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A FRAMEWORK FOR EVALUATING SOA GOVERNANCE FRAMEWORKS

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ABSTRACT

While there are several SOA governance frameworks to serve SOA implementation in organizations, no systematic evaluation of these frameworks has been proposed. As a result, it is difficult to select a framework to address SOA governance requirements. Also, there are no methods for determining advantages and weaknesses of each framework. To resolve these problems, we devise a framework for evaluating and comparing SOA governance frameworks. The framework is designed to assess evaluation across the spectrum of substantive fields. It focuses on four major aspects of a SOA governance framework: concepts and properties, qualitative features, SOA governance focus areas, and pragmatics. The evaluation framework ensures that a complete picture of all aspects of SOA governance can be achieved. We demonstrate the usage of the suggested framework by evaluating Open Group framework. This evaluation identifies the strengths and the weaknesses of Open Group, and also exemplifies the capabilities of our framework.

Keywords: *SOA Governance, Evaluation Framework, Qualitative Features, SOA Governance Framework*

1. INTRODUCTION

Service Oriented Architecture (SOA) is an architectural approach that improves business agility by building systems with reusable, and loosely coupled services [1]; however, SOA implementation always has a lot of challenges and complexities such as designing decision structure, funding and ownership of shared services and identifying and managing services [2]. To successfully implement SOA and address the existing challenges and capture maximum benefits of SOA, organizations need precise definition of processes, control mechanisms, SOA metrics and enforcement of policies that are mainly defined in SOA governance frameworks [3]. An SOA governance framework defines a set of processes, governance structures, policies, solutions and technologies that can help to manage complex SOA deployment in an effective and efficient manner [2]. A SOA governance framework according to[4] should provide the following: a comprehensive set of service lifecycle and governance lifecycle processes; a full set of roles and responsibilities and decision structures; a fully delineated set of policies; SOA governance technology including a registry and repository, policy management tools and platforms; a set of metrics; and a set of management guidelines to govern the processes. The relationships between these components are shown in Figure 1.

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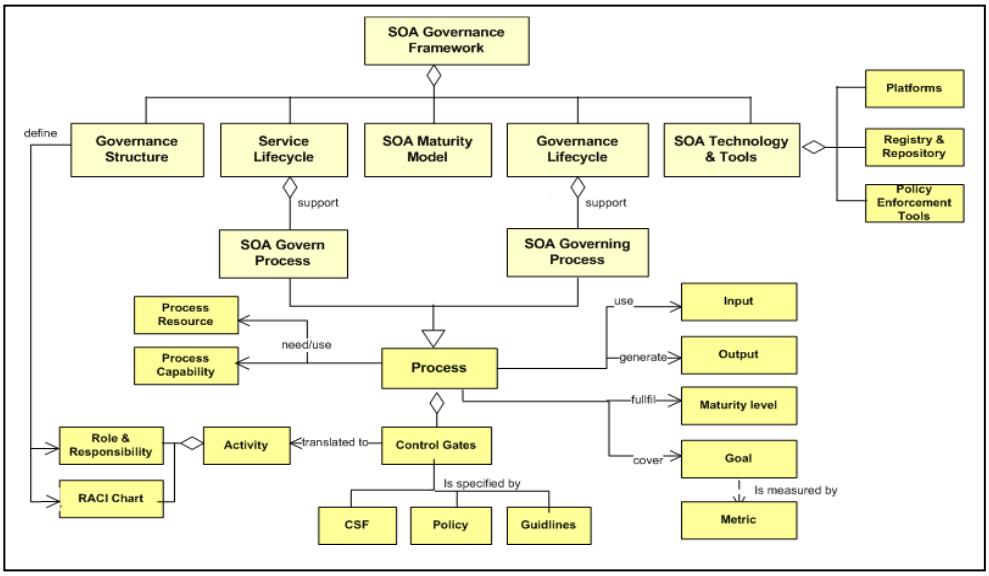

Figure 1: *The elements of a SOA governance framework and the relationships among them*

A number of SOA governance frameworks have been proposed by researchers and practitioners. The scope and coverage of these frameworks differ extensively. The multiplicity and variety of SOA governance frameworks make some difficulties in selecting a framework for implementing SOA in organizations. Also, in the research area of SOA governance, neither a common definition of SOA governance nor commonly accepted models for SOA governance frameworks have been defined [3]. So, with no standard available, research efforts are spent on developing SOA governance frameworks, in times producing overlapping results. In this paper, we provide means for addressing these problems by supplying a framework for evaluating SOA governance frameworks. This evaluation framework may be used by organizations to select an appropriate framework to implement SOA. It can also help researchers to examine the similarities and the differences among the existing SOA governance frameworks and to analyze the needed components of such frameworks. Moreover, setting a scale for grading SOA governance frameworks and using the scale with our framework may result in a selection of the better framework. This selection may cover a small set of the most appropriate SOA governance frameworks and possibly lead to standardization.

This paper is organized as follows: First, in section 2, the literature review is presented. In section 3, we introduce the proposed framework and its characteristics. In Section 4 we perform an evaluation over a well-known SOA governance framework and finally in sections 5 and 6, the conclusion and further works are presented.

2. LITERATURE REVIEW

The framework provided in this paper is aimed for the assessment and comparison the existing SOA governance frameworks such as ORACLE [5], Web Methods [6], IBM [7], CBDI-SAE[8], Software AG [9] and Open Group [2] and also for the appraisement the quality of them. Because there is not a precise definition of SOA governance, these frameworks have different perspectives on SOA governance. Yet, evaluating these frameworks introduces several difficulties:

- Comparing frameworks is often difficult, because they might be differ in definition and scope or address different aspects. For example, the approach by Software AG and the model by Open group are the most comprehensive ones, while others like Bieberstein [10] or BEA Systems [11] dig deeper into single aspects.
- The completeness of various frameworks varies dramatically. For example, some provide only service lifecycle processes, some present governance structure and organizational entities, while others integrate several aspects of SOA governance (i.e., service lifecycle processes, maturity model, policy management, evaluation metrics, etc).

A few evaluations of SOA governance frameworks have been presented. In [3], the author performs an evaluation of the existing SOA

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governance frameworks; however, he refers only to some SOA governance properties and concepts such as organizational changes, metric model, service lifecycle and not to the broad set of attributes that constitute a complete framework. In [4], we propose a set of SOA governance elements that a framework should address and also present the comparison among some existing SOA governance frameworks by analyzing the coverage of these elements. Other studies that deal with evaluating SOA governance frameworks compare two or three frameworks, with respect to the expressiveness and the concepts supported by the frameworks. Another study [12] suggests a framework for qualitative evaluation of an artifact; however, neither qualitative evaluation nor a comparison has been performed among SOA governance frameworks using the qualitative criteria. So, the qualitative criteria should refer to the set of criteria encompassed within the SOA governance definition.

In this paper, we provide a comprehensive framework for evaluating and comparing SOA governance frameworks. The framework is built on certain premises surrounding the SOA governance enquiry, how it can be used for evaluating SOA governance frameworks and how their functionality and quality can be assessed. The proposed framework offers a well-defined, structured set of aspects that an SOA governance framework should include. Our framework can be used for various evaluation techniques:

- Feature analysis – The evaluation is done by studying the proposed framework in the use of dynamic qualities (e.g., performance)
- Survey – The evaluation is done by examining the results of the survey that is distributed among practitioners and researchers. As a result of the size of the population surveyed, these results may be statistically justified.
- Case studies – The evaluation is done by using the proposed framework to examine the results of case studies.
- Field experiments – The evaluation is done by using the proposed framework in multiple projects.

Due to the lack of space we will not discuss the advantages and drawbacks of each technique. However, such a discussion can be found in [13].

In this paper, we perform the evaluation of the framework by using the field experiment technique to demonstrate its applicability and usability. An evaluation of this type can be easily performed by researchers and practitioners. Yet, this technique is subjective and this is its major defect. Subjectivity may produce different evaluation results from different evaluators.

3. THE PROPOSED EVALUATION FRAMEWORK

SOA governance has a critical role in achieving success and realizing the benefits of SOA. To successfully implement SOA and capture maximum benefits of SOA, organizations need precise definition of processes and relationships, control mechanisms, SOA metrics and enforcement of policies that are defined in an SOA governance framework. In this paper, we refer to an SOA governance framework as the entire set of service lifecycle and governance lifecycle processes; decision structures; a set of policies; SOA technology and tools; a set of metrics; and a set of management guidelines to govern the processes. Our evaluation framework is a qualitative model to examine the various aspects of an SOA governance framework. There are numerous appraisal items that could have been included in the evaluation framework. The framework is built on a set of SOA governance principles. Also, a set of quality indicators are listed that cover the key features involved in qualitative enquiry. The indicators are separated in four major divisions: concepts and properties, SOA governance focus areas, qualitative features and pragmatics. The two first indicators have been derived from the SOA governance domain. Also the qualitative features are related to quality requirements. The pragmatics criteria are belonged to practical aspects of the framework. We have devised this framework with a particular focus on the methods used most extensively in evaluations and a review of the existing frameworks for assessing quality in qualitative research[14]. An overview of the major criteria is presented in the following sections.

3.1. Concepts and Properties

A concept is an abstract idea or a guiding general principle derived from specific instances within a problem domain. A property is a particular characteristic or distinctive feature of something [14]. This section deals with the question whether a framework adheres to the basic notions (concepts and properties) of SOA governance and SOA adoption requirements. In order to perform such an evaluation, we use the

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most essential topics in SOA governance domain that have been identified as SOA governance elements and reported in [4]. Besides these elements, we leverage on previous studies (e.g.,[2], [13], [7],[12]) and utilize concepts defined there as a basis for our set of concepts. The following are the concepts that should be evaluated in an SOA governance framework:

- **Service lifecycle**

Service lifecycle encompasses processes of design, development, test, deployment, management, and ultimate retirement of services. In a good SOA governance framework, governance policies should be complied through service lifecycle.

- **Governance lifecycle**

Governance lifecycle involves several processes to provide checkpoints in multiple entry points of service lifecycle where policies are checked to comply and establish a governance model for managing service activities.

- **Governance structure**

The deployment of SOA governance makes some changes in organization structure, and also new processes and roles should be defined. Furthermore, SOA boards and committees and their responsibilities must be determined.

- **SOA technology & tools**

Governance technology is technology capabilities that can be used to perform the SOA governance processes. Technology capabilities include a repository, policy enforcement tool, manual processes and sophisticated software.

- **SOA governance artifacts**

SOA governance artifacts are new artifacts to support SOA governance. These artifacts consist of business level artifacts (governance vision, scope), organizational artifacts (processes description, roles and responsibilities, RACI chart...), services, policies, contracts, metadata and related SOA assets such as XML schemas and plans.

- **SOA maturity model**

A SOA maturity model is a method of evaluating the organization that creates an understanding of the maturity level of SOA within the organization and its readiness to ensure that SOA governance framework is defined in an appropriate level for the organization [2].

- **Evaluation metrics**

In an SOA governance framework, metrics are established and regularly monitored to measure business agility, processes efficiency and performance of governance processes and activities**.**

3.2. SOA Governance Focus Area

SOA governance focus areas describe the needed topics to address governance in the context of SOA within enterprises. We have extracted these topics from IT governance focus areas. . We have extracted these topics from IT governance focus areas defined in COBIT framework [15]. SOA governance extends IT governance to ensure that SOA benefits are met. To successfully support SOA governance, an SOA governance framework must be able to manage the costs and risks involved with applications, services and SOA infrastructure. Performance measurement is essential for SOA governance. It includes setting and monitoring measurable objectives of what the processes need to deliver (process outcome) and how to deliver it (process capability and performance).The SOA governance focus areas are defined as follows:

- **Strategic alignment** focuses on ensuring the linkage of business goal and SOA plans. The SOA governance program should support the business and IT drivers. This alignment will increase the benefits of a service-oriented approach. We need to have a SOA strategy, ensure that it is executed in accordance with guidelines and constraints defined and aligned with business goals and SOA. An appropriate framework begins and ends with strategic goals, which help align the governance model to desired SOA outcomes. It defines the generic business and SOA goals and determines the relationship between SOA goals and the processes as well as the relationship between SOA goals and business goals.

- **Resource management** is about the optimal investment in SOA, and the proper management of critical resources: services, applications, infrastructure, cost and people. An SOA governance framework can cover this feature if it provides the mapping of its processes to these resources.

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- **Risk management:** A deeper understanding of the risks of SOA adoption helps adopters understand how to apply SOA principles better. It requires identifying and mitigating the risks associated with SOA, understanding the compliance requirements, transparency about the significant risks to the enterprise and embedding of risk management responsibilities into the organization. To facilitate risk assessment, risk analysis criteria should be defined to determine the impact of the noncompliance to the organization, such as increased cost, delayed strategies, and implementation delays. Risk assessment, control activities and monitoring are the most important activities of risk management, which could be done in the corresponding processes in an SOA governance framework.

- **Performance measurement** focuses on specifying the strategic key performance indicators of services and tying them to underlying business processes and policies, or business rules. It helps organizations formulate, implement, and monitor their strategies. This is where management methodologies such as the balanced scorecard or Six Sigma can be used to systematically align performance objectives and execution. The SOA governance framework supports this area by setting and monitoring measurable objectives of what the processes need to deliver (process output) and how to deliver it (process performance).So, a set of (Critical Success Factor) CSFs and metrics related to the process goals should be defined in the framework.

Besides considering these aspects to implement the processes, activities and control mechanisms, a desired framework may provide the mapping between its processes and the four SOA governance focus areas. This mapping matrix demonstrates at a high level how the framework addresses SOA governance and risk management requirements, and shows the relationship between the processes and the IT resources and performance indicators.

3.3. Qualitative features

This section deals with the properties and qualitative factors to which the SOA governance framework should adhere. In order to establish a set of qualitative criteria for evaluating SOA governance framework, we examine the existing quality frameworks and explore various aspects of SOA governance and identify a set of qualitative criteria that contribute to successful or unsuccessful delivery of SOA governance framework. These criteria are used to ensure that an SOA governance framework meets its functionality and quality requirements. The qualitative criteria are defined as follows:

Understandability is an ultimate prerequisite for users to deploy a framework in their organizations. There are many aspects for understandability of the framework: structure, procedures, terminology and processes. This principle requires that users always know the state of their task, what to do next, how the framework reacts to certain inputs, and so on. This indicates whether users are able to understand processes, governance structures and other related components. And also indicates whether users can demonstrate the framework successfully after an online tutorial.

Expressiveness is a capability of presenting framework concepts that refers to:

- the structure of the framework;
- the knowledge encapsulated within the framework;
- the data flow within the framework;
- the control flow within the framework;
- the framework's architecture;

Manageability is the state or quality of being manageable. Governance provides management and control for critical activities or decisions where stakeholder representation is imperative. For SOA governance to be successful, SOA governance framework should provide clear policies and good practices/procedures for the processes and also should define measure against which to judge when things go wrong. So, an internal control system put in place.

Comprehensiveness relates to the ability to address SOA governance elements presented in the previous section and SOA governance principles. A set of important SOA principles has been defined in [2],[12]. SOA governance framework should support or enforce those principles by considering policies, control gates and check points for each process.

Well_ Documentation is the capability of supplying with or using documents or references and providing clear conceptual links between

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analytic commentary and presentations of the original model. A proper framework can usefully guide reader through providing a meta model or a conceptual model for presentation of its components and documenting them in a well-defined structure. It can also provide extended information including technical manuals and online information available at provider web site.

3.4. Pragmatics

Pragmatics refers to practical aspects of deploying and using a methodology / framework / model[14]. This subject deals with pragmatics of adopting the SOA governance framework within an organization. In particular, the framework suggests examining the following issues:

- **Resources:** What resources are available in order to support the SOA governance framework? Is training and consulting offered by the vendor and/or third parties? In addition, are the automated tools (CASE tools) available to support the framework (e.g., policy management tools, registry &repository, SOA management tools and service portfolio)? This issue should be examined in order to enable an organization for adopting an SOA governance framework to check the resources required and the alternatives for acquiring them.

- **Applicability:** Is the use of the SOA governance framework suitable for a particular application domain? This issue should be examined to check whether the framework adheres to the intended problem domain. The solution must also enable companies to efficiently and effectively apply and enforce governance throughout the entire SOA lifecycle—from design time, to run-time, to change time.

- **Implementation Guide:** dose the framework provide a generic road map for implementing SOA governance using the framework and a supporting tool kit? This guidance can be used to support management and to offer suggested testing steps for all the processes.

3.5. Metrics

For ranking the properties in the evaluation process, we propose a scale of 1 to 5 as follows:
1. Indicates that the framework does not address the property.
2. Indicates that the framework refers to the property but no details are provided.
3. Indicates that the framework addresses the property, yet some major issues are lacking.
4. Indicates that the framework addresses the property with minor deficiencies.
5. Indicates that the framework fully addresses the property.

In summary, in this section we provided a framework for evaluating a SOA governance framework. We divided it into four divisions of concepts and properties, SOA governance focus areas, qualitative features, and pragmatics. In the proceeding section we demonstrate the use of that framework.

4. EVALUATING OPEN GROUP FRAMEWORK

In this section we evaluate Open Group framework according to the framework presented in Section 2. Open Group has provided a technical standard that defines a core SOA governance framework. This framework is an appropriate regimen includes a generic SOA Governance Reference Model (SGRM) and a SOA Governance Vitality Method (SGVM) which defines an incremental deployment approach to SOA deployment [2].

4.1. Concepts and Properties

Examining the coverage of the framework building blocks by open group framework shows that open group framework addresses most of them, as shown in Table 1.The left column is the SOA governance elements (concepts and properties) presented in the previous section as the framework building blocks. The required capabilities to completely address each element are presented in the middle column of Table 1.The third column presents the coverage of each element within Open Group framework.

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***Table 1**.The coverage of the framework building blocks within Open Group Framework*

Framework building blocks (SOA governance elements)	Required capabilities	Open Group concepts and properties
Service lifecycle	o Determine the complete picture of service lifecycle activities (design, implement, deploy , …) o Determine the management processes of service lifecycle (service portfolio management, solution portfolio management, ...) o Describe the details of the processes and activities (description, process goals, inputs, outputs, metrics, control mechanisms, ...) o Illustrate of the relationships between service lifecycle processes and governance lifecycle	Service Portfolio Management, Service Lifecycle Management, Solution Portfolio Management, SOA Solution Lifecycle
Governance lifecycle	o Define an iterative process or method to implement effective governance (the phases description, the plan and roadmap to do, the activities of each phase, …) o Determine Governing processes (Compliance process, Dispensation process ,Communication process) to manage and govern any particular process of the service lifecycle o Consider the enforcement points across the entire service life cycle(Design time governance policies, run time governance policies) o Describe the governance activities , governance rules and procedures for those activities	SOA Governance Vitality Method
SOA governance Technology	Determine technology capabilities used to perform the SOA governing processes and SOA governed processes o The description of capability o The name of the related tools and The application of them o The corresponding processes	Policy enforcement, Monitoring, Management tools
Governance structure	o Define decision structures, key roles and responsibilities o Define RACI chart for each process (who is **R**esponsible, **A**ccountable, **C**onsulted and/or **I**nformed.)	SOA Governance Roles and Responsibilities
SOA Governance Artifacts	Define completely : o The Processes description o Policies of each process o Plans and roadmap o Procedures and guidelines	SOA Governance Process Artifacts
SOA Maturity Model	Present a maturity model consistent with the framework to assess SOA maturity of the organization	Open Group SOA Integration Maturity Model
Metrics	o Determine the process goals and metrics(that define what the process must deliver to support objectives and how to measure it) o Determine the activity goals and metrics (that establish what needs to happen inside the process to achieve the required performance and how to measure it) o Define critical success factors (CSFs) and measurable metrics for each process	SOA metrics, SOA Governance Metrics

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More details about our evaluation are described as follows:

- **Service lifecycle**

The Open Group framework has defined a set of SOA governed processes in service lifecycle that cover the design, development, deployment, management, and retirement of services. Also in order to manage service lifecycle activities, a set of management processes including service portfolio management and service lifecycle management have been defined. The definition of the processes has been presented but it does not provide more details (control mechanisms, process goals, metrics…) on these processes. Also the relationship between service lifecycle processes and governance lifecycle processes has not been completely described. The ranking grade is 3.

- **Governance lifecycle**

In open group framework, governance processes and activities are considered in SOA Governance Vitality Method. It is a process that follows a number of phased activities (plan, define, implement, monitor) to customize the governance model within a continuous improvement loop. This framework also defines three SOA governing processes. It has defined process checkpoints to denote key approval points. Despite defining the governance activities in SOA Governance Vitality Method, no detail on these processes has been presented. The ranking grade is 4.

- **Governance structure**

In open group framework, governance structure has been considered as the part of an organization's SOA governance model. It is expressed within the organizational topic in Open Group framework; however it does not provide a RACI chart for each process and does not define roles and responsibilities of the processes. The ranking grade is 3.

- **SOA governance Technology**

In open group framework, technology is expressed within SOA Governance Reference Model. In this framework, a number of technology capabilities are briefly described; however, it does not specify the relevant processes to enable and use the technology capabilities.. The ranking grade is 4.

- **SOA Governance Artifacts**

Open group framework provides the description of the processes, policies, plans and some guidelines for implementation. The SOA governance artifacts are separately expressed by governing process artifacts, governed process artifacts, SOA governance vitality method (SGVM) artifacts, service description, etc. The ranking grade is 5.

- **SOA Maturity Model**

Open group framework uses Open Group SOA Integration Maturity Model (OSIMM) to assess organization's maturity and define a roadmap for incremental adoption. So, OSIMM is used as SOA maturity model for understanding the level of SOA maturity in an organization. This model is consistent with the concepts and structure of the framework. The ranking grade is 5.

- **Evaluation Metrics**

In open group SOA governance framework, a set of SOA metrics are defined by SGVM as the part of the SOA governance artifacts that are regularly gathered to measure what is happening or not happening. Further, some SOA governance metric checkpoints are specified for the processes. To measure performance perfectly, metrics should be defined at process level and activity level. The last feature is not considered in the framework. The ranking grade is 3.

4.2. SOA Governance Focus Areas

Strategic alignment: in Open Group framework SOA governance strategy and vision are documented during the plan phase of the SGRM. Further, the framework considers a number of additional process activities and governance checkpoints to align with the SOA strategy and SOA guiding principles within the SGRM. It defines *compliance* process that ensures continuous alignment and guidance of governance goals and policies, business goals, and SOA solutions and services. Although the purpose of each process is defined, the relationship between SOA goals and the processes is not clarified. The ranking grade is 4.

Resource management: one of the important aspects of resource management belongs to cost that is considered within SOA governed processes of the framework by defining and implementing service and solution funding models. The other key aspects of resource management can be driven by defining, providing and managing the resources and capabilities of the processes. This has not been specified explicitly in Open Group framework. The ranking grade is 2.

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Risk management: the most activities of risk management are done within SGRM that defines three processes including *Compliance*, *Dispensation* and *Communication*. These processes are used to govern any particular process. They are responsible to identify and mitigate the risks associated with SOA, and to understand compliance requirements. The ranking grade is 5.

Performance measurement: in the monitoring phase of Open Group framework, statistics are regularly gathered as a part of the normal SOA governance checkpoints to measure what is happening or not happening**.** Despite considering several checkpoints for the processes, it does not refer to the implementation issues. Also it does not specify the performance indicators and metrics for the assessment of each process. So, performance measurement is not supported completely by Open Group framework and the ranking grade is 3.

4.3. Qualitative features

Understandability: Open Group framework is basically easy to understand and use. The behavior of the framework is introduced via a SOA Governance Reference Model (SGRM) and a SOA Governance Vitality Method (SGVM) which reduces overall complexity and helps perceive the implications of the framework. Although the framework expands on a variety of topics, it does not provide a meta-model to explicitly represent the various framework elements. The ranking grade is 4.

Expressiveness: in the following we present our analysis regarding the expressiveness of Open Group framework according to the properties defined in the previous section:

- The framework processes are defined via a logical well-defined structure;
- The governance structures, processes, activities and measurement metrics are presented explicitly and defined in details;
- The control mechanisms and policies within the framework are not presented explicitly;
- The constraints and limitations within the framework are not presented explicitly;
- The framework architecture is specified;
- The meta model and the conceptual model are not provided explicitly;

The ranking grade is 3.

Manageability: Open Group framework does not focus on control. There are no control mechanisms, control gates or any management policies to successfully execute the processes of the framework. So, this issue is not dealt within the framework. The ranking grade is 1.

Comprehensiveness: based on the obtained results of the first evaluation presented in table 1, almost all imperative SOA governance elements have been considered in Open Group framework; however, some deficiencies exist in covering their scope and domain entirely. The ranking grade is 4.

Well_ Documentation: in Open Group framework, the processes description are documented and clarified in a well-defined structure. But as we mentioned previously, some other elements such as control mechanisms, policies, RACI charts and CSFs have not been adequately documented. Also there is not a meta model or a conceptual model of the framework. The ranking grade is 3.

4.4. Pragmatics

Resources: Open group does not provide special automated or CASE tools (i.e., policy management tools, registry & repository, service management tools) to support the application of the framework; however, some other standards and documents such as SOA reference model, reference architecture, maturity model and modeling language have been offered to use simultaneously with the development of the framework. It also provides some guidelines to users for selecting the technical products most appropriate for their needs. The ranking grade is 4.

Applicability: open group framework is suitable to deploy SOA in organizations. The focus of the framework is primarily based on the IT aspects of SOA governance. So, it is consistent with some formal standard IT governance frameworks – such as COBIT, ITIL, etc. By defining an incremental process (SVGM) and a number of phased activities to customize the framework for the organization's variants, it defines an incremental deployment approach so that organizations can continue to meet their current demands while moving towards their long-term goals for SOA. The ranking grade is 5.

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Implementation Guide: although Open Group framework briefly expresses all processes and activities, there is no governance guidance regarding the deployment of the framework. Further the framework does not specify a plan or a roadmap including all steps and activities, required resources and capabilities and the priority of them to support users of the framework. The ranking grade is 2.

4.5. Evaluation Summary

In this section we summarize the evaluation of Open Group framework. This evaluation demonstrates the use of the proposed framework and the way in which it identifies the strengths and the weaknesses of a SOA governance framework. Examining the concepts and properties (as defined by the framework) supported by Open Group framework, we found that Open Group framework addresses them to a satisfactory level. Examining the qualitative features provided by Open Group framework, we found that it addresses them to a limited extent, mainly due to lack of support control mechanisms and an insufficient expressiveness of the framework's elements. Examining the SOA governance focus areas, we found that the framework covers fairly these aspects; However further enhancements are required. Finally, examining the pragmatics supported by Open Group framework, we found that it lacks in providing most features except applicability. Given these results, it seems that there is more intention in Open group to support SOA governance properties and elements and SOA governance focus areas rather than the qualitative criteria as well as the practical aspects.

5. CONCLUSIONS

Although there are several SOA governance frameworks to serve SOA adoption in organizations, they propose different perspectives on SOA Governance. Because of the variety of SOA approaches and solutions, it is difficult to select a framework that provides context and definition to enable organizations to understand and deploy SOA governance. Also, there is no systematic method for identifying the advantages and weaknesses of each framework. In this paper, we proposed a framework for evaluating and comparing SOA governance frameworks. The framework examines the various aspects of a SOA governance framework: concepts and properties, SOA governance focus areas, qualitative features and pragmatics. These principles are based on themes that are highly repeated in the literature and in the interviews conducted for the study. It can be used for selecting a framework to address SOA adoption requirements. It can also be utilized for identifying the advantages and weaknesses of the existing SOA governance frameworks and promoting the improvement of them.

To demonstrate the general applicability of our framework, we performed an evaluation of Open Group SOA governance framework using a feature analysis technique. Open Group framework is justifiably considered an advanced SOA governance framework; however, our study shows that there are several aspects in which Open Group framework can be improved, to provide a comprehensive solution to help enable effective SOA governance. By detecting the shortcomings (and providing the details) of one of the most advanced SOA governance framework, we showed that our evaluation framework is applicable: it points at the weaknesses of a SOA governance framework and thus can promote its improvement. Although we presented the framework and the feature analysis technique as well-structured and easy to use, we are fully aware of its subjectivity. That is, the ranking grades may vary across evaluators. However, we believe that the overall evaluations resulting from using the proposed framework by several evaluators will be similar due to the well-defined properties and the ranking scale.

6. FUTURE WORK

Further research is required to evaluate the suggested framework. It may be evaluated with respect to several criteria: usability, coverage, adaptability. usability refers to the ability of the framework to be understood, learned, used and attractive to the user; coverage refers to the extent to which the framework addresses the needs of SOA governance framework evaluation; adaptability refers to the ability of the framework to be adapted for different specified environments without applying actions or modifying the framework to evaluate domain-specific SOA governance frameworks. Another research direction could be a comparative evaluation of the existing SOA governance frameworks, utilizing the proposed framework.

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