security equipment. The security infrastructure may contain software components that cannot be separated from the equipment.	Indirect	REC, ITS	No
Run	Security	OPESEC	Security operations	Tasks related to system security, security strategy, security operations, cybersecurity. Operation and administration of security (Disaster Recovery Plan / Business Continuity Plan): ● Testing and implementation of the DRP / BCP, ● Drafting of DRP / BCP instructions.	Indirect	EUS, REC, ITS	Yes
		OPEIAM	Identity and access management	Tasks related to the management of identities and authorisations.	Indirect	EUS, REC	Yes
	Network	INFNET	Data network infrastructure	Amortisation / leasing and maintenance of network equipment (datacentre, local networks, including floor switches and wifi terminals). The data network infrastructure may include software components.	Indirect	REC, ITS	No

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
		INFVDB	Voice / data subscriptions and consumption	Operator costs for setting up the WAN network and associated subscriptions. Subscriptions / consumption for the voice network (including Edge, 3G and 4G), including for call centres and for mobiles, smartphones, tablets.	Indirect	REC, ITS	No
		OPENET	Network (voice and data) operation and administration	Administration, operation and maintenance of data and voice network infrastructure and architecture	Indirect	REC, ITS	Yes
Run	Maintenance and Support	SUPLE1	Level 1 support	Level 1 support / Help Desk: ● Taking calls (incidents or requests), ● Diagnosis and qualification, ● Resolution or routing to the right skills at the next level, as applicable. Back office and incident management (follow-up, reminders, L1 communication)	Indirect	REC, ITS, EUS	Yes
		SUPL23	Level 2 & 3 support	Level 2 and 3 support: handling of incidents, problems and qualified requests referred on from level 1. In the case of an application malfunction, this activity is limited to the diagnosis and analysis of the malfunction (code correction is part of corrective maintenance).	Indirect	REC, ITS, EUS	Yes
		SUPFCT	Functional support	Functional support tasks for the use of the services / products provided.	Direct	REC	Yes
		CORRSI	Corrective sprints or iterations	Sprints / iterations to correct anomalies detected in a product.	Direct	REC	Yes

Type	Macro activity	Activity Code	Activity Wording	Description	Direct / Indirect	Families of services	Human activity
		CORMAI	Corrective maintenance	Maintenance tasks aimed at correcting malfunctions or improving the performance of the applications made available: Code correction, ● Corresponding tests, ● Pre-production and corresponding production start-up.	Direct	REC	Yes
Run	End User Services	INFEUS	End user services infrastructure	Amortisation / leasing and maintenance/warranties for equipment (PCs, printers, multifunctional devices, fixed and mobile phones, smartphones, tablets, etc.) and associated operating systems	Direct	EUS	No
Run	End User Services	OPEEUS	Desktop operation, mastering and deployment (on a continuous flow basis), including MDM	Operation, installation and maintenance of user work environment equipment: ● IMAC (Install, Move, Add, Change) management, ● Master design and configuration update tasks (patch management, etc.), ● Administration, fleet management and interventions on local equipment (workstations, tablets, smartphones, multifunctional devices, interactive boards, videoconferencing room equipment, etc.), ● Tasks related to remote distribution, ● Tasks related to MDM (Mobile Device Management).	Indirect	EUS	Yes
		SOFEUS	End user services software	Amortisation / leasing and maintenance / warranty of software installed on user work environments (office suite excluding email costs, etc.).	Direct	EUS	No

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Influence

Cigref ensures that its member companies' legitimate interests are known and respected. As an independent forum in which practitioners and actors can discuss and create, it is a benchmark recognised by its whole ecosystem.

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