CONCEPTUALISING IT CONSULTING SERVICES: AN APPROACH FROM IT-BUSINESS ALIGNMENT MODELS AND DESIGN SCIENCES

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ABSTRACT.

The constant integration of business and manufacturing processes is a difficult task that can be facilitated through IT consulting services. However, if these services do not adequately address the problems of alignment between IT and business, efficiency in integration can be seriously compromised.

This article presents a methodology that systematises IT consulting services for the acquisition, incorporation, and integration of IT elements in an organisation in such a way that is aligned with the business and by contemplating its contribution to the value chain. The proposal is based on a set of rules, methods, guidelines, patterns, and artefacts that define a flow of action and implement a strategy that provides a consulting solution as a final result. Likewise, a method is proposed to evaluate the applied methodology and the solution obtained. For validation of the method, a set of business processes based on a case study applied in several Cuban companies related to the food sector has been defined to help adjust the parameters and corroborate the generalisation of the proposal.

This research allows to ensure the alignment of business and IT to avoid the failure in the incorporation of IT to companies. It also analyzes and establishes the ideal artefacts for IT consulting and generates an IT consulting methodology that makes the analysis of consultants more robust in order to guarantee the success of incorporating IT into companies.

Keywords. *IT Consulting Services, IT Alignment Models, Business Modelling, BSC-IT, BPM*

1 INTRODUCTION

The application of E-Business models in the industrial sector responds to the demands of an extremely competitive market and highly specialised and diversified business processes [1, 2, 3, 4, 5]. A characteristic of these process-oriented models is their structuring into two basic processes: those located at company levels or business processes and those deployed at production plants. The constant integration of both processes has been approached in works that have abstracted the logic of production as integrated IT services in Business Process Management Systems (BPMS) [6]. However, ensuring the implementation of each IT solution is extremely complex due to the high dependence on the continuity of the solution and the diversification of the business models [7].

When an organisation approaches an R&D project, one of the first actions involves the acquisition of some type of technology. From the earliest stages of the project, one can see how expectations regarding these technologies are inflated and do not necessarily correspond to the true technological needs of the organisation to facilitate its business processes. That is, the organisation is not properly calculating where and how IT should be introduced into its environment, at what levels, and to what extent.

An emerging paradigm of IT is Business Process Management (BPM). BPM encompasses the set of methods, techniques, and software tools that support the design, execution, control, and analysis

of operational business processes in order to facilitate optimised value creation in an organisation [8].

The implementation of BPM initiatives is an extremely complex task ranging from the identification of key success factors and checklists to implementing a BPM system [9] to the development of architectural components that consider the fundamentals of the process models to be executed under specific notations and technological infrastructures [10, 11].

In this context, IT consulting services can be considered as a complement to facilitate the implementation of BPM solutions and initiatives. These are professional services that the top IT managers incorporate into their IT service-provider centres. The essential motivation is the need to seek advice to evaluate and develop different technological strategies and, consequently, to align them with business in a specific organisational context. This evaluation is a difficult process because the sophisticated levels of integration of IT with business [12] in BPM solutions [9] require highly specialised advice in order to conceive strategic, architectural, or implementation plans as the possible outputs of these services [13, 14].

The alignment of IT with business, and vice versa, at all levels of abstraction in the organisation [15, 16] is assumed to be the core of the problem for the design of effective IT consulting services capable of facilitating the incorporation of value-generating IT into an organisation [17, 18]. Research in IT consulting from positions related to IT/business alignment is complicated by the gaps between practice and research in IT consulting, which are generally nuanced by academic positions and practices in global consulting firms. The need to offer relevant practical solutions that take full advantage of the accumulated utilitarian knowledge in this area of IT requires a new paradigm that re-conceptualises theory and practice in IT consulting from co-adaptive postures [19].

Design Science in Information Systems (Design Science Research, DSR) is an emerging research paradigm [20] whose use is proposed in this research to materialise this co-adaptive posture. The meta-artefact concept in information technology refers both to the outputs of Design Sciences in forms of constructs, models, methods, and prototypes [21], as well as the design process itself [20]. Thanks to the adoption of the DSR model, the methodological complexity for co-adapting practice and research in IT consulting is comparable to the complexity of incorporating IT consulting services under the IT/business alignment approach [22]. This

process of correlation is concretised in what we have defined as the features of IT Consulting Services (ITCOS), which constitutes the starting point of our research [23].

The ITCOS features are organised in two ways. The first one includes theories related to the scope of IT consulting services: the *consultant intervention*, the *work tool* [24], the *nature of the service* [25], and *IT market segmentation* [13, 14]. The second class encompasses theories and their practical applications in the conceptual integration processes that take place between business and IT. These theories span areas of knowledge, such as business architecture, IT governance, and IT/business alignment models [22, 26, 27, 15, 16].

In this article, a proposal is presented based on the research in Design Sciences in Information Systems for the systematisation and modelling of IT consulting processes. This proposal has been called ITCOS methodology. In specific terms, the methodology is a framework composed of four features: nomenclature, restructured BPM, generating nucleus, and adapt/incorporate pattern. These integrated features allow the generation of three IT consulting methods: IT/Business Diagnostics, Design of IT Consulting Mechanisms, and Implementation of IT Consulting Strategy. The purpose of these methods is to describe an IT consulting model in the domain of incorporation of the BPM paradigm and to make it operational within the guidelines of a specific organisational domain of process management.

In the following section, a critical analysis of the work is carried out to address the integration of the fea of IT services. In section 3, a methodological framework in IT consulting is developed that prescribes the co-adaptation between practice and research in IT consultancy. In section 4, a set of IT consulting methods for the strategic implementation of IT in a business is designed, under the methodological framework previously proposed. Section 5 assesses the consistency of the proposal and its capacity for systematisation. Finally, section 6 presents the conclusions of the work together with the main contributions and future directions.

2   STATE OF THE ART

One of the fundamental concepts on which this work is based is the business process. According to Hammer [28], a business process is defined as "a set of measurable, structured, and ordered activities, designed from a series of inputs that produce a series

of outputs for a particular customer or market." It is noteworthy that other definitions, such as those proposed by [29, 30], or even [31], do not differ much in the essence of the previous definition but are more adapted to the definition of business processes. It is from this definition that management paradigms and business-process modelling techniques called Business Process Management, appear, which generally focus on three factors: people, processes, and technology. To obtain a global view of an organisation and the way it is being managed, the BPM paradigm requires an approach based on four perspectives [32] of great importance that must be simultaneously aligned for the success of its implementation and of the organisation. These four perspectives are divided into organisation, business, processes, and information systems. In addition, the organisation and IT teams need to work collaboratively to ensure the success of incorporating BPM into a specific organisational context.

The first of these perspectives, the organisation, focuses on the company's strategy, obligations, and position of the company in a segment of the market. The second refers to its efficiency in relation to customers, shareholders, and employees. The perspective of business processes, which are used at all levels of the organisation, lead to the wealth of an organisation when used efficiently but can also lead to hardship when these processes are weak. Finally, the technological perspective of information systems refers to the systems that allow addressing the set of methods, techniques, and software tools that support the design, execution, control, and analysis of operational business processes to facilitate the creation of optimised value in the organisation [33]. In addition, these paradigms provide significant benefits for organisations in most areas involving a company, such as transparency, communication with employees, or standardisation, among others [34, 35].

From a technological perspective, business processes are designed and modelled electronically, configuring the specific context under the technological architecture of the organisation. This BPM model is part of one of the phases of the complete BPM cycle for the incorporation and redesign of business processes. Currently, BPM is a consolidated paradigm that has recently proven its validity as it has become widespread among the most important organisations [36].

The incorporation of IT as a strategic business within the organisation [17] is the basis for responding agilely to changes in business and

technology in a globalised service economy [37, 38]. In this context, IT is called IT services. Its study and orientation to services in a business environment are carried out from the perspective of Design, Engineering, Management, and Service Science [20]. Currently, consulting and IT consulting services occupy the same interdisciplinary field as IT and IT services but are considered a subset of these.

The specific treatment of IT consulting is scarce [39]. Bibliographic approaches based on IT consulting practices are the dominant ones and are characterised by providing lessons learned in the development of IT consulting projects [18, 40] and in developing market research into IT services [41, 13].

Contributions are partially focused on some of the subclasses within the technological and social context of IT. For example, [42, 43] address the importance of the consultant's communication skills. Works [44, 45] present the formation and execution of curricula in IT consulting in Europe and the United States. Papers [46, 47] show tools to evaluate an IT consulting service by focusing on customer satisfaction. Bloomfield & Danieli [48] and Becker et al. [49] analyse the impact of the socio-political environment, and Meng [50] and Hongli & Lei [51] propose designing this type of service as an e-Business model that intensifies the use of consultants' knowledge in a distributed environment.

All of these contributions are useful for characterising IT consulting but do not focus on the design of its processes. Therefore, they are partial approaches to consulting as a system.

In this vein, [52] defined the role of strategic IT consulting as part of the life cycle of a consulting service. This proposal details some characteristics of strategic IT consultancy, such as strategic IT audit, IT strategy development, IT-services organisation, and IT outsourcing. However, Niehaves & Becker [39] note the few contributions that exist to define specific IT consulting processes, arguing that research aimed at the design of these processes should seek the links between process design practices and deepen the internal foundations of systemic approach and systems theory.

To approach research practice in IT consulting under all the identified dimensions - that reach multiple elements in the strategy, advice, processes in its broadest sense, the management of the operations of management, and IT services - we will use the Design Science Research model as a basis. This model provides new ways of legitimising research activity in engineering and allows us to approach this interdisciplinary field that

encompasses practice and research in consulting. The fundamental concepts on which DSR is based are IT artefacts and design. An IT artefact extends its definition to abstract concepts in computing that reach the definition of models, methods, algorithms, software design, evaluation of frameworks, modelling language, strategies, or architectures, among others [13, 53, 54, 55, 56].

In conclusion, through the emerging DSR model and the disciplines of Information Systems, an example of multiparadigmatic synergy is achieved [20]. This synergy represents the genesis of the IT methodology proposed in this research, and we have called it the IT Consulting Services (ITCOS) Methodology, the basis for the effective definition of the strategic incorporation of IT into specific organisational contexts of business process management.

3 BACKGROUND AND METHODOLOGICAL FRAMEWORK

This research aims to systematise IT consultancy for the acquisition, incorporation, and integration of IT elements in the organisation. To this end, the rules are defined for the design of a set of integrated IT consulting methods and the design of a set of IT artefacts that, based on an identified problem, defines a flow, implements a consulting strategy, and proposes a consulting solution.

From this context of IT consulting, as a fundamental element of IT consulting services, the process of incorporation and IT integration in the organisation has been related to the BPM paradigm as a type of IT incorporation under a systemic approach, capable of integrating the rest of the IT incorporations specialised in each organisational field, e.g., flexible manufacturing or vertical integration of processes and manufacturing elements as a service.

These standards or methods have the value of being an effective complement to facilitate the incorporation of the BPM paradigm from the perspective of IT services configured in specific organisational contexts of process management.

In addition, we propose a way to validate the methodology by modelling a case study as a process [57, 58].

The contributions of [59, 60, 49] are the methodological foundations that have been consulted, which have more comprehensively addressed the design of IT consulting processes. These were developed and led by the European Centre for Business Information Systems of the University of Münster, which we consider to be a very effective methodological language to handle the interdisciplinary nature of IT services. The contributions of [59, 19, 39] justify attending to the complexity of its design, in that the design of IT consulting and epistemological processes are combined.

Moreover, the selection of UML and its extension for process models [61] guarantees the formal continuity with the proposal of [62] as an instance of specific organisational contexts that may be potential application scenarios. The research, while attending the practical relevance of UML in the IT solutions development environment, brings the communication of research to this specific IT domain.

Research in Information Systems Design Sciences has its antecedents in the book The Science of the Artificial by Herbert Simon [63], which discusses the privileged position of the natural sciences over all academic disciplines to legitimise the creation of new knowledge. In this context, it uses the term artefact to define something that is artificial or constructed by humans as opposed to something that occurs naturally. These devices have the value of both improving an existing solution to a problem as well as offering a first solution. The problems of Design Sciences are not trivial problems but are wicked problems [64] characterised by unstable constraints and requirements in poorly defined contexts, where the interactions between the subcomponents of the problem are complex. Likewise, there is an inherent flexibility to change in the design processes/artefacts obtained, and dependence is critical in relation to the cognitive and social skills of the designers, e.g., creativity and teamwork.

In this context, research in Design Sciences begins with design practices as a routine in a fundamental principle: the knowledge and understanding of a design problem and its solution are acquired in the construction and application of an artefact [64] In this sense, research in Design Sciences is a paradigm for solving problems where the designer answers relevant questions of human problems through the construction of innovative artefacts that contribute to the creation of a new knowledge of utilitarian value that adds to the body of scientific evidence. In the designed artefacts, it is fundamental to recognise both their usefulness and the understanding that they solve given problem. In the case of design practices as a routine, no new knowledge is generated; rather, existing knowledge is applied as good practices by designers in their professional practice.

In general, there is consensus [65] to delimit research studies in Design Sciences according to the type of DSR artefacts, the approaches and research processes used, and the nature of the contributions obtained.

With the previous background, the proposal of a methodological framework is conceived from the pragmatic vision of Design Sciences of [56]. Under this foundation, a transparent, rigorous, and disciplined design of consulting processes can be guaranteed by assuming four sources of resources derived from research results taken as a priori design theories. These sources serve as starting ideas for the design of different types of IT artefacts that would originate from (1) practical problems and opportunities, (2) existing IT artefacts, (3) analogies and metaphors, and (4) general theories.

The internal subclasses of the ITCOS edges proposed by [23] are the starting point for identifying and classifying these sources of resources in order to reflect the result of a design process materialised in four methodological traits (Figure 1), which would allow (a) defining a vocabulary in terms of process diagrams (Nomenclature); (B) establishing the scope of consulting services (restructured BPM); (C) formalising a system of processes as the generating nucleus of advisory activities (core consultancy); and (D) normalising the transformational flow of resource sources in a pattern from conceptual use to descriptive or prescriptive use (IT consulting flow pattern).
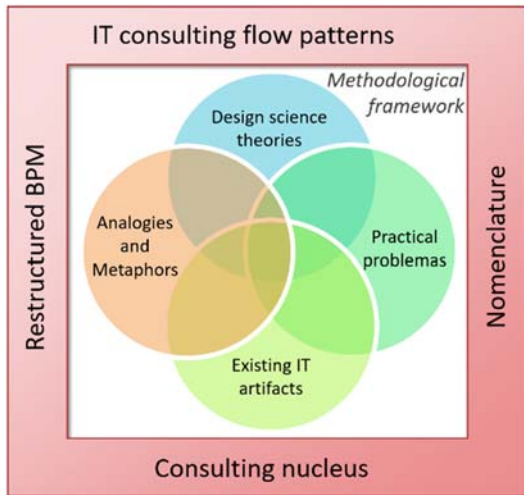

Fig. 1. Methodological Traits Defined By The ITCOS Features [23].

3.1   Nomenclature

It is important to start by specifying the methodology and establishing a nomenclature that will, by defining and explaining a set of constructs, define the vocabulary necessary to communicate the methodology. To this end, two sources of resources have been used: existing IT artefacts and analogies.

The existing IT artefacts are based on modelling of UML process diagrams proposed by [61], which approximate process modelling to a vocabulary that can be understood by both the CIO (Chief Information Officer) and IT-technical and business personnel. This extension recommends four views for business modelling: business vision, business processes, business structure, and business behaviour. All recommendations are consistent with [66, 67], who identify that the motivation for business modelling has surpassed the traditional motivation framed exclusively within the domain of software engineering. At present, business modelling extends to other domains - not excluding software engineering - that are more in line with the interdisciplinary nature of IT. The use of the Erikson-Peker extension is complemented by the Business Motivation Model [68], which will be used to model the consulting solution and the IT consulting problem as complementary subsystems. Table 1 shows how the proposal of [67] has specialised in the ITCOS methodology proposed in this research. In the conception of nomenclature, two fundamental analogies have been established: (1) structuring the problem and the consulting solution as a single DSR artefact and (2) business modelling as an IT consulting system.

Table 1.   Reconceptualisation of business modelling from [67].

Bridgeland/ Zahavi Proposal	ITCOS Methodology
Communication between people	Communication between internal IT clients and IT consultants.
Training and learning	Participatory process of socialising the methodology as a modelling technique with a value that the CIO must fundamentally recognise in order to pass it on to the rest of the managers.
Persuasion and sales	Contractual processes of services that are

	established between the IT service provider centre and the organisation itself. The consultant A.T. Kearney [68] recognises three types of contractual processes: IT services provided by the same business unit - in-house, an internal IT service provider that provides IT services to several business units, and outsourcing IT services.
Analysis of a business situation	Analysis of an IT help and consulting situation developed within the organisation of IT and that is addressed from each method of IT consulting.
Conformity management	Management of agreements at the level of IT consulting services.
Development of software requirements	Development of the consulting solution at the level of implementation of solutions and tools for Business Process Management as part of a software engineering project.
Direct execution in a software engine	Development of the consulting solution at the level of execution of business processes in Business Process Management (BPM) systems.
Knowledge management and reuse	Lessons learned as a result of iterating in the application of IT consulting methods.

3.2   Restructured BPM paradigm

The integration of consulting methods in a process system aims to facilitate a strategic use of the BPM paradigm, seen from the perspective of IT market segmentation of IT consulting services and under a systemic approach. The paradigm is analysed under three subsystems - BPM phases, BPM specifications/standards, and BPM tools and solutions - which are conformed by a set of IT services that respond to a unique configuration of (1) a service line, (2) a set of IT solutions, (3) their acquisition methods, (4) the vertical segmentation of the processes that distinguish the organisational context, and (5) an IT platform as a technological support.

This approach to the BPM paradigm is consistent with the characteristics currently evidenced by empirical research on the use of BPM [36, 70] and are reflected in the process system as integrated ITCOS features, such as the Conceptual Advisory Platform. The combination of traditional IT incorporations, whether to model, execute, integrate, or analyse business processes, is considered a way to incorporate BPM without necessarily doing so in a BPM suite as an IT solution to a BPM System (BPMS). Therefore, we can affirm BPM characteristics in the following scenarios of traditional IT incorporation:

1. use of generic transactional systems, such as Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) systems, and Supply Chain Management (SCM);
2. use of techniques for information integration and business analysis;
3. design and electronic modelling of business processes using text and graphics editors; and
4. use of the components of a BPM suite in a specific organisational context that is process oriented and characterised by strategic use of IT.

Under these considerations, facilitating the strategic use of IT to incorporate the restructured BPM paradigm means designing IT consulting services as complements for an effective configuration of these IT services, thus facilitating incorporation of the BPM features in the mentioned scenarios of the IT-BPM scenario.

The value of these BPM scenarios is analysed in terms of satisfying internal customers who use IT in the organisation to

1. enable the creation of new products and services;
2. create or maintain competitive advantages in an extreme competition environment;
3. make an informational use of IT as a way to provide information relevant to the direction and control of the organisation;
4. make transactional use of IT as a means of processing basic and repetitive transactions of the organisation; and
5. create an IT infrastructure to support IT services. These supports can be (a) **utilitarian**, when the IT infrastructure is used

only to reduce costs; (b) **use dependent**, when the IT infrastructure is conditioned by a current business strategy; or (c) **facilitative use**, when infrastructure IT supports long-term strategic use of IT.

3.3 Consultancy IT methods: system process view

Much of the proposal presented in this research is supported by two terms developed by [56], which are essential for their conceptualisation: *theory* and *IT artefact*. A theory in IT seeks what is true knowledge and to understand the behaviour between IT-Business interactions, such as analysis, design, implementation, management, and use of IT consulting. While IT artefacts create innovations that define ideas, practices, technical capabilities, and products through the analysis, design, implementation, management, and use of IT consulting theories are complementary terms in IT consulting.

According to [39], the research cycle of information systems is based on the relationship between theory and artefact. The latter are categorised into four crucial elements for the design process of information systems: constructs, models, methods, and implementations. Constructs provide vocabulary to express a consulting problem and solution. The models facilitate the understanding of a real world problem and its solution by abstractions and representations. The methods represent each of the algorithms or consulting practices, and the implementation refers to the instances of the models (for example, the Adapt/Incorporate pattern instance to be explained in the next section).

The analogies and practical problems on which the core of consultancy proposed is based, from the point of view of process systems, are Alignment Maturity Model (AMM), the Strategic Alignment Model (SAM), and Balanced Scored (BSC). We will describe them briefly.

AMM Model (Alignment Maturity Model): This is a maturity model to evaluate the IT/business alignment developed by [71], which constitutes a consolidated and validated IT/business model that integrates the most relevant dimensions in the process of alienation and realignment. The criteria, subcriteria, alignment descriptions, and maturity levels of AMM are classified as construct-type IT artefacts capable of reflecting IT consulting problems that are identified through the proposed intervention alternatives [72] - expert, doctor/patient, and process. For its part, these

interventions are classified as method-type IT artefacts by analysing their latent guides on how to advise IT clients in an assistance scenario. In this sense, Schein's proposal can be analysed from a theory of design centred on the action of language in workflows according to [73].

SAM Model (Strategic Alignment Model): The Strategic Alignment Model [74] is a model-type IT artefact that represents the structure and dynamics of an IT/business alignment process. The structural view of SAM - Business Strategy, Business Infrastructure, IT Strategy, and IT Infrastructure as constructs - and dynamic view - its original and extended alignment perspectives as constructs - are used as a frame of reference for developing IT consultancy mechanisms to identify or leverage BPM features in the single configuration of restructured IT-BPM services. SAM is the most developed proposal in studies on BITA (Business IT Alignment); in this sense, we consider it pertinent to take it up again from its original bases.

BSC-IT (Balanced Scorecard): The strategic framework for IT (BSC-IT) [75, 76] is classified as a method-type IT artefact that makes an IT strategy operational in line with a business strategy. Therefore, it is considered relevant to use an IT consulting strategy that controls the systematic introduction of IT initiatives through the execution of highly structured IT consulting flows. The elements of the BMM (Business Motivation Model) [68], End-BMM and Mid-BMM and IT decision areas of the Weill/Ross IT governance model [27, 77] are classified as model-type IT artefacts that represent the detailed structure needed for implementation of the IT consulting strategy.

3.4 Adapt/incorporate pattern

After analysing and identifying the first three characteristics of the methodological framework, nomenclature (AMM), structured BPM (SAM), and generating nucleus (BSC-IT), three basic characteristics emerge from each of them: diagram of processes, process management practices, and system of processes, respectively.

Next, we will propose the definition of the consultant flow that allows a transformation from the traits identified to their basic characteristics. We will define said flow via a methodological pattern based on the seven design-science research guides proposed by [56] and by applying the Levels of Applied Information Systems defined by [20], which is considered a challenge for the Business Information Systems community, such as the cases

of ITIL, COBIT, and Weill and Ross [40]. These models are not essentially different from the guided models, and they are referred to with a typical language that has to be reconceptualised. Table 2 shows these reconceptualised guides for the definition of the new pattern.

Table 2. Guidelines For The Contextualisation Of The New Pattern.

Guide	Description
Pattern as an IT artefact	Pattern design as a method-type artefact
Pattern relevance	Elaboration of methods applicable to real problems
Evaluation of the pattern	Demonstrate the utility, quality, and effectiveness of the pattern through an evaluation method
Contribution of the pattern	The pattern should reflect unmodulated methodological reconceptualisation processes and new consulting methods
Rigor of the pattern	Use theories and IT artefacts to model effectively
Pattern design as process	Design through the use of available means to achieve the desired end
Communication of the pattern	To the scientific community and to the IT/business audience

This pattern defines three levels of action on IT artefacts and IT consulting flow: a conceptual level where IT artefacts will be visualised as a construct, a descriptive level that will define the empirical invariants and regularities as IT artefact models, and a prescriptive level in which recommendations for practice can be seen as IT methods. Each of these levels has two consulting flows: a flow that describes the IT consulting system and another that prescribes the model as consulting actions.

Logically, starting from the generating nucleus, it behaves as an input and output element; therefore, it is necessary to visualise how the process of transformation is seen: conceptual elements into descriptive and descriptive elements into prescriptive. The adapt/incorporate pattern establishes its operation from input elements (IT as a business, candidate consulting objects, strategic advisory patterns, among others), elements such as the IT artefacts of the reference model that will be adapted to the IT consulting subsystems, and output elements or components that will be the same but adapted to the new framework. To solve this problem, this consulting flow has been identified under a dual approach of two cross-process diagrams (Figure 2), such as the adapt process (the conceptual IT artefact and defined as a model), and prescribed as a specific output through the incorporate process.
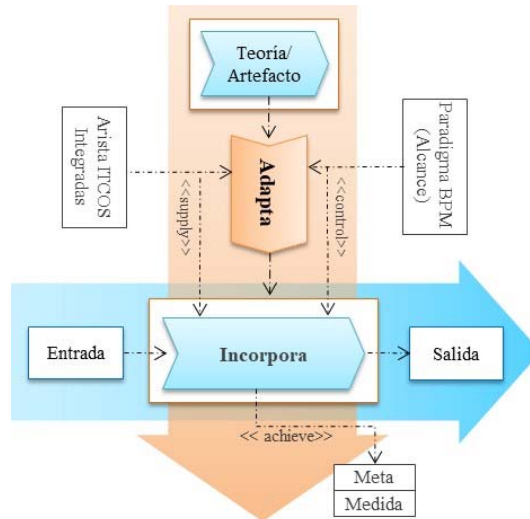

Fig. 2. Adapt/Incorporate Pattern.

4. ITCOS Methodology

At this point, the traits of the methodological framework, its main characteristics, and a pattern that defines a consultant flow have been identified that will help to build, thanks to its dual nature, both the IT Consulting Method Generation Process or ITCOS Methodology and the IT consulting solution itself. Throughout this section, we will apply the adapt/incorporate pattern of each of the features to develop both objectives.

4.1 Method of IT/business diagnosis

The starting point of the ITCOS methodology is the IT/business diagnosis. This methodology has been designed by taking the model of [71, 78, 26] as a reference, and it is the result of instantiating the AMM artefact to the adapt sub-process following the adapt/incorporate pattern proposed in the previous section (Figure 2). This process allows us to understand how a quantitative tool to measure the level of maturity of IT/business alignment under a process approach can be

transformed into a qualitative tool that facilitates the identification of diagnostic elements in the domain of an IT consultancy. This process of transformation consists of the criteria and sub-criteria of AMM, IT customer systems, and the types of intervention of an IT consultant.

intervention of an internal or external IT consultant is a determining factor in this model, which seeks to establish a system of interactions between the IT consultant and the entire IT client system to be advised.

The definition of the AMM adaptation sub-
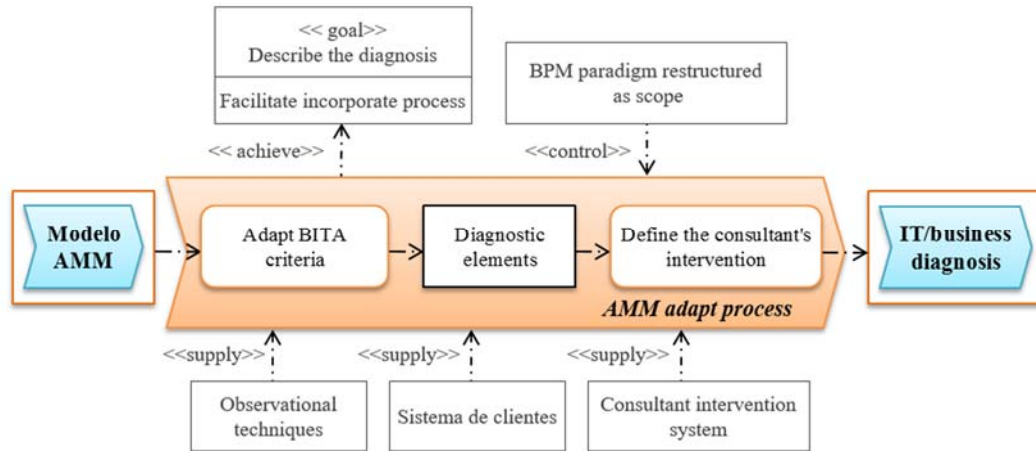
Fig. 3. Adaptation Flow Applied To The AMM.

The original AMM criteria are the IT artefacts that are types of constructs: communication, value metrics, governance, collaboration, scope/architecture, and skills. The original evaluation of each criterion is based on the evaluation of its sub-criteria using group consensus techniques based on the Likert scale from 1 to 5. The consensus is established among a group of managers of the organisation that represent the business units that interact with IT. The evaluation is done at the level of a sub-criterion of alignment, an alignment criterion, the business units, and the organisation itself. In this process, strategic alignment initiatives are identified, and the organisation is given one of the five maturity levels of the alignment process: ad hoc, committed, established, improved, and optimised.

The AMM adaptation process describes a workflow (Figure 3) where an IT consultant uses a diagnostic intervention technique to observe each of the attributes and characteristics of the criteria and sub-criteria of AMM that will be transformed into elements with a structuring level from low to high. This flow is controlled by a restructured BPM paradigm, according to the considerations already mentioned in the methodological framework in IT consulting.

From the perspective of diagnosis, this methodology can become an instrument to identify an organisation's gaps in IT self-assessment. The

process is based on the use and incorporation of the BITA paradigm as a conceptual framework for representing the levels of process abstraction. To this end, six alignment criteria have been defined: communication, value metrics, governance, collaboration, scope/architecture, and adapted skills. Likewise, the types of customer systems and their roles have been identified: contact, intermediate, principal, and last.

Finally, the IT consultant can apply three intervention techniques to each type of client. These techniques differentiate the way of identifying problems, conceptualised in the diagnostic elements that we have previously specified: (1) intervention technique as an expert, which establishes a series of conditions on the different types of clients with the objective of analysing the state of the diagnostic element; (2) medical/patient intervention technique, which is a variant of the previous technique but with conditions adapted to the analysis of the client system, adequate when the system experiences clear symptoms by knowing which IT area is diseased and which ITCOS methodology can be applied; and (3) intervention technique as a process, which places the IT client system as responsible for its problem and assigns the IT consultant the role of facilitating how to solve it.

Taking into account the result of the adaptation of the AMM, the AMM incorporation process (Figure 4) starts by identifying IT as a business within the organisation itself to obtain what
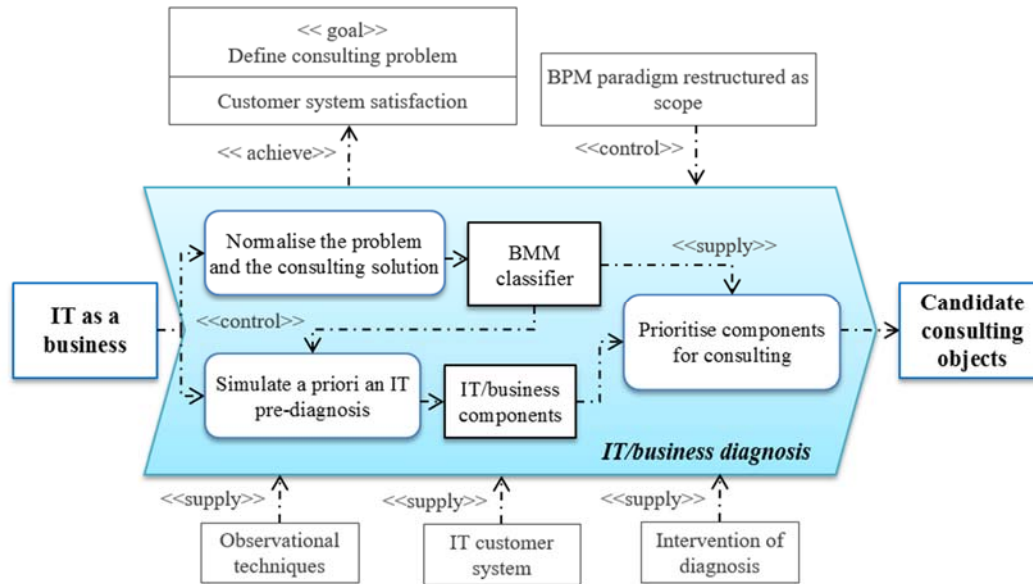
Fig. 4. Flow Of Incorporation Of The Adapted AMM: IT/Business Diagnosis.

we have called Candidate Consulting Objects, which will be the first departure from our business diagnostic method. This process of incorporation is called IT/Business diagnosis and will be developed very succinctly in the following paragraphs.

Once the consultant's intervention is established (Figure 3) and IT is assumed as a business, it is necessary to normalise the problem and the consulting solution, all through a classifier called BMM. This classifier is modelled with the BMM standard as part of the nomenclature defined in the research (section 3) and under the principles of participatory business modelling according to the adapted guide of the methodological foundations of the adapt/incorporate pattern. This ensures that the structure of the consulting solution and how to

represent the potential problems of IT consulting are equivalent to a business plan that is highly structured and specialised in IT consulting. The sophistication levels of IT/business alignment relationships justify these high levels of structuring of the consultant plan.

The BMM classifier is used in a consultant workflow to prescribe both (1) simulation of an IT pre-diagnosis in the organisation in order to obtain IT/business components and the classification of IT/business components according to the elements of diagnosis as type-problems of IT consulting, such as (2) prioritisation of IT/business components classified to conform Candidate Consulting Objects.

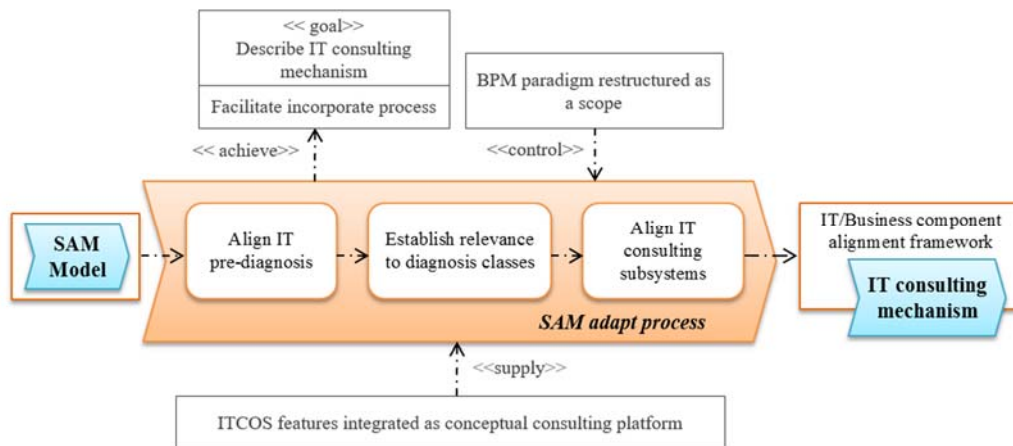The process of instantiation of this sub-process is done through a series of tasks designed as

Fig. 5. Adaptation flow of the SAM

a process diagram and specified as *directives* according to the methodological framework in defined IT consultancy.

4.2 Method of designing IT consulting mechanisms

This second method of consulting takes into account the incorporation of the BITA paradigm as a basis for the development of highly structured IT consultancy. The contribution of this research on BPM is to establish coherence with the methodological framework in the defined IT consultancy and to re-conceptualise the works that have integrated BPM and BITA under the concepts of IT artefacts according to the established methodological framework. For this, the conceptualisation process focuses on the SAM [74], which will allow establishing a framework to align results obtained in the diagnosis.

The definition of the IT/Business Component Alignment Framework (Figure 5) is based on SAM and is the result of the second application of the adapt/incorporate pattern defined in section 3.4 (Figure 2). The objective of SAM is to define how the Candidate Consulting Objects obtained during the diagnostic process are integrated such that a set of IT consulting actions can be applied.

The starting point of the adaptation process flow is the analysis of the following elements: (1) the requirements of the IT pre-diagnosis where the applied diagnosis intervention, the examined IT client system, and the identified IT consulting actions are collected; (2) the presence of the six IT/business diagnostic classes in IT/business components as a way of identifying the nature of the problem to be solved; and (3) interactions between IT/business components and IT consulting subsystems - Processes, IT Requirements, Actor/Resources, and Concepts.

Each of these elements of the Candidate Consulting Objects should be analysed and re-conceptualised to the latent BITA process structure in SAM to obtain an alignment framework. This framework is defined by four strategic change centres: business strategy, IT strategy, business infrastructure, and IT infrastructure. The concepts of strategic adjustment as construct and functional integration developed by [71] are re-conceptualised as the options of an IT consultancy that act as connectors of the interactions between IT/business components. Therefore, once the initial constructs have been defined as a result of the application of the methodological framework in IT consulting, it prescribes three actions within this adaptation flow: *align the IT pre-diagnosis, establish relevance to diagnostic classes, and align the subsystems of IT consulting* (Figure 5).

Once the IT/Business Component Alignment Framework is defined, the conditions for the development of the second part of the Design of the IT Consulting Mechanism method are created. Once again, the adapt/incorporate pattern is re-invented with the goal of designing a process that incorporates SAM as a consultant workflow (Figure
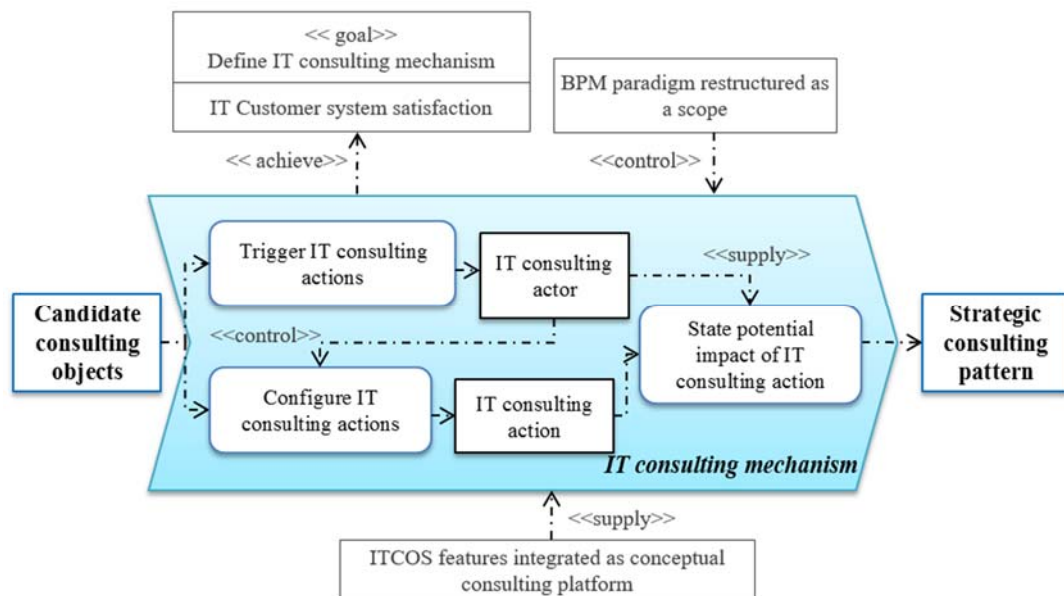

Fig. 6. Flow Of Incorporation Of The Adapted SAM: IT Consulting Mechanism.
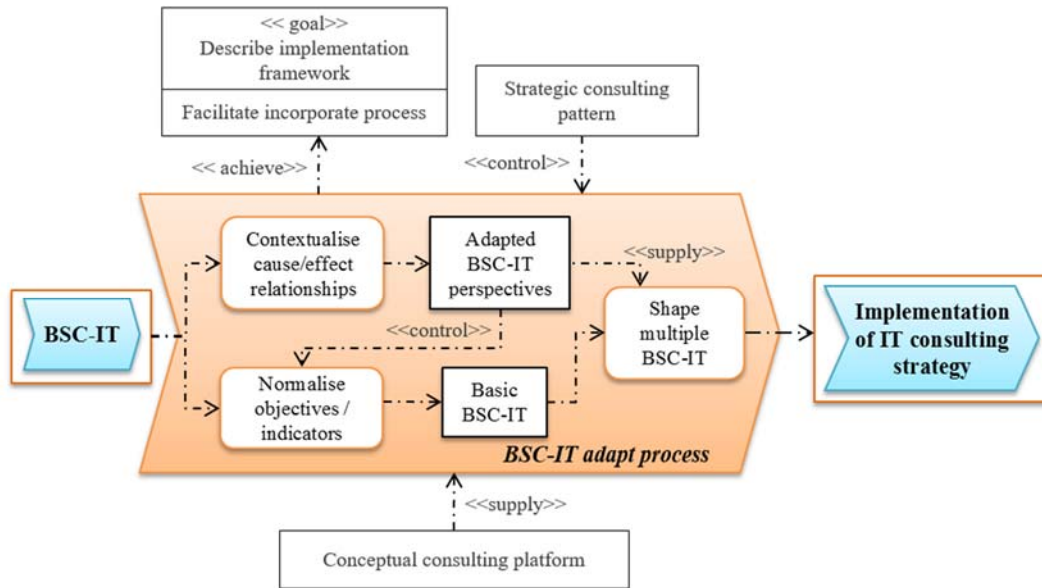
Fig. 7. It-Balanced Scorecard Adaptation Process Flow (Bsc-It): Bsc-It Adapt Process.

6) that makes the IT/Business Components Alignment Framework operational.

The starting point of the incorporation process is to use the alignment perspectives defined by [73] and extended [71] as a way to execute an IT/business alignment process. These alignment perspectives are re-conceptualised as an IT consulting mechanism. The general approach is to interconnect the relationships between IT/business components that have been formalised in the constructs, strategic fitting, and functional integration across the four change centres of IT/business interactions: business strategy, IT strategy, business infrastructure, and IT infrastructure. The structure of these patterns under the methodological framework in the proposed IT consultancy is summarised in two actions that act on the three archetypes:

1. Trigger IT consulting actions: the catalyst change centre develops consulting actions to verify the potential of an effective triggering of the consulting flow.
2. Configure IT consulting actions: this is the second task of the SAM incorporate sub-process in which IT consulting actions of configuration-type are selected to compose a course of configurable consulting actions that work as a complement to incorporate the level of Restructured Business Process Management that has been decided.

Therefore, it can be established that the consulting actions that occur in the problematic change centre are defined according to the function of the market segmentation view (Table 4):

Table 4. Basic IT consulting actions.

#	Action
1	*Incorporation of IT service line*
2	*Incorporation of IT solutions*
3	*Incorporation of practices of vertical process segmentation*
4	*Incorporation of practices to study alternatives in the IT services acquisition*
5	*Incorporation of practices to support a consistent technology platform*

Finally, for the final conformation of the Strategic Consulting Pattern, it is necessary to state the desired impact as a result of a course of configurable consulting actions in the problematic change centre. The statement of this impact is made based on the BPM characteristics established in the methodological framework in IT consulting. Once the patterns and archetypes established in this design phase have been defined, a consulting flow will be available to complete the IT consulting strategy.

4.3   Method of implementation of the IT consulting strategy

the formation of an archetype process of IT consulting service as a way to materialise the consulting solution (Figure 8).
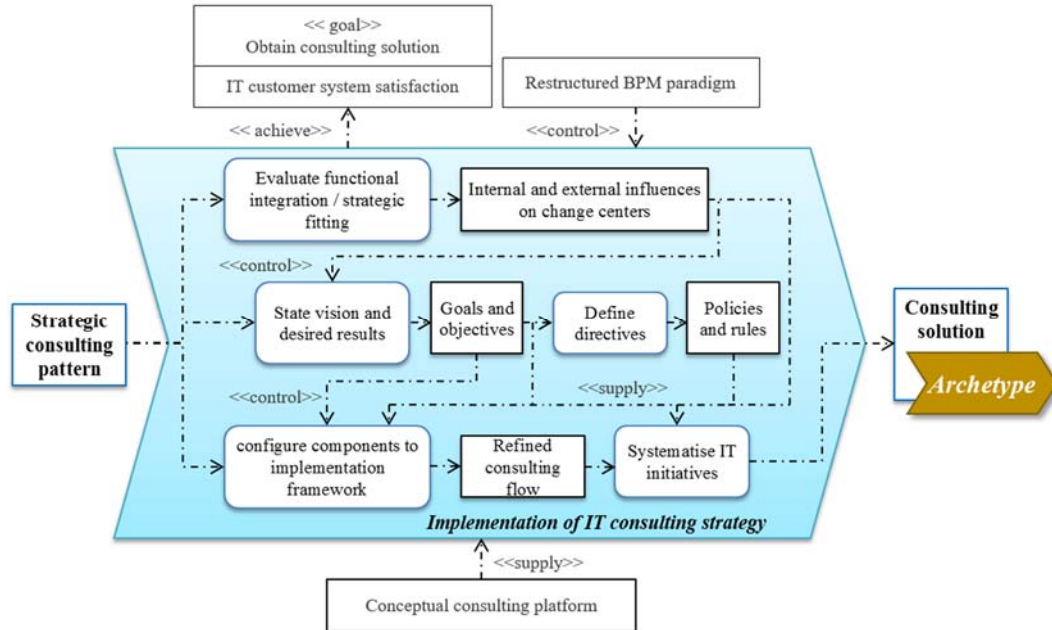

Fig. 8. Flow Of Incorporation Of The Adapted BSC-IT: Implementation Of The IT Consulting Strategy.

The design of the third IT consulting method delves into the pair of configurable consulting actions/declarations of the expected result by incorporating the BPM characteristics defined in the IT consulting methodological framework. To do this, we analyse the IT Consulting Goals and Rules subsystem, which is specified in the BMM classifier as part of the diagnostic application process, and the evaluation elements. The application of the adapt/incorporate pattern takes the strategic BSC framework for IT as a third instance [76], considered a method-type IT artefact that makes an IT strategy (BSC-IT) aligned with a business strategy operational. In our case, we propose a comprehensive approach to the BSC-IT that is consistent with the methodological framework in IT consulting because the BSC-IT is, in itself, an adapted strategic framework. The guidelines for the process of adaptation and incorporation of the BSC-IT are as follows, respectively:

- the design of the BSC-IT adapt process to structure the IT consulting strategy by adapting the BSC-IT to the domain of an IT consultancy as defined in the IT Concepts and Goals and Rules consulting subsystems (Figure 7); and
- the design of a process for the implementation of the IT consulting strategy through the definition of the consulting progression type lines that allow

The adaptation of the original BSC-IT (Figure 7) takes the form of a system for measuring the result of the IT consulting performance based on the balance of qualitative and quantitative metrics by describing the processes that allow us to obtain the Framework for Implementation of the Adapted BSC-IT - IT Consultancy Strategy.

The original elements of the BSC are perspectives, cause/effect relationships, objectives, measures, targets, and strategic initiatives. These are the background for the works of Van Grembergen and Van der Zee [76]. The initial ideas will be developed to adapt the BSC, centred in its origin to the highest strategic level of the business, to a BSC that would link corporate strategy with IT goals in an aligned manner.

This research is based on these elements to define the IT consulting strategy (Figure 5) and to identify an Implementation Framework for a Consulting Strategy. The concrete proposal is to reconceptualise the shape of the BSC-IT structure following the methodological framework in IT consulting through a participatory process. The key elements of BSC-IT are defined in [79]. From these fundamental elements, the process of adapting this strategic framework to the domain of IT consulting can be described through three actions: *contextualise cause/effect relationships, normalise means and*

ends, and link levels of IT/business components and of IT consulting.

With this process of adaptation are laid the basis for making the Framework to Implement the IT Consulting Strategy operational as a systematic construction of archetypal IT consulting processes.

Fig. 9. Generating Processes For IT Consulting Methods: ITCOS Methodology.

The process of BSC-IT incorporation (Figure 6) is the last application of the adapt/incorporate pattern. The premise for its design is to integrate the BSC implementation process for the business [80] under participatory business modelling and the logical progression prescribed by the Business Motivation Model (BMM) for execution of a highly structured business plan [68]. This process is called the implementation process of the IT consulting strategy.

By integrating the proposals of BMM [68] and [80], we obtain the BSC-IT incorporate sub-process that is coherent with the Implementation Framework of the IT Consultancy Strategy. This process has the Strategic Consulting Pattern as an input and the consulting solution as an output, which has the characteristic of being two-fold. This duality implies that the consulting solution represents an archetypal process of IT consulting when a consensus is established for the execution of a strategy that is implicit in a Strategic Consulting Pattern selected in a specific organisational context of Business Process Management.

The five tasks that the IT consultant undertakes in designing this archetypal IT consulting service process are: evaluate functional integration/strategic fitting, configure components to the Implementation Framework of the consulting

strategy, state desired vision and results, define directives, and systematise IT initiatives.

These five tasks are not modelled as atomic tasks. To respect the levels of process segmentation that have been followed in this study - the syste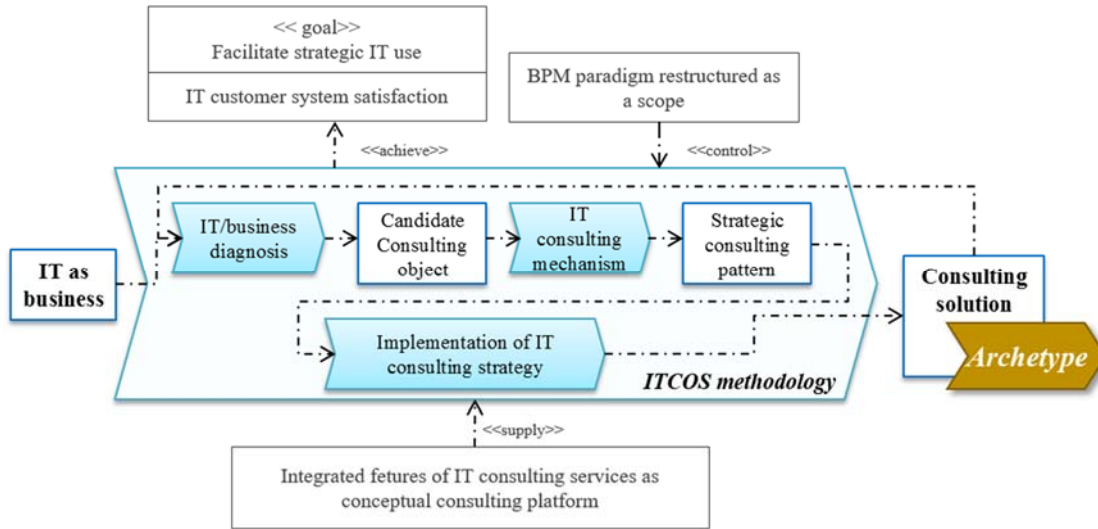m level processes as a whole, the level of the adaptation/incorporation processes, and the level of the tasks of each of these sub-processes - they have been modelled as composite tasks. Each IT organisation can conveniently extend them based on established practices in the use of business modelling techniques.

4.3   Consulting solution

Starting from conceiving IT as a Business, by applying the established methodological framework, a process of IT consulting methods is generated (Figure 9) and is composed of three major processes: IT/Business Diagnosis, IT Consulting Mechanism, and Implementation of the IT consulting strategy; each of these sub-processes is the result of applying the adapt/incorporate pattern to AMM, SAM, and BSC-IT, respectively.

This achieves the desired consulting solution that is two-fold: the generative process formalises the ***ITCOS Methodology*** (Figure 9) and the result of applying this methodology to the problem that is posed following the steps established by the process. This result materialises in the ***archetypes of IT consulting services***.
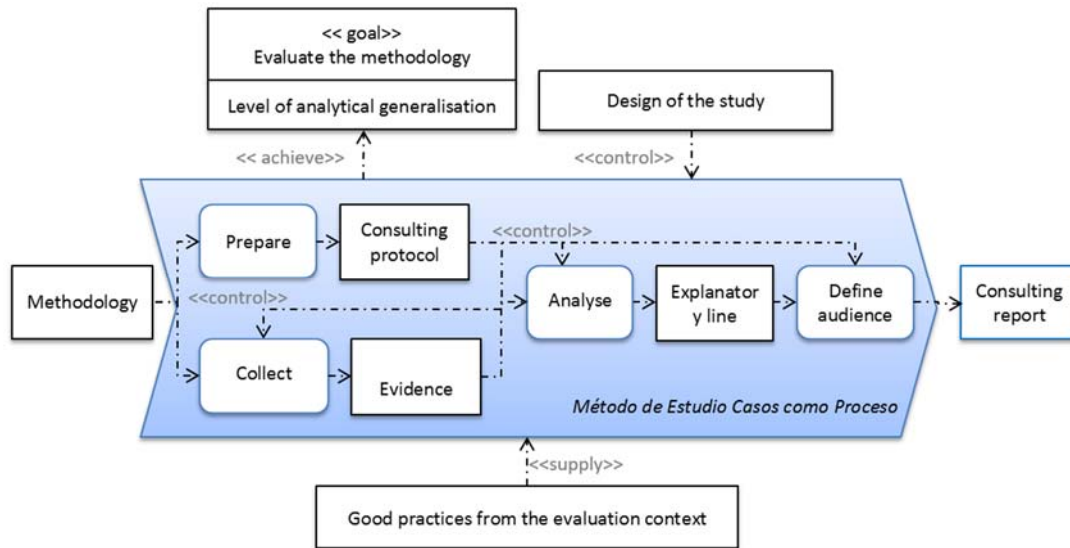
5.   Validation

Fig. 10. Design Of The Case Study Method As A Process

The evaluation of both the ITCOS methodology and the consistency of the methodological framework defined for its elaboration is conceived as an element of self-evaluation. The self-assessment states that its usefulness, quality, and effectiveness must be demonstrated by a properly executed evaluation method. The evaluation method chosen is the case study. From the point of view of the case study, the methodology for systematising IT consulting services is essentially a scenario characterised by the interactions of an IT consultant with a specific organisational context of Business Process Management, the information technology itself that is incorporated, and potential IT consulting actions that can be performed.

This scenario is called a consulting context. As a proposal for evaluation, a group of Cuban organisations belonging to the food production sector was selected.

The evaluation has been formalised by modelling it as a process (Figure 10). According to this process, an intervention protocol is obtained as a result of the preparation of the case based on the methodology [58]. This protocol will control the sub-processes of collection, analysis, and reporting of the case. The parts of this protocol are nomination of the cases, units, and context of analysis; access and classification of evidence; and implementation planning.

Under the control of this intervention protocol, we proceed to the collection of evidence.

The most significant types of evidence are documents, computer records, observations, and physical objects. The most complex activity of the process is the analysis of evidence, which is responsible for examining, categorising, tabulating, and testing any combination of qualitative and quantitative evidence. It requires the definition of strategies and analysis techniques. Finally, the results of the study should be communicated through the definition of the audience. The structure of the report conforms to the description, explanation, and judgement of the findings of the case. Audiences can be both the units of analysis and academic specialists.

5.1 Case study preparation

The preparation activity has the fundamental mission of establishing a protocol that will control the design and development of the case. The good practices that we have systematised by taking [58] and [81] as a starting point are formalising the channels of intervention in the context of consulting; controlling the formulation of questions throughout the process of execution of the case in two lines of analysis: a verbal line and reflexive line based on the Theory of Explanatory Design; and establishing clear boundaries between units of evidence collection and units of analysis.

The intervention protocol in the context of consultancy is defined as the set of activities that, under a calendar, the IT consultant performs with the objective of establishing the channels of intervention

in a specific organisational context of Business Process Management. These activities are defined by applying the Theory of Explanatory Design.

To address the selection of the instance in the consulting context, the research consortium proposal of [82] is analysed as a frame of reference for multilateral collaborations between companies and researchers that develop research projects in Design-Oriented Business Information Systems. Under the proposal of this consortium, the manufacturing sector in Cuba is explored, and the food industry is selected, particularly the industry dedicated to the production of food from animals. The main considerations for selecting this area are summarised in (1) the current process of organisational structure change in IT with the merger of two Ministries (Fishing Industry and Food Industry) into the new Ministry of Food Industry (MINAL); and (2) the prioritisation of projects linked to food production.

As a consequence, a contract is established between the Polytechnic Institute CUJAE of Havana and the MINAL of Cuba to formalise the intervention on three specific manufacturing organisations: PRODAL, the Dairy Complex of Havana ALIMATIC, and TELEMAR. From the analysis of the MINAL response and an exploratory study on the structure of the Ministry and of the IT service provider centres, the IT consultant decides to design the MINAL context as a single context of analysis.

The units of analysis are an essential process in case design. Therefore, we decided to establish three units of analysis: Ministerial IT, Business IT, and Academic-Solutions IT.

Once the context and the units of analysis for the MINAL case have been decided, the access and classification of the evidence should be organised for each of the collection centres according to the case design. Multiple sources of evidence have been defined (Table 5), which has allowed the application of data triangulation techniques to compare the reliability of the results with conceptual validity.

Table 5. Summary of the types of evidence to be collected and specifics of the units of analysis involved.

Evidence	How it supports the explanatory line / Unit of analysis
Documents	Helps to specify the official location and names of the sources of evidence. Corroborates other

	sources of evidence. Some allow direct inferences. / All
Digital records	Provides information on customers, markets, business processes, training levels of IT specialists, and types of IT incorporations. / All
Interviews	Used for the identification of the types of problems of IT consulting. The semi-structured or open interviews are used according to the classification of Sampieri [83]. Dubé & Paré [81] indicate that 95% of cases use them. / Ministerial IT and Business IT
Observation	Type observations are made, moderated according to the classification of [83]. This means that some of the activities that occur in these units of analysis are observed by the IT consultant. / All
Physical objects	IT infrastructure that supports the industrial machinery and the productive processes. / Business IT

The collection of case evidence is performed through applying each of the three IT consulting methods: the IT/Business Diagnosis Method, the Method for the Design of IT Consulting Mechanisms, and the Method of Implementation of the Strategy of IT Consulting. The objective of this action is to define the Candidate Consulting Objects, the Strategic Consulting Pattern, and the Consulting Solution.

5.2   Consulting solution as an explanatory and transferable model

The process of evaluating the Methodology for the Systematisation of IT Consulting Services (ITCOS methodology) concludes with the explanation of the consulting solution that has been obtained by applying this methodology for the design of an IT Consultancy Services Archetype process.

The consulting solution prescribed by this research has the duality of representing the archetypal process itself as well as each of the specific outputs that materialise in the IT initiatives. According to this, two archetypes of IT consulting service have been designed: the Redefine IT

Governance Model Archetype and the Retain Positioning in the Market Archetype.

The first archetype defines the general requirements as BMM-End constructs and the general components as a function of the BMM-Mean construct, reconceptualising the Business Motivation Model.

The second archetype, the Retain Positioning in the Market Archetype, proposes that the MINAL context maintains the exclusive positioning of the Business IT analysis unit in an environment that considers External Influences. To this end, both the PRODAL company and the Dairy Complex of Havana have exclusive markets for
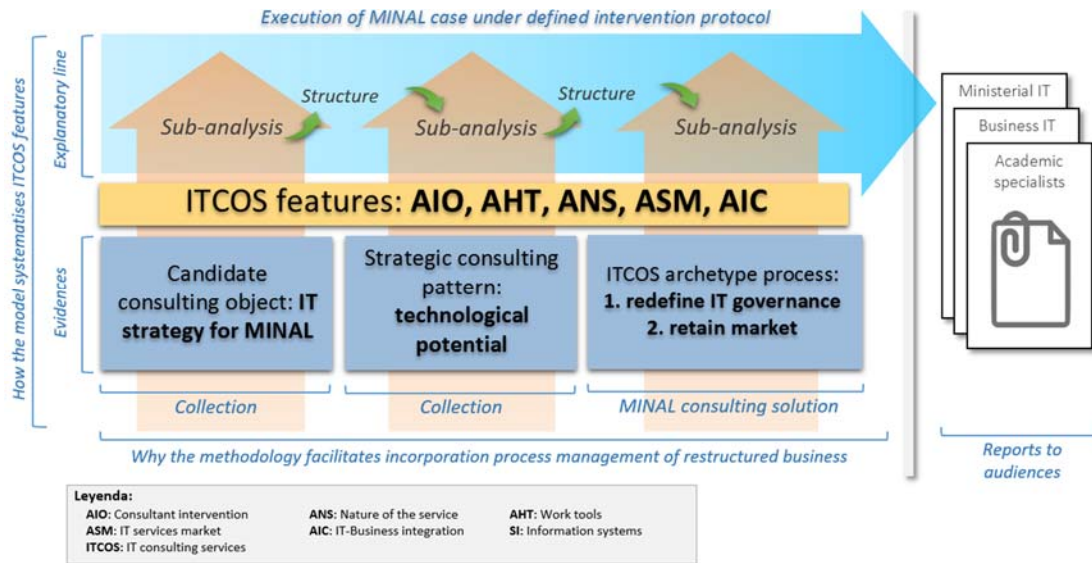

Fig. 11. Synthesis Of The Explanatory Model Of The MINAL Case.

According to this archetype, the strategic consulting actions that would allow the MINAL to organise IT governance from the latent centralised model is concretised in the merger of its IT service providers: ALIMATIC and TELEMAR. This objective is the first feature of the Restructured Business Processes paradigm that MINAL must have in order to implement BPM solutions and tools.

Likewise, as tactical actions, the archetype proposes the formalised implementation of agreements at the levels of IT services to be reached between the MINAL IT service providers and its business sector. Objectives to measure these tactical actions can be taken from the reference models provided by the scientific community - COBIT and ITIL - and which narrow the gap in the assimilation of lessons learned in other centralised IT governance contexts.

The prescription concerning which IT Policies and Rules need to be implemented must be established by consensus in each Business IT analysis unit, but under the requirement that all IT consulting policies be analysed and represented. Under this premise, the iterative implementation of the Implementation Method of the IT Consulting Strategy became a generalisable consulting practice.

dairy products and foods. Therefore, it is strategic for both environments to create capacities to diversify their production models, both towards product diversification and production volumes. In this sense, it is proposed to establish alliances at the Business IT levels with the academic sectors of Cuba as strategic consulting actions to incorporate the BPM paradigm and to explore the Cuban technological market for outsourcing IT services in other IT service provider centres. Both the Dairy Complex and PRODAL can take advantage of being exclusive suppliers of various business sectors with IT service provider centres in order to establish alliances and outsource applications and data integration projects.

Likewise, this second archetype proposes two courses of tactical actions: (1) to carry out replication studies on the technological capabilities that exist in the MINAL for the incorporation of the BPM paradigm; and (2) to establish that the terms of these strategic alliances with academic sectors are based on studies prescribing how to implement BPMS solutions within an academic environment.

Figure 11 summarises the explanatory model of the MINAL Case as a case model transferable to similar contexts of the Ministry of the Food Industry in other branches of food production.

5.3   Analysis of the results of the MINAL case study

After analysing the results obtained, it is possible to assert that the case study method is effective for confirming the validity of the proposed methodology. Its specific use as an evaluation method required the formalisation of a highly structured evaluation process that has guaranteed the internal consistency of the MINAL Case.

The proposed analysis strategy has made it possible to materialise the consulting solution following the theoretical propositions of this study. It did so by prescribing a set of IT consulting guides concerning improved theories about the practice and investigation of IT consultancy services systematised through the features of IT consulting services in each of the descriptive and prescriptive processes designed in this study and specified through diagrams of processes and directives.

Therefore, the Theory of Explanatory Design is part of this renewal of the incorporation of IT, and we consider that the consulting solution of the MINAL Case guarantees its rigor under this explanatory model. In addition, the evaluation process and its results are transferable to other contexts similar to the MINAL Case and constitute a revelatory documentation about the impact that changes of organisational structure have on IT incorporation.

6.   CONCLUSIONS

This paper presents the results of a study in the field of IT consulting services in which a methodological framework has been developed to systematise the specification of IT consulting services under a methodological framework that generates IT artefacts integrated and modelled as processes. This framework constitutes a reconceptualisation based on a set of reference frameworks in the field of the BITA and of IT governance. This reconceptualisation process has been carried out from a pattern that adapts and incorporates them into a coherent system of consulting processes.

As a result of applying this methodology in a case study, we obtained a set of generalisable elements seen as a concept and a solution to this specific proposal. The e-manufacturing elements, the BPM Paradigm itself, and the SOA paradigm are generalisable elements seen as a concept; meanwhile, manufacturing with flexibility, vertical normalisation of processes, and manufacturing elements as services represent the generalisable elements as a solution.

The contributions of this research are (1) the application of an inductive method to a specific proposal for the integration of business processes and production processes in an academic laboratory environment; (2) the proposal of a methodological framework in IT consulting; (3) the design of a methodology for the construction of IT consulting solutions that contemplates the strategic alignment of IT with the business. This methodology is prescribed as a result of obtaining three IT consulting methods from the aforementioned methodological framework; and (4) the evaluation of the methodology by designing a process that models a case study method.

The main novelty of the methodological framework in IT consulting is how it manages to integrate a set of methodological norms existing in the scientific community according to the features of IT consulting services.

Thanks to its application to the proposed case study, it has been possible to verify its consistency and generalisation such that it can be applied in different scenarios.

The following are identified as aspects of the research that remain pending: evaluate the intervention of the IT consultant from the perspective of groups of consultants and their competencies to intervene in a work system; explore and extend to other methods of IT value management the core of the IT consulting process system of the methodological framework; and develop specific guides for the implementation of IT governance models by designing IT artefacts for the integration of the data sources of the indicators that measure the objectives and goals of the IT consulting strategy.

Regarding future lines of work that give continuity to this research, it would be very useful to scale the methodology towards a methodological model developed through the systematisation of the lessons learned in the execution of the defined but redesigned evaluation process for different typologies of unit design and contexts of analysis.

ACKNOWLEDGMENTS

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