

SOA Business Process Interoperability with TOGAF - The Case of Microfinance Customers

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Abstract

When customers seeking MSE (micro and small enterprise) related services, it is required to fill multiple forms at each participating institution and expect validation at each stage. The validations of the forms, that is, information provided by the customers and by the respective institutions depend on each other. There is lack of a communication system between the participating institutions and lack of dependable organizational interoperability, as the institutions perform according to their own plans, procedures and timings without consideration of the completion of service provision to the customer. To have a better insight on the design of the architectural framework, this paper discusses in detail about the business process, organizational structures, and business rules of the participated organizations in the interoperability framework. In the framework design process, it is also needed to select and use appropriate standards, tools, guidelines, and architectural patterns that should be used in the process of designing the multilevel form validation architectural framework. It is also discussed in detail about how to apply SOA in TOGAF architectural framework

Keywords: Multilevel form validation; Business Process Interoperability; Architectural Framework; SOA

1. Introduction

Understanding business processes across multiple organizations requires understanding the connections that exist between the organizations, the degree of commonality in business processes, the governance rules applied on the process, the flow of information across those processes, and the technology used to create those connections. A consistent approach to defining and managing processes, both internally and with external partners, is critical. It should also be kept in mind that whether a process is performed internally, or in an interoperable framework, appropriate evidence (records) of the transactions and activities will need to be created and stored for future reference [1]. It aims to improve the ability of organizations to respond to new requirements quickly and effectively by providing a common language and the ability to develop a common understanding of business processes and business requirements. This is particularly important as the need for cross-organizations collaboration increases with the drive towards 'connected government'.

In general, this paper is intended to grasp the service provision by each organization in the validation of customer forms filled in request of MSE

group formation, business license, and loan at microfinance institutions. Accordingly, identifying the problems related to defining the interoperability between the organizations in the process, the governance rules applied on each organization and standardizing the services and design the architectural framework is considered. The intension is to design the business processes interoperability for solving interoperability problems and to simplify the process of the MSE group formation and loan appraisal, as multiple organizations participate in the process of validating, approving and updating customers' data.

The rest of this paper discusses on what are the problems, in relation to the research question and the objectives of the research. The significance of the research and the methodology of the research will lead us to review literature. The literature review will revolve around the supporting documents in relation to the research questions and objectives. The document also mainly focused on the design of the architectural framework and discusses the governance and the case studies in related to the implementation and testing of the work.

2. Background

Microfinance is often defined as a financial institution that is organized to give financial services for the poor and low income people [2], sometimes called “banking for the poor” or “rural banking” because microfinance is an amazingly simple and proven idea that empowers poor people around the world to pull themselves out of poverty by giving small loans for the purpose of starting, establishing, sustaining, or expanding small businesses. Microfinance institutions share similar vision and missions, as the strategy of the government of Ethiopia, which is clearly associated with serving people who are under poverty and not getting banking facility or who are living in un-banked and under-banked areas. The government also focused on MSE as one of the main strategies to reduce poverty and bring about sustainable development in the country in creating jobs for the urban unemployed. To this effect, MSEs need some capital to do their business to be successful on the strategy of poverty eradication and the government created different workflows to process this MSE strategy by incorporating microfinance [3].

For this work, the case study is taken at Addis Ababa and Oromia regions by focusing on the MSE loan of the MFIs. Customers seeking MSE related services are required to fill multiple forms at each participating institution and expect validation at each stage. Basically, the participating institutions comprise close-by woreda administrative offices, cooperatives, associations, MSE offices, MFIs, and training institutions. The validations of the forms, that is, information provided by customers and by the respective institutions depend on each other. This dependence creates serious overhead on the customers as the institutions business processes perform independently and there is no end-to-end process management for the series of form validations among the institutions. There is no known standard mechanism of information exchange between the institutions, and the chore of carrying the required information from one institution to another is the sole responsibility of the customer, creating customer dissatisfaction and reduced interest in seeking MSE services.

To solve problems related to customer service, operations and process management literatures recommend the creation of single window systems whereby the collaborating institutions perform back office activities and are visible to the customer through one contact point. According to the information obtained through data collection and observation made in Addis Ababa, woreda 03, this same strategy is also exercised by the Addis Ababa region. This approach creates overheads on the participating institutions as it doesn't take into account the specific organizational missions they are organized for. So another solution is making interoperable the organizations without changing their working structure and business process. To make interoperable, it is crucial to understand business processes across multiple organizations and requires understanding the connections that exist between the organizations, the degree of commonality in business processes, the governance rules applied on the process, the flow of information across those processes, and the technology used to create those connections. The identification of common processes and services within the government has the potential to achieve economies of scale, reduce duplication, and improve seamless service delivery across the government. In designing the business process interoperability, it is also crucial to select the best architectural framework that is compatible with the existing system. For this work, the TOGAF Enterprise Architecture framework [4] is selected for developing the architectural design document, as it is the one adopted for the Ethiopian National Enterprise Architecture [5]. Using SOA with TOGAF is also applied on the application framework of the architecture on the designing of service as a means of communication between the organizations.

3. The Proposed Solution

The proposed solution is the deliverable container for the core architectural artifacts created during the research. The architectural design started by defining the architectural vision. It clarifies the purpose and demonstrates how it will be achieved by the proposed architecture development. Key elements of the Architecture Vision such as the enterprise mission,

vision, strategy, and goals have been documented. This has its own lifecycle within the enterprise. The next step is defining and discussing with the business architecture (Phase B of ADM) [4].

The Business Architecture defines the business strategy, governance, organization, and business services and processes. The objective of business architecture is to develop the Target Business Architecture that describes how the enterprise needs to operate to achieve the business goals, and respond to the strategic drivers set out in the Architecture Vision, in a way that addresses the request for Architecture Work and stakeholder concern. According to the case study, there is no existing architecture description in the organizations that should be used as the basis for the baseline description. Where no such descriptions exist, information will have to be gathered in whatever format comes to hand and should start by studying the baseline architecture as a high level and document it as an input for the target architecture. So, a knowledge of the Business Architecture is a prerequisite for architecture work in any other domain (Data, Application, Technology), and is therefore the first architecture activity that needs to be undertaken. A variety of modeling tools and techniques are employed like BPMN [6], SOAML [7], and others to model different architectural views that are produced in each step of the ADM. Some of them are AS-IS and TOBE BPMN, Services, Data and sequence diagrams that show us the chierography of the interfaces in the service information exchange matrices.

The next step is service identification for the purpose of defining the target application architecture on the domain/sub-domain. All the domain teams (excluding the data and infrastructure domains) need to produce target application architecture at the conceptual and logical levels for their respective domains. The starting point for the artifacts that are developed in this phase is the set of key business requirements identified in Phase A (Business architecture). For the kind of enterprise SOA that are discussed here, the following artifacts should be used because they contribute to the definition of SOA building blocks in Phase C (Application

Architecture). The other information that is used as an input for the design of the application architecture is the national enterprise architectural framework of Ethiopia Service Delivery channels [8] which should support open standards in order to allow access for a wider range of client access technologies and devices to interact with government services and exchange information with these services. On the service delivery solution component, authentication is used to authenticate citizens before getting the services. So in this architectural design, the MSE groups should authenticate as a citizen before getting the MSE services and the designed multilevel form validation middleware should have to get the citizen information from the citizen information system. If the citizen is not registered, the middleware should request the citizen to insert all the necessary information and the middleware updates this information to the citizen information system. So, on this service design to integrate the citizen information system and the multilevel form validation, it is necessary to build a service. Services are modeled using SOAML. The first reason is that the TOBE diagram and BPMN diagram shows us functionalities and their process interactions between the organizations will be transformed to the service using IBM Rational web sphere. The other reason is SOAML provides the capability to create and leverage an architecture that helps people, organizations, and systems to collaborate via services and shows how those services connect to other parts of the architecture such as processes, information, and business rules.

Service identification is one of the first steps in the Service Oriented Development life cycle. The process of identifying services can be approached from a number of perspectives and in combination with a particular project type. There are different approaches used to identify services from BPMN models. Some of the approaches and tools mentioned in different literatures are top-down and bottom-up, and exposing existing assets. Top-Down – Business Process Driven (Value-Chain Analysis) is the most preferable approach and best practice to start with for the enterprise transformation to SOA. The first step to identify the services from BPMN using SOAML

[9] is service identification. It is done by extracting candidate services from the TOBE BPMN diagrams. As can be seen from Figure 1, the service identification will start by identifying specific capabilities that may be exposed as services. Capabilities identify or specify a cohesive set of functions or resources that a service provided by one or more participants might offer. Capabilities can be used by themselves or in conjunction with participants to represent general functionality or abilities that a participant must have. The next step is to identify the data flows between these services or tasks. These data objects will be associated with message types or data entities in SOAML. It focuses on the tasks that describe the interaction points between the business entities. These interaction

points will be associated with service contracts in SOAML. Finally, the choreography [10] defines a specification of what is transmitted and when it is transmitted between parties to enact a service exchange. It defines what happens between the provider and consumer participants without defining their internal processes. Their internal processes have to be compatible with their service contracts. Modeling the behavior of service contract in order to get a better understanding of the interaction between the roles is done using sequence diagram.

Based on the candidate services, data and choreographic design, the application view of the target application architecture at the logical level is designed.

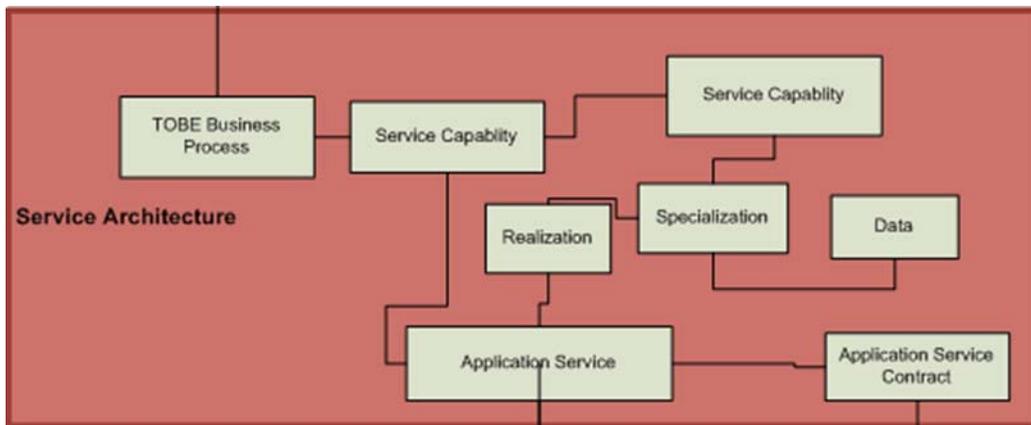


Figure 1: Service Identification

Finally the architecture framework is a foundational structure, or set of structures, which can be used for developing a broad range of different architectures. It describes a method for designing a target state of the enterprise in terms of a set of building blocks, and for showing how the building blocks fit together. It contains a set of tools, standards and deliverable channels, and deliverables in each phase of the development steps and building blocks. Using TOGAF [4] results in enterprise architecture that is consistent, reflects the needs of stakeholders, employs best practice, and gives due consideration both to current requirements and the perceived future needs of the business.

In general, the architectural framework incorporates the following components:

- a) Deliverable channels,
- b) Customer/Citizen applications,

- c) Service layer/Middleware service for multilevel form validation,
- d) Organizational services/functions,
- e) Applications or portals that can be used by the organizations, and
- f) Standards and guidelines, goals, objectives participated organizations, roles, actors, functions, business services, and processes.

4. Experimentation/Prototype

To test the framework and to design and modify the governance that should be applied, it was necessary to discuss with different organizations that participate in the business process interoperability. One of the selected organizations that participated in the case study was MSE office. The key issues discussed on the framework testing were to establish which organizations were responsible for which process and which staff/actor in the organizations

was responsible for which tasks and activities. The other is the prototype design using the web service on J2EE environment to show the designed framework

5. Related Work

Different organizational interoperability are designed in different countries based on their business process, service delivery provision, and governance rules. The Australian Government Interoperability Framework (AGIF) [1] is a key element in the implementation of the e-government strategy, especially in relation to building connected service delivery and achieving value for money.

The Australian Government Business Process Interoperability Framework (BPIF) is one of several frameworks which combines to form a foundation for connected government. The Business Process Interoperability Framework (BPIF), in association with the Australian Government Architecture (AGA) provides agencies with principles, policies, tools, standards, and guidelines for working together. The framework provides the means for individual and collaborating agencies to map business processes with a view to identifying areas of commonality and opportunities for integration or collaboration within an agency and with other agencies [11]. Understanding business processes within an agency or across multiple agencies encompasses understanding the connections that exist between agencies, the degree of commonality in business processes, the flow of information across those processes, and the technology required to facilitate those connections. Business process interoperability enables collaborating agencies to share processes for the achievement of a common goal or for delivering similar services.

The BPIF also provides a roadmap which operates as a high-level methodology for undertaking business process interoperability in government. A number of industry standards and proprietary solutions exist to support agencies to map, model, and manage processes. Undertaking business process interoperability requires a common set of standards, methodologies, and frameworks. Some emerging standards that are used to model business processes

include Business Process Execution Language (BPEL), Unified Modeling Language (UML) and Business Process Modeling Notation (BPMN) [12].

A defining characteristic of business process interoperability is that two or more autonomous organizations jointly execute a process with the purpose of creating a certain output that can serve as an input to other organizations. Some specific challenges exist at the boundaries of organizations.

- Business processes of different organizations are often perceived as a “black box” since process activities and their interdependencies with internal processes are unknown to the internal staff. In order to allow for basic coordination among business partners and clarify interdependencies, the future process architecture needs to reflect external process integration [13].
- In business process interoperability, responsibilities for the different process activities are shared among two or more organizations. Process coordination at the boundaries of organizations is often performed independently due to inadequate clarification of responsibilities. Process models have to provide means to split responsibilities among different organizations and allocate tasks to specific actors.
- Business process design may contain specific organizational know-how that represents competitive advantage. Furthermore, processes contain confidential information, giving rise to a need for organizations to hide internal details of their processes. The future process architecture needs to provide concepts for providing selective transparency of internal processes.
- Boundaries between legal entities have to be treated differently than boundaries between internal organizational units. It is usually governed by contracts and legal frameworks specifying service levels and prices. Process design has to formally describe the interfaces at the organizational boundaries [11].

6. Conclusion and Recommendations

For this work, some of the appropriate TOGAF enterprise architectural framework artifacts and catalogs are applied. The design is done by the point of view of the enterprise architect. In general, this work is a starting point for our country in the field of software engineering. Because the National EA framework of Ethiopia is planned to be implemented using TOGAF so this will show us TOGAF can be applied for our country enterprise architecture. The research also shows the implementation detail of the service architecture of the TOGAF reference model. As a recommendation in the future, it is necessary to study in detail on the governance that should be applied and implement and test fully the security of data exchange between the participated organizations and the real time multilevel form validation option. The other is the multilevel form validation middleware prototype should handle any change made on the services.

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