Article

Enterprise Architecture, IT Service Management and Service Oriented Architecture: relationships, approaches and operative guidelines (part 2 of 2)

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Abstract
*Enterprise Architecture, IT Service Management (and Governance) and Service Oriented Architecture are current topics, widely discussed in the information technology departments and professional publications. In addition, many companies have been (or are) involved with the adoption of at least one of these innovations. While each of these elements can be considered in its own right, it is in their relationships, and more or less strong intersections, that interesting opportunities and synergies can emerge, potentially even with some specific issues to manage. The focus of this **two part** article is just that: to show the relationships, approaches and operative guidelines related to the synergic adoption in an IT organization and/or in an Enterprise of concepts from the Enterprise Architecture (EA), IT Service Management (ITSM) and Service Oriented Architecture (SOA) domains.*

Keywords
Enterprise Architecture, EA, IT Service Management, ITSM, Service Oriented Architecture, SOA

Introduction

If the **first part** of this article the relationship between Enterprise Architecture (EA), IT Service management and Governance (ITSM) and Service Oriented Architecture (SOA) was introduced, briefly describing each of the topics considered in their own right and in three couples (EA and ITSM, ITSM and SOA, EA and SOA).

In this **second part**, the “full” relationship between all the topics in scope is analyzed, covering also some practical approaches and operative guidelines, frequently emerged from consulting and delivery projects.

At the end, some conclusions and directions for further research are also presented, in order to support additional directions of analysis on these subjects.

Relationships between EA, ITSM and SOA

Even on the basis of what already discussed in the **first part** of the article, this section will introduce concepts and considerations related to the synergic adoption (typically in an incremental and “step by step” approach) of initiatives in the three areas EA, SOA and ITSM. There are in literature few resources that explicitly describes the relationships between EA, ITSM and SOA considering at the same time all these three domains. See for example [5.3] and [8.3] in the “References” section.

Considering the three main conceptual knowledge areas introduced in these article, and an “as-is” vs. “to-be” evolutionary perspective, a combination of 8x8 theoretical “cases” can arise, as shown in Table 1, in which the rows are titled with a current situation, and the columns are titled with a future required and desired situation (the presence of “E” – for EA –, “I” – for ITSM – or “S” – for SOA – means the existence of some corporate or enterprise level explicit initiatives in the corresponding area):

	I need and want ("to")							
I have ("from")	`---`	`E--`	`-I-`	`EI-` (1)	`--S`	`E-S` (3)	`-IS` (2)	`EIS` (4)
`---`		C2	C4	C2'	C5	C2''	C6	C3
`E--`		$C1_1$		C7		C8		C9
`-I-`			$C1_2$	C10			C11	C12
`EI-`				$C1_3$				C13
`--S`					$C1_4$	C14	C15	C16
`E-S`						$C1_5$		C17
`-IS`							$C1_6$	C18
`EIS`								$C1_7$

Legend: **E**: Enterprise Architecture; **I**: IT Service Management; **S**: Service Oriented Architecture
(#): Numbers in parenthesis after the columns labels identify the type of conceptual "intersection" in scope:
(**1**): Relationships between EA and ITSM (**2**): Relationships between ITSM and SOA
(**3**): Relationships between EA and SOA (**4**): Relationships between EA, ITSM and SOA

Table 1: Initiatives roadmap

All the cases labeled with "**C1**" in the table (along the main diagonal, from $C1_1$ to $C1_7$) represent some increase in the "level" (or "maturity", or "compliance") in one or more dimension(s), however, already existing, without introducing new initiatives in other areas. The level of maturity can be measured adopting specific approach and methodologies. For example, in the context of EA, TOGAF references some "Capability Maturity Models" (CMMs) like the Capability Maturity Model Integration (CMMI), and in the context of SOA a maturity assessment can adopt the OSIMM model (Open Group Service Integration Maturity Model) or the IBM SIMM – Service Integration Maturity Model.
The grayed out cases represents not so interesting situations, in which the initiatives in one or more of the three areas in scope will be ended (for example the wish to pass from an "`EI-`" to an "`-I-`" situation, that is ending any initiative – and/or related outcome – mainly defined in the EA area).
The other cases can be described as follows (considering that some considerations are certainly applicable in more than one case):

- Cases "**C2**", "**C2'**" and "**C2''**": In **C2**, the introduction of EA initiatives is the key driver of this case, starting from a "greenfield" situation, so the best practices related to the adoption of EA (assessments, principles, etc) can be leveraged. This can be considered true also for the cases **C2'** and **C2''**, in which the introduction of EA initiative is accompanied with ITSM-related initiatives (C2') or SOA-related initiatives (C2''). Considering that also in C2' and C2'' EA-related initiatives are planned, probably these EA initiatives can be considered the main driver, and so the EA Governance Processes eventually introduced.
- Case "**C3**": starting from a "greenfield" situation, like in C2 (or C2' and C2''), a complete set of initiative in EA, ITSM and SOA areas are started here. Obviously this is not an "incremental" or step-by-step approach, and generally it's not the recommended one, considering also the large organizational impact. Probably it's better to consider an intermediate transition passing through the cases C2' or C2'' (if the Enterprise Architecture need to stay as a very strong demand), or evaluate other roadmaps considering for example a transition passing through "`-I-`", "`--S`" or "`-IS`" before reaching "`EIS`".
- Case "**C4**": the introduction of ITSM initiative is the key driver of this case, still starting from a "greenfield" situation like in the previous introduced cases. In this situation the guidelines related to the introduction of ITSM initiatives and related frameworks can be adopted, following the international best practices and the recommended frameworks considering also the technical platforms adopted in the company; usually is not recommended to discard "a priori" and completely the suggestions of the vendors suppliers of these technologies in relation to the ITSM area.
- Case "**C5**": the introduction of "SOA" principles, architectural design patterns, Center of Competence etc. is part of this case. Considering the emphasis that in the last years has been placed on SOA, a lot of well tested best practices are already available to start this kind of initiative. Here are some of these:
    - Consider and evaluate the best "SOA Entry Point(s)" for your organization: People (Portals and collaboration), Informations (data bases and data analysis), Processes (Business Process management, workflow engines, etc), Application Services Reuse, Integration and Connectivity (leveraging patterns like the ESB – Enterprise Service Bus)

    - Make an assessment, leveraging some capability framework (for example the Open Group OSIMM or the IBM SIMM).
    - A “strong” stakeholder is fundamental to start a SOA initiative; in particular, the engagement and active participation from Business Stakeholders
    - Adopt some level of SOA Governance. In particular, assign service domain owners and implement governance mechanisms to ensure that corporate SOA strategy gets implemented in delivered and also in acquired applications.
    - Divide the enterprise into business components (cohesive activities which collaborate with other business components).
    - Develop a SOA strategy which defines the business context, pain points, reference architecture and a living roadmap for SOA adoption for a line of business and/or enterprise. The definition of a set of well documented “SOA principle” is really considered an enabler and a solid driver to implement any SOA initiative.
    - Extend systems development methodology to address creation of business services with corresponding design attributes for services. Approaches of Service Oriented Analysis and Design (SOAD) like the IBM SOMA – Service Oriented Modeling and Architecture – are recommended (with all the related technical and methodological best practices) to integrate the “business as usual” analysis project phase in the Software Development Lifecycle.
    - Study, adopt and reuse the SOA Design Patterns (see for example [4.2] and the IBM Patterns for e-business at http://www.ibm.com/developerworks/patterns/).
- Case “**C6**”: in this case we have the “logical OR” of the previously introduced cases C4 and C5, with the introduction of both ITSM and SOA. In this case it’s possible to leverage the considerations already introduced in cases C4 and C5, plus the ones described in the section “Relationships between IT Service Management and Service Oriented Architecture” of this article. As already recommended for example in [6.3], it is important that organizations bridge the gap between SOA plans and ITSM plans, so that they can benefit from the fusion of these initiatives. The earlier these initiatives are aligned, the more successful the overall implementation will be – and there will be fewer organizational issues and politics. Excellent starting points are a steering committee (o” Center of Excellence”) that bridges these two initiatives and a complementary communication and collaboration framework to weave the two together.
  Most organizations today have some type of an SOA initiative at some level of maturity. Many have also taken on ITSM-related initiatives (frequently using the guidelines of the ITIL). As well synthesized in the already quoted reference [6.3], as organizations embark on SOA and ITIL initiatives, they will quickly question the convergence of these two initiatives and see how one can be more effective with the other. It’s a bit of a chicken-and-egg problem – should you do ITIL first or SOA? And there’s probably no single correct answer. ITIL can be an SOA enabler, and should probably be implemented first (i.e. passing from a case like “C4”). But also in this case only a thorough analysis and assessment of the “enterprise context” (vision, needs, strategies, plans, etc.) can drive to the best choice.
- Case “**C7**”: in this case there are some initiative in the EA area already started, and there is the need and willingness to begin some other initiative in the ITSM domain. In this situation there is the availability of a reference framework, which is a good thing. According to [5.1] – considering for example TOGAF as a reference framework for EA and ITIL as an ITSM framework – besides a number of similarities between the frameworks, there are also a number of differences. Although both frameworks contain a quality loop, these loops do not completely overlap. The two main differences are:
    - Developing business architecture is part of the TOGAF framework. The scope of ITIL is limited to developing an effective and efficient IT department, whilst developing business architecture is out of scope in ITIL.
    - Running IT operations and delivering actual IT services are within the scope of ITIL (as demonstrated in the Service Operation volume). TOGAF does not cover the development and maintenance of a run time environment. How services are actually produced and delivered is not covered in TOGAF.

  These kind of considerations must be taken into strong account in this scenario.
- Case “**C8**”: this case is similar to the case “C7”, but the new initiatives on top of EA are in the SOA domain. So, the focus here is the introduction of SOA principle in an already define (at least at some level) EA framework. In this case it’s recommended to extend and specify a set of SOA principles “on

top" of the (presumably) already established principles of EA. From a conceptual point of view the SOA Governance the SOA (and SOA Governance) principles are fully contained in the EA Principles, but in the SOA (governance) context there is a more detailed and "expanded" set of SOA-related principles. It's also suggested an alignment between the EA management processes and the SOA governance process, typically in terms of Vitality, Compliance/Review, Communications, and a review of the involved roles and organizational structures. If some EA processes are already "in place", we can consider that the SOA Governance processes are (usually) "specialized instances" of the corresponding EA Management Processes, when SOA concepts are strongly involved.

- Case "**C9**": in this case we have the "logical OR" of the previously introduced cases C7 and C8, with the introduction of both ITSM and SOA in an existing "EA" context. In this situation EA defines the overall reference framework, and ITSM and SOA considerations, processes, best practices and patterns need to be integrated in this framework. Some considerations already introduced in this article can be applied in this case (see cases C7 and C8). It would also be appropriate to consider and evaluate the option, starting from the "`E--`" situation, to pass in an intermediate condition like "`EI-`" or "`E-S`". If this is consider a valid option, some drivers must be evaluated in choosing between an initial transition on a "`EI-`" versus an "`E-S`" condition. First of all, the predominance of ITSM wants and needs versus the SOA ones in the corporate strategy. If one is clearly dominant over the other, that is the way to follow. Otherwise, like already mentioned in case C6, ITIL can be an SOA enabler, and should probably be implemented first, at least at an initial level. In relationship with the integration of ITSM and SOA into EA, the source [5.3] contains additional interesting information.
- Case "**C10**": this is the dual situation as compared to case C7. In this scenario there are some initiative in the ITSM area already started, and there is the need and willingness to begin some other initiative in the EA domain. The considerations already introduced in case C7 are useful also in this scenario, considering however that here the some level of ITSM is already in place, and that we need to integrate "on top" some EA-related element, probably starting from the technology architecture (speaking for example the "TOGAF language").
- Case "**C11**": in this scenario the focus is the introduction of SOA initiatives in a context in which there are some ITSM initiative already in place. As the loosely coupled, composable SOA services come into play, the service support and service delivery processes (usually part of an ITSM framework) can manage and support them per the ITSM guidelines (for example adopting the ITIL reference model). As a simple example (see also [6.3]), what would the incident management process be on a "get currency rate" SOA service built using technology such as Web services? On the flip side, you can implement ITSM services such as DBA support in a more service-oriented manner, learning from the concepts of SOA. If you think about it, SOA and ITSM are less likely to be successful without each other. ITIL (or IBM PRM-IT/ITUP) can be the glue that ties them together.
  According with these principles, the availability and adoption of a SOA Governance framework coherent with the chosen ITSM framework is certainly to be considered as a best practice.
- Case "**C12**": in this case we have the "logical OR" of the previously introduced cases C10 and C11, with the introduction of both EA and SOA, and the considerations already introduced in this section of the article can be applied. It's important to consider the fact that here the "entry point" (or – better – the "starting point") is the ITSM: some initiatives is this area are already deployed, and the desired situation includes – on top of ITSM – both EA and SOA. The existence of a model for managing the IT (by the current ITSM initiatives) can be a powerful driver to adopt an EA and SOA joint approach. In particular, the IT domains defined in the ITSM context can be a driver to define the technology layer of the EA and of the SOA reference model, and likewise the governance process defined in the ITSM context can be an entry point to define EA and SOA Governance models. Also the organizational roles already defined in the IT context can become part of the whole set or EA (and SOA) roles.
- Case "**C13**": the introduction of SOA-related initiative in a context in which there are a set of EA and ITSM elements already defined is the main focus of this scenario. So, this case can be considered similar to the other cases that involving the adoption of SOA "on top" of something already defined, like in the cases C8 (from "`E--`" to "`E-S`") and C11 (from "`-I-`" to "`-IS`"), and the considerations already introduced talking about C8 and C11 can be applied. Here the main reference model should be the EA framework together with the ITSM adopted reference model, considering that SOA comes next and must be placed in an already defined – at least to some extent – context.
- Case "**C14**": this is the dual situation as compared to case C8. In this scenario there are some initiative in the SOA area already started, and there is the need and willingness to begin some other

initiative in the EA domain, attaining (like in C8) the state "E-S". It's important to consider that the entry (and starting) point here is the SOA initiatives already in place, but some considerations from case C8 can still be applied, in particular in relationship to principles and governance processes. SOA domains are a subset of the EA domains. For example, SOA is not concerned with the development of business architecture. Instead, it uses the outcome of business processes and other business architecture artifacts, such as Component Business Modeling (CBM), as input to identify business services. In contrast, EA is concerned with the development of business architecture, including business processes and CBM among others. Similarly, from an Application Architecture point of view, SOA is concerned with the modeling and development of services and the components that realize them, while the EA architecture deals not only with SOA-specific artifacts, but with other components, packages, and systems for the whole enterprise. When analyzing the Technology Architecture, the SOA ESB is just one of many integration mechanisms an EA may need to address. Note also that – for example – SOA doesn't address Content Management Architecture, while EA does. Another area of overlap is security and service management. In fact, SOA security is a special case of the total security that EA must specify, and SOA Service Management and Monitoring is a subset of Systems Management that EA must deal with.

- Case "**C15**": this is the dual situation as compared to case C11. In this scenario there are some initiative in the SOA area already started, and there is the need and willingness to begin some other initiative in the ITSM domain, attaining (like in C11) the state "-IS". In a SOA-enabled scenario there is a desire to introduce ITSM elements, for example by adopting ITIL (or IBM PRM-IT/ITUP) guidelines. The considerations already introduced in the section "Relationships between IT Service Management and Service Oriented Architecture" can be applied in this context. Considering the probable "dominance" of SOA (as a starting point) in this scenario, we can leverage any model of "SOA Governance" (specially "run-time" governance) already available as possible baseline to the definition of IT governance and management models.
- Case "**C16**": in this case the target is a complete set of initiative in the EA, ITSM and SOA areas, starting from a set of SOA initiative already in place. The starting point can be considered the deployed SOA-related initiatives, also in terms of governance processes if available. On top of these set of elements, there is a willingness to grow in the Enterprise Architecture and IT Service Management directions. It's important to assess the current level of "SOA Compliance" or "SOA Maturity" of the organization, and the adoption of maturity models like the OSIMM can be very useful. The evaluation of the current and "to-be" SOA maturity level and a good gap analysis are strong driver to define a roadmap towards EA and ITSM. Also in this case you might want to consider intermediate scenarios like "E-S" (as in the case C14) or "-IS" (as in the case C15) before reaching the target "EIS".
- Case "**C17**": this case is "complementary" with respect to the case C12. Here the transition (or "gap") is from "E-S" to "EIS", with the adoption of ITSM initiatives in a context of EA already SOA-enabled. In this scenario the context it's probably well defined, considering the initiatives already deployed in EA and SOA domains, so there are a set of principles and guidelines to follow in the definition of the ITSM framework. According also with [5.3], a well developed and documented EA is a very valuable basis for ITSM. EA provides an overview of the IT infrastructure, software components and applications, the support of business processes and customer processes, as well as the dependencies between these key components. So, nearly all of the core operational processes identified by ITIL will benefit from this.
- Case "**C18**": this case is "complementary" with respect to the case C9. Here the transition (or "gap") is from "-IS" to "EIS", with the adoption of EA initiatives in a context with ITSM and SOA already deployed. Apart from the different starting point, a lot of considerations described in case C9 are still applicable. Here the definition of the EA framework can largely take advantage of what has already defined, and must be consistent with what has been done.

For each "target state" we can also leverage the considerations introduced in the corresponding section of this article (including this one):

Target state "E--": Section "Enterprise Architecture"
Target state "-I-": Section "IT Service Management"
Target state "--S": Section "Service Oriented Architecture"

Target state "EI-": Section "Relationships between EA and ITSM"
Target state "E-S": Section "Relationships between EA and SOA"
Target state "-IS": Section "Relationships between ITSM and SOA"
Target state "EIS": Section "Relationships between EA, ITSM and SOA"(this one)

From a gap-analysis point of view, the previously described cases can also classified and tabulated as follows. The symbols and abbreviations adopted are the same of the Table 1. This kind of representation can be useful as a tool to support the definition of a transition roadmap given a set of specific gaps.

From ("as-is")	To ("to-be")	Gaps (*)	Case
---	E--	E	C2
---	-I-	I	C4
---	EI-	EI	C2'
---	--S	S	C5
---	E-S	ES	C2''
---	-IS	IS	C6
---	EIS	EIS	C3
E--	E--	-	$C1_1$
E--	EI-	I	C7
E--	E-S	S	C8
E--	EIS	IS	C9
-I-	-I-	-	$C1_2$
-I-	EI-	E	C10
-I-	-IS	S	C11
-I-	EIS	ES	C12
EI-	EI-	-	$C1_3$
EI-	EIS	S	C13
--S	--S	-	$C1_4$
--S	E-S	E	C14
--S	-IS	I	C15
--S	EIS	EI	C16
E-S	E-S	-	$C1_5$
E-S	EIS	I	C17
-IS	-IS	-	$C1_6$
-IS	EIS	E	C18
EIS	EIS	-	$C1_7$
(*): an "empty" ("-") gap means increased compliance and maturity on the same dimensions and domains of the "as-is" scenario			

Table 2: Gap analysis to define a roadmap

The transition (or "gap-analysis") model defined here can also be expressed in a graph-diagram (a state transition diagram) as in Figure 11, in which the nodes are the "as-is" and "to-be" states, and edges represent the transition, i.e. the "cases" (scenarios) previously listed in Table 1 and Table 2.

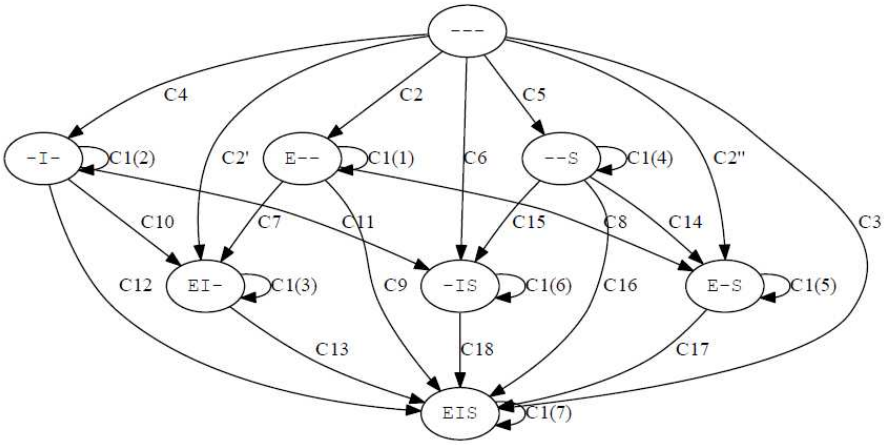

Figure 11: Possible "roadmap" states and transitions

(Note: this diagram was produced automatically starting from a textual representation like the one previously introduced in Table 2, using the open-source graph drawing system *Graphviz*, http://graphviz.org/, leveraging the "*dot*" layout for directed graphs).

Looking from the top towards the bottom at the graph in Figure 11, it's possible to identify four different level of "maturity":

- Maturity level "1": the "`---`" state (at the top of the picture) in which there are no explicit initiatives in place to address EA, ITSM, SOA
- Maturity level "2": The three states at the second level ("`-I-`", "`E--`" and "`--S`") in which some initiative are already started in one (and only one) of the three areas
- Maturity level "3": The three states at the third level ("`EI-`", "`-IS`" and "`E-S`") in which there are a couple of synergic areas of initiative in place
- Maturity level "4": the "final" state "`EIS`" at the bottom of the graph, in which there are a set of initiatives in all the three areas: EA, ITSM and SOA.

Given this concept, we can observe that some transitions (i.e. initiatives aimed at bridging the gap between the "as-is" and the "to-be" state) "pass through" (cross) more than one level of maturity (for example the transition labeled with the tag "C3", from the state "`---`" to the state "`EIS`"). Such initiatives will usually have costs, impacts and risks higher than "step by step" initiatives.

A practical example of a roadmap defined by a set of "step by step" initiatives may be as follows:

- From the state "`---`" to the state "`-I-`" (case **C4**)
- From the state "`-I-`" to the same state "`-I-`" (to refine the ITSM model) (case **$C1_2$**)
- From the state "`-I-`" to the state "`EI-`" (case **C10**)
- From the state "`EI-`" to the same state "`EI-`" (to refine the EA and ITSM models) (case **$C1_3$**)
- From the state "`EI-`" to the state "`EIS`" (case **C13**)
- From the state "`EIS`" to the same state "`EIS`" (to refine the EA, ITSM and SOA models) (case **$C1_7$**)

This kind of approach can be extended considering that for each "state" may be several increasing levels of "compliance" and adoption, measurable with specific capability models (the "refine" term used in the previous example mean exactly that).
The study [8.3] suggest that many SOA adopters have realized that they need to adopt EA before a wide-scale SOA adoption. These findings also suggest that while a company may adopt SOA initially without adopting EA, a wide-scale adoption/assimilation of SOA requires adoption of EA. So, considering EA as a "prerequisite" for SOA we can also propose a different example of "evolution roadmap", like this:

- From the state "`---`" to the state "`E--`" (case **C2**)
- From the state "`E--`" to the same state "`E--`" (to refine the EA model) (case **$C1_1$**)

- From the state "E--" to the state "E-S" (case **C8**)
- From the state "E-S" to the same state "E-S" (to refine the EA and SOA models) (case **$C1_5$**)
- From the state "E-S" to the state "EIS" (case **C17**)
- From the state "EIS" to the same state "EIS" (to refine the EA, ITSM and SOA models) (case **$C1_7$**)

So, this model can be an useful aid to the definition of structured roadmaps with the activation of synergic initiatives in EA, ITSM and SOA areas.

According also with [5.3], Enterprise architecture supports organizational engineering in many ways. Service orientation is regarded as dominant operations model for service providers – within and beyond IT. As a consequence, it is important to integrate service management and service orientation into enterprise architecture. But – as already described and modeled – this kind of integration require a "roadmap", specialized depending on the "starting point" or current situation of the enterprise (see for example the previously introduced Table 1). And this roadmap must be aligned with (or, even better, part of) the corporate strategy plan. To design this roadmap, it's important to be able to leverage the best practice and guidelines of the selected EA, ITSM and SOA reference models and framework adopted, starting from an accurate and complete assessment of the context in scope.
A possible ideal target situation is depicted in the following Figure 12.

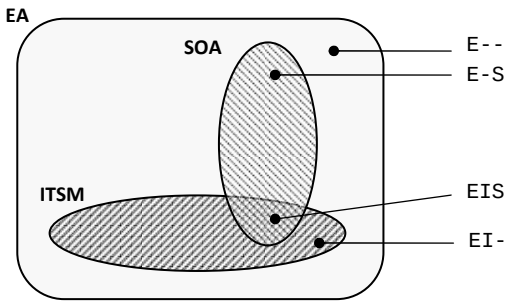

Figure 12: A possibile target scenario with EA, ITSM and SOA

In this scenario there are EA, ITSM and SOA initiatives defined and adopted, but the focus is on the fact that both SOA and ITSM are "fully contained" in the EA reference framework (compared for example with the generic representation of **Error! Reference source not found.**). In this "ideal" target model there is no evidence of states such as:

- "-I-": ITSM alone, without EA/SOA-related initiatives
- "--S": SOA alone, without EA/ITSM-related initiatives
- "-IS": ITSM with SOA, without EA-related initiatives

These "states" must be considered (speaking from an ideal perspective) "transient" and intermediate ones.

The significant areas of the diagram are as follows, considering the partition defined by the three depicted sets EA, SOA and ITSM (with SOA and ITSM contained in EA, and with an intersection between SOA and ITSM):

- Area labeled with "E--": Elements specific only to the EA domain (for example some specific business architecture models or processes, Business goals, mission and objectives, Enterprise information model for the business)
- Area labeled with "E-S": SOA elements and initiatives that "lives" inside the EA framework, but without explicit references and/or links with the ITSM (for example a SOA reference architecture, or a service modeling process with related guidelines)
- Area labeled with "EI-": ITSM elements and initiatives that "lives" inside the EA framework, but without explicit references and/or links with SOA (for example specific ITIL concept and/or processes adopted in the enterprise to manage the IT)

- Area labeled with "EIS": Elements in which there are some explicit intersection between ITSM and SOA, all still inside the EA framework.

Between the four area defined in this model (Figure 12), six possible relationships can be identified, analyzing the boundaries between an area and each other, as tabulated in Table 3:

Relationship between:	E-S	EI-	EIS
E--	Case "**a**"	Case "**b**"	Case "**c**"
E-S	-	Case "**d**"	Case "**e**"
EI-	-	-	Case "**f**"

Table 3: Relationships between partitions of an ideal target model

These cases are briefly analyzed below.

- Case "**a**": in this case the focus is on the possible relationships between initiatives and/or elements in the SOA domain "E-S" (that is always part of the EA domain in this "ideal" scenario) and other initiatives and/or elements part of the Enterprise Architecture domain "E--", not characterized by SOA aspects/principles. This boundary must be leveraged with a "managed" approach: for each new "candidate" initiative in one area/domain, it's import to verify if there are (at least at some level) impacts on the other area/domain. For example: the introduction of a new element in the business architecture metamodel can be initially candidate as member of the "E--" partition, but with further analysis you may find that the initiative actually has two components, one of which is more properly pertaining to the domain "E-S", for example because it requires the application of some SOA principles. With this kind of guideline, the jointly model EA+SOA can grow in a structured and consistent way. Obviously this guideline is applicable to the extended context of the whole cases described here.
- Case "**b**": in this case the focus is on the possible relationships between initiatives and/or elements in the ITSM domain "EI-" (that is always part of the EA domain in this "ideal" scenario) and other initiatives and/or elements part of the Enterprise Architecture domain "E--", not characterized by ITSM aspects/elements. Also this boundary must be leveraged with a managed approach, "testing" any new candidate initiative for the right location in the model, so you can properly adopt the good/best practices of the domain/area in scope.
- Case "**c**": relationships between "pure" Enterprise Architecture initiatives and initiatives in the common area "EIS" (for example elements like SOA governance processes for SOA assets operational management ITIL compliant). On top of the new candidate initiative positioning in the right place, it's important to consider here also the drivers that can push the "migration" (or "extension")of some initiative from the "E--" domain to the "EIS" one. For example, an EA initiative initially aimed at supporting the design of traditional (legacy) applications is extended to support the design (plus management) also of SOA application.
- Case "**d**": this scenario defines the possible relationships between elements in the SOA domain (part of the EA domain) and elements in the ITSM domain (also part of the EA domain in this ideal model). There may be migration (or extensions) of initiatives between domains, and this model can also allow an optimal positioning of new candidate initiatives.
- Case "**e**": in this scenario the focus is on the possible relationships, migrations and/or extensions of initiatives and elements between the SOA domain and the SOA+ITSM domain (i.e. between "E-S" and "EIS"). For example, an initial element designed to support (in an EA "global" framework) the governance of SOA assets is enriched with additional capability at ITSM level, so the position of this element "migrates" from the "E-S" domain to "EIS".
- Case "**f**": in this scenario the focus is on the possible relationships, migrations and/or extensions of initiatives and elements between the ITSM domain and the SOA+ITSM domain (i.e. between "EI-" and "EIS"). For example, an initial element designed to support (in an EA "global" framework) the management of EA assets is enriched with additional capability at SOA level, so the position of this element "migrates" from the "EI-"domain to "EIS".

Also this model can become an operational tool to design a synergic corporate-level approach to a real EA, ITSM and SOA adoption.

Considering a given “as-is” (and related “to-be”) scenario, in terms of maturity on the three domains EA, ITSM and SOA, an organization can leverage the introduced models to support the definition of a roadmap towards more aligned and proactive initiatives. One key element to consider in the definition (design) of these kind of initiatives is the dual nature of each one project activity in this context:

- “Design time” aspects, related mainly to the analysis, definition, project planning and (in a word) “design” of the initiative
- “Run-time” aspect, in which the focus is on the enablement and measure (feedbacks and so on) of the running initiative

This kind of separation is usually expected in IT and SOA Governance projects, in which usually we can identify a (more or less) clear separation between these two main project phases. But this is true – in a more general point of view – also for joint initiative in EA, ITSM and SOA domain, not only considering the “governance” related aspects, but all the elements of the initiative. There are nearly always the coexistence of design-time and run-time aspects that require specific care and support. Considering the different “roadmaps and transitions” already introduced (see for example Figure 11), for each project initiative designed to support an evolution in the company EA, ITSM and SOA maturity levels, both design time aspect and run time aspect need to be considered. Some examples of these kind of project elements are as follows (this list can also be used as a practical “check list” to verify and integrate a specific initiative project plan in the EA, ITSM and SOA domain):

- At Design Time (usually in a “Plan” and “Define” project/initiatives phases)
    - Gather and Understand Current State Documentation
    - Identification and Selection of one or more reference frameworks and delivery processes
    - Kickoff meetings
    - Specific EA and/or ITSM and/or SOA “mission & vision” plus guiding principles formalization
    - Assessment of the current “as-is” situation (in the involved domains)
    - Requirements formalization and definition of the target “to-be” desired situation (“to-be” assessment)
    - Gap analysis (considering people, processes, technologies and informations elements)
    - Plan migration/evolution initiatives in the selected domains (EA, ITSM, SOA); detailed projects plans design, aligned with the IT/EA Strategy plans
    - Define specific “governance” elements (EA Governance, ITSM Governance, SOA Governance) and related supporting frameworks/models
    - Refine principles, on the different involved domains and at the different levels (business, application domain, information domain, infrastructure domain, etc.)
    - Define the Center of Excellence (or similar structure) in the EA, ITSM, SOA domains
    - Define the governance detailed elements (processes, guidelines, roles and responsibilities, etc.)
    - Define the required KPI and metrics to “measure” the defined governance elements
    - Define the required infrastructure and tools, designing also specific product evaluation/selection matrices (specific considerations must be done for each one of the EA, ITSM and SOA domains affected)
    - Design specific organizational change, if needed and consistent with the corporate vision and context
    - Develop communication plans and learning initiatives
- At Run Time (“Enable/Execute” and “Measure” project/initiative phases)
    - Execute the transition plan defined and designed
    - Initiate (governance) organization changes (CoE etc.)
    - Initiate education and mentoring plans execution
    - Implement defined and designed infrastructures and tools
    - Measure the effectiveness of the governance processes
    - Measure the effectiveness of organizational changes
    - Monitor and manage the operational environment
    - Review and refine the designed EA, ITSM SOA frameworks

The items listed above are to be adapted and "tailored" case by case, but can be leveraged to integrate and/or verify a set of initiative in the EA, ITSM and SOA domains.

A set of practical rules (and "best practices") related to the joint adoption of EA, ITSM and SOA are also described (or summarized if already previously introduced) in the following section "Conclusions and further research".

Conclusions and further research

One of the main consideration that emerge from the foregoing discussion is the importance of the "governance topic". The three analyzed conceptual domain discussed in this article (Enterprise Architecture, ITSM and SOA) can be "managed" by applying at some degree a set of governance principles, processes and best practices frequently organized in specific "Governance frameworks". For example:

- TOGAF Architecture Governance Framework or IBM Enterprise Architecture Consulting method governance processes in the context of EA (or another EA Governance framework)
- ITIL or IBM PRM-IT/ITUP in the context of ITSM (or another ITSM / Governance framework)
- The Open Group SOA Governance Framework or the IBM SGMM in the context of SOA (or another SOA Governance framework)

Figure 13, adapted from the Open Group SOA Governance Framework [4.7], shows the relationship between SOA Governance, EA Governance and IT Governance.

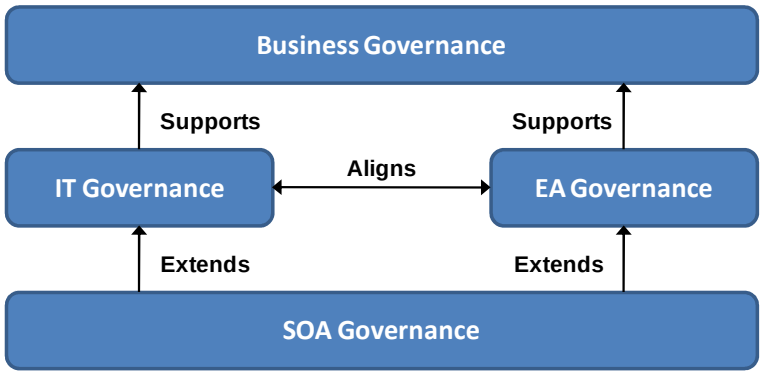

Figure 13: SOA Governance relationships

So, the "intersection" and "relationship" between EA, ITSM and SOA can also be considered from a specific "governance viewpoint", specializing some of the more general considerations already made.

Another useful result that can be "distilled" from considerations previously introduced is the maturity and "roadmap" model presented in the Figure 11. Leveraging this model an organization can analyze, design and produce an EA/ITSM/SOA Roadmap coherent with the objectives, needs and strategic directions.

A set of practical rules (and probably "best practices") can be adopted in real context in which EA, ITSM and SOA are involved at some level. In the following some of these "rules" are described, on the basis of what has been introduced and analyzed above in this article.

- Start with what you need and want, and on what you already have, taking in strong consideration the IT Strategy Plan.

  A model like the one already introduced in Table 1 (shown in another representation in Figure 11) can be adopted to position the current situation and to support the definition of a strategic evolution-

roadmap, case by case. The recommendation is to leverage assessment models and approaches to define the “as-is” and “to-be” states on the EA, ITSM and SOA domains.

- In a medium-long term vision, it’s better to address an EA strategy, in which SOA is included, supported by an ITSM framework. As mentioned also in [5.1], today’s IT is often a combination of many components that need to be aligned seamlessly in order to be conceived as ‘a service’ to the end user. The integration between SOA and ITIL in a powerful EA framework is probably the best target to aim at, as already synthesized in Figure 12 in the previous section of this article.

- Study your frameworks. EA, ITSM and SOA require frameworks and guidelines, like for example TOGAF (or the IBM EA Consulting Method), ITIL (or IBM PRM-IT/ITUP), the Open Group SOA governance Framework (or the IBM SGMM). Knowledge of these models is not obvious, and an appropriate communication process must be implemented, also with specific training plan in terms of audience, channels, contents and so on. And these elements must be appropriately supported and funded.

- Support the definition of your strategy and roadmap with assessments (leveraging also specific capability/maturity models) and guiding principles definitions. The formalization of a set of guiding principle is a well known best practice in the initial phases of EA, ITSM and SOA initiative, and the formalization of the “current” and “desired” situation is a preliminary step to define gaps and roadmaps.

Some extensions and enlargement of the considerations introduced in this article can be foreseen. For example, could be interesting to explore the relationships between the previously introduced triad of concepts and the IBM **Actionable Business Architecture** (see [8.1] and [8.2]).

The definition of Actionable Business Architecture starts from the Business Architecture context. Business Architecture defines and manages the valued relationships and interactions among the strategy, operating and IT models of a business. Business Architecture is, as reflected in Figure 14, at the intersection of these three models.

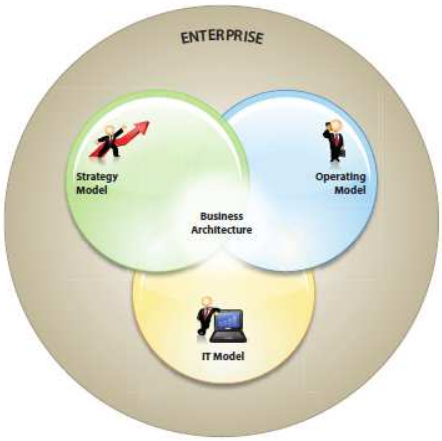

Figure 14: Positioning of Business Architecture within an Enterprise

In order to have the an Actionable Business Architecture, as created from the conceptual model outlined in the previous figure, the Business Architecture should be realized through prescriptive approaches guided by robust techniques. It should also be represented through a detailed set of rich artifacts.
Each of the three models, namely, strategy, operating and IT, should be realized and managed through the following respective contexts:

- The strategy model is best realized though a strategy and transformation (S&T) context that explores the details of the business strategy and captures the specifics through models and codified artifacts.

- Business Process Management (BPM) is a well known context and approach that addresses the operating model domain.
- The IT model can be realized through a variety of representations. Service orientation as a concept is most applicable across all three of the models and hence service oriented architecture (SOA) is chosen as the context to discuss the realization of the IT model. The overlap of SOA with the two contexts above clearly illustrates the extension and impact of SOA beyond just the IT model.

Actionable Business Architecture (Figure 15) exists in the intersections of the three business model contexts. It is considered “actionable” because it is codified through a rich set of artifacts and with the corresponding prescriptive approaches.

Figure 15: Actionable Business Architecture is the intersections of the contexts

Actionable Business Architecture is the IBM proposed solution to drive tangible value from the alignment of business strategy, operations and IT.

Representing Actionable Business Architecture at the intersection of these approaches is only the first step. There are several other requirements that come into play, e.g.:

- Appropriate coverage across the respective domains
- Prescriptive and supported by methods and techniques that lead to a high degree of repeatability
- Cohesively integrated among the approaches used for each context

The most traditional use of Business Architecture comes from Enterprise Architecture. Different EA frameworks have had the construction of BA as a prerequisite for quite some time.
Therefore it is very important to present the relationship between Business Architecture developed as part of an EA initiative and the “Actionable Business Architecture” described thus far (Figure 16).

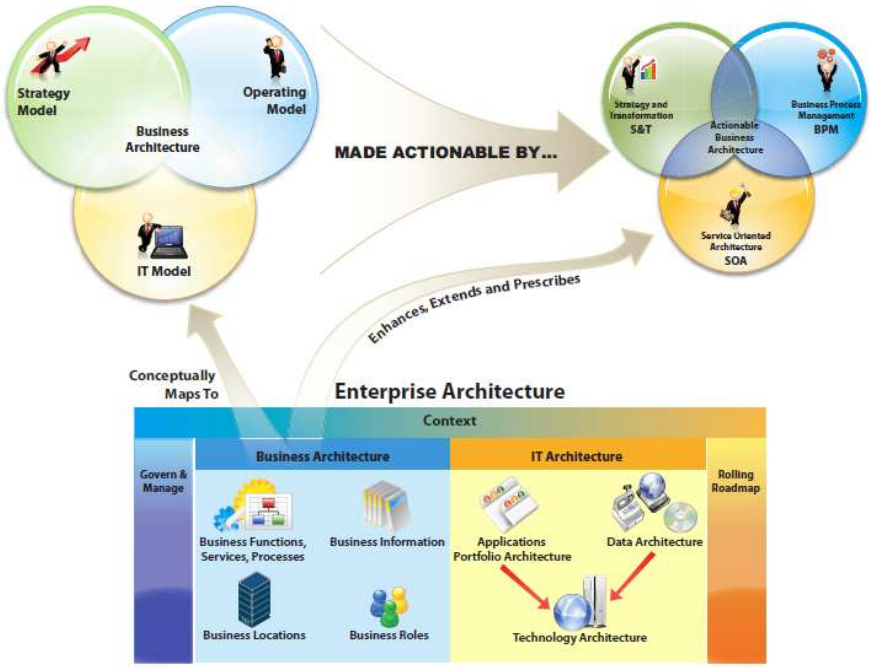

Figure 16: Conceptual Relationship between EA and Actionable Business Architecture

Actionable Business Architecture can and should be developed as part of every EA initiative, and at the same time Actionable Business Architecture can be established as a separate effort independent of EA. Actionable Business Architecture is an instantiation of Business Architecture realized through the application of specific and prescriptive approaches, techniques and tools.

This critical perspective between Actionable Business Architecture (or similar paradigms) and EA can be explored also considering the concepts introduced in this articles, leveraging – for example – the already defined relationship between the Enterprise Architecture and the Service Oriented Architecture. The introduction in the model of the **Strategy & Transformation** and **Business Process Management** concepts may lead to further interesting results.

Another possible interesting area for further studies is related to the three typical dimensions along which we can define an IT (or SOA, or EA) Governance framework: **people**, **process**, and **technology**.

To put it generally:

- **People**: who is involved in processing the information?
- **Technology**: what systems are being employed in processing the information?
- **Process**: How is the information transformed/transferred?

As already introduced in this article, EA, ITSM and SOA require – at some level – a “governance” model/framework. So, the relationship between these three knowledge domains can also described in terms of the involved (and to some degree intersecting) people, processes and technologies resources.

In the Technology domain , the definition of evaluation matrix and product-selection grids it’s an interesting area of investigation, considering the different kind of commercial proposal available on the market in support of the patterns and capabilities required by EA, ITSM and SOA.
For example, EA and ITSM tools can integrate in many ways, among them:

- EA Repositories (Meta Data Repositories) can provide Configuration Items (CI), in the form of EA models and documents, to the ITSM Knowledge Management System
- EA Repositories (Meta Data Repositories) themselves can use CI data and other information from the ITSM Knowledge Management System to develop certain meta models and system models
- EA Tools can integrate with Software/Application Lifecycle Management and Software Development/Configuration Management tools, which in turn can integrate with ITSM tools such

as Configuration and Knowledge Management tools both from an Application and Data integration perspective

In the three domain of EA, ITSM and SOA it is interesting to consider how different roles are involved, on which processes and with which techniques. Also from this different perspective or "viewpoint" some interesting considerations, approaches and operative guidelines could arise.

Talking about the Actionable Business Architecture, the BPM concept was already introduced. **BPM** (**Business Process Management**) is a discipline consisting of software and expertise to improve the performance, visibility, and agility of business processes by enabling customers to discover, model, execute, rapidly change, govern, and gain end-to-end visibility on their business processes. The analysis of the relationships between EA, ITSM and SOA with BPM is an interesting and promising field of study. It's possible to start, for example, considering these set of base considerations that binds EA and BPM:

- EA gaining additional benefits from BPM:
  - Reference business processes for enterprise architecture analysis and blueprint design
  - Analyze business processes to verify optimal IT implementation (data, applications, processes, systems, technology).
  - Examine impact of utilizing processes intra- and inter-company.
  - Validate against other corporate solution delivery approaches.
- BPM gaining additional benefits from EA:
  - Consume architectural considerations into BPM solution delivery, enable reuse and IT governance
  - Provide corporate approved templates and blueprints to govern and facilitate BPM business process design.
  - Optimize and deploy process models for maximized business outcome.
  - Publish updated process for corporate re-use and IT governance

Each of BPM (also enabled by SOA) and EA individually facilitates and accelerates business and IT alignment; however even greater value can be gained through their architectural convergence. Put simplistically, in this service-oriented environment the foundational SOA solution platform provides the IT solution design, BPM provides the business optimization and a framework for business solution development, and EA provides, and governs the implementation of, the master plan ensuring synergies across the enterprise, visualizing and driving the connection between business objectives and change activities carried out by projects. All of this occurs in the context of realizing enterprise strategy and vision. So, the relationships and the "intersections" between EA, ITSM and SOA with the large "BPM" subject defines a set of possible areas of study.

Another opportunity to extend the arguments presented in this article is the so-called "**Information as a Service**" (**IaaS**) knowledge area. Information as a Service, as originally introduced by IBM, is described in terms of the relationship – and actually the overlap – of Information Architecture (aka "Information On Demand") and Service Oriented Architecture. Information as a Service is about leveraging information architecture concepts and capabilities in the context of SOA. There are important capabilities and concepts in SOA that are not related to Information On Demand and vice versa. But there is also a substantial overlap between them – such as leveraging content, information integration, and master data services –which significantly improve the delivery of an SOA project.
In relationship with this IaaS conceptual framework, a big issue, not currently part of ITIL but which can be part of the Enterprise Architecture framework, is a data architecture for defining the policies and procedures for repositories integration. It is clear that multiple repositories will remain. There is the LDAP repository for security information, the CMDB (Configuration Management DataBase) defined in ITIL for configuration management, the SOA registry/repository, and the runtime repository, and probably other home grown metadata repositories. Each of these repositories is the authoritative source for some information, and probably also duplicates information in other repositories. The problem with redundant data is when it is out of synch. Integration technologies and techniques make it possible to automate the synchronization of information across repositories. But unfortunately different parts of the organization own the different repositories and do not usually work together to ensure consistency. On top of IaaS, the IBM Information Discipline proposition can outline the route in this direction.

Also from a Project management point of view there are some opportunity to leverage the consideration presented here to find other interesting and "operational" guidelines and good practices. **Project Portfolio Management** (**PPM**) is a term used by project managers and project management (PM) organizations, (or PMOs), to describe methods for analyzing and collectively managing a group of current or proposed projects based on numerous key characteristics. The fundamental objective of PPM is to determine the optimal mix and sequencing of proposed projects to best achieve the organization's overall goals – typically expressed in terms of hard economic measures, business strategy goals, or technical strategy goals – while honoring constraints imposed by management or external real-world factors. In our context (in which we have EA, ITSM and SOA all together), the PPM team may collaborate with the Enterprise Architecture team to better understand the impact of new demands on the company's architectures. They may also interact with the IT Service Management for Capacity Management and Service Level Management to better assess these demands. The relationships between PPM and EA, ITSM and SOA are probably high potential area of investigations.

As a last consideration, it's also possible to hypothesize, as an additional subject of investigation, the relationship between EA, ITSM, SOA and the emerging topic today generally known as **Cloud Computing**. According to NIST (National Institute of Standards and Technology, U.S. Department of Commerce), Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics (*On-demand self-service*, *Broad network access*, *Resource pooling*, *Rapid elasticity*, *Measured service*), three service models (*Software as a Service – SaaS*, *Platform as a Service – PaaS*, *Infrastructure as a Service – IaaS*), and four deployment models (*Private cloud*, *Community cloud*, *Public cloud*, *Hybrid cloud*).
Some studies and papers are already available in literature about the relationships between Cloud computing and each one of the topics described in this article, but a comprehensive view of the synergies and relationships (with potential opportunities and points of attention) between the different Cloud service models (and/or deployment models) and the EA, ITSM and SOA topics is probably yet to be developed.

About the author

Carlo Randone (carlo_randone@it.ibm.com) is a Senior Certified IBM IT Architect and Open Group Master Certified IT Architect in IBM Global Business Service, Italy. Carlo, that was born in the sixties, has a deep knowledge of different development platforms and middlewares on heterogeneous environments and operating systems. He have been working for several years as Certified Trainer and Solution Developer for a Microsoft Certified Partner. In IBM since 2000, now his main job interests are related to Service Oriented Architectures – with related software engineering methodologies and enabling platforms – and Enterprise Architecture planning and design. He enjoys collecting documentation and hardware pieces related to the historical development in IT, and to support this hobby he is a member of the Charles Babbage Institute (CBI).

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