# Implementation of an Adaptor Component to Integrate Legacy Applications into an SOA Middleware

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**Abstract - Service Oriented Architecture (SOA) is becoming a great innovative architecture in software industry, which supports reusability and interoperability of applications. It is essential for this architecture to be implemented in Information and Communication Technology for Development (ICT4D) domain to leverage its advantages. The use of SOA can accelerate the growth and proliferation of eServices for Marginalized Rural Areas (MRAs) by enabling easy integration of third-party services through Web Services interfaces. The integration of legacy applications using the current SOA architecture will afford flexibility and extensibility. For the integration and modernization to be attained, relevant Web Services interfaces to the SOA middleware need to be exposed. Hence this research will explore the use of Web Services for the modernization of these legacy applications, with a specific focus on eCommerce and eLearning applications.**

**Index Terms—Application Integration, Service Oriented Architectures, Information and Communication Technologies for Development, Siyakhula Living Lab**

## I. INTRODUCTION

The availability of contemporary architectures presents a number of possibilities to modernize legacy applications. Since Service Oriented Architecture (SOA) is next generation software architecture, which through the utilization of web services, XML and other technologies, provides a viable working solution to implement dynamic e-business solutions [1]. As a level of complexity evolves, traditional architectures do not have the ability to deal with the current software problems. Hence this research investigates the integration of eLearning and eCommerce applications into an SOA middleware developed specifically for ICT4D contexts.

Due to the availability of current architectures such as SOA that offers reusability and flexibility of services, there is a need to enhance Information and Communication Technology for Development (ICT4D) eServices platforms by embracing SOA architectures. An SOA based middleware called TeleWeaver, has been developed within the Siyakhula Living Lab. This has enhanced the overall quality of eServices development and delivery within SLL [2]. The use of current architectures enhances ICT4D eServices that have so far been developed using legacy architectures. Within SLL, there is a need to integrate legacy eServices into the TeleWeaver SOA middleware, to make them easily accessible, easy-to-use, scalable, user friendly, flexible and modularized. Taking advantage of existing applications and making them scalable and interoperable using the SOA architecture is therefore what has motivated this research.

## II. SOA AND LEGACY APPLICATIONS INTEGRATION

### *A. Service Oriented Architecture (SOA)*

The maturing of the Internet has resulted in an increase in web based applications. However there is a necessity to update and enhance the web applications, which were implemented using traditional architectures, by using current architectures that allow services to be flexible, reusable and scalable. Service Oriented Architecture (SOA) consists of many interconnected components that allow services to be interoperable and it is used as new architectural paradigm that promotes extensibility of legacy applications. SOA has evolved to allow greater flexibility in adapting IT infrastructure to satisfy business needs.

SOA is revolutionizing how distributed computing is organized. It offers opportunities as well as challenges in modernizing legacy applications [4]. "SOA is attractive because it can lower IT integration cost, freeing funds for greater innovation and transformation at the line business level" [4]. The SOA paradigm allows eServices to be reused on a broad number of computing platforms. Using contemporary architectural paradigm allows legacy applications to be modernized by opening them up as web services as well as to publish the services to a service registry.

### *B. Teleweaver*

Siyakhula Living Lab (SLL) is an ICT4D intervention undertaken between the University of Fort Hare and Rhodes University at the Dwesa community. SLL has developed lots of eServices such as eCommerce, eLearning and eHealth for Dwesa community. Dwesa is a Marginalized Rural Area in the Eastern Cape region. These eServices allow the Dwesa community to benefit from the use of technology and from participating in the global information society. As part of evolving the SLL eServices platform, all the eServices that have been developed are being migrated to be hosted on a SOA middleware. The SOA middleware under consideration is called a Teleweaver, and it has been developed by Reed House Systems, an ICTD software company affiliated to the

Siyakhula Living Lab (SLL). Teleweaver is an open source technology that is developed for SLL. It is poised to become a next generation enabler for rural telecenters and digital access nodes [3].

*C. Integration*

Application integration is typically a complex and costly process, in which different techniques are needed for different technologies. Integrating legacy applications increases flexibility in connecting clients with the eServices. The integration of distributed computing into Teleweaver SOA middleware will enable applications to be reusable and also more usable through using Single Sing On (SSO) functionality. Integration increases performance of legacy applications, and also enhances reuse and transparency of eServices. It promotes business visibility as well as offering easy access to applications. Integration of legacy applications into SOA middleware will leverage third-party solutions that are based on open standards. Hence this research will integrate the osCommerce and Moodle legacy applications into the TeleWeaver SOA middleware, to increase the development productivity, also to reduce the processing time for the applications and provide user friendly applications.

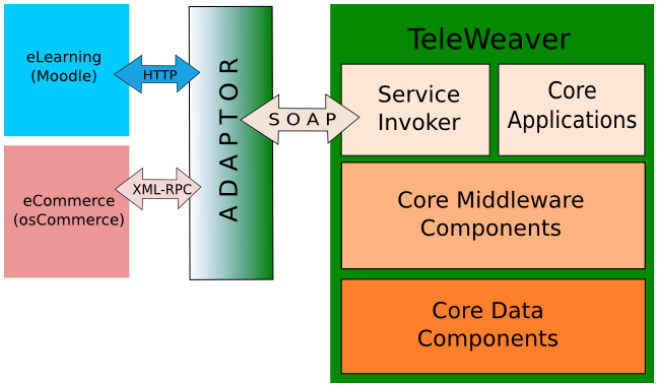


**Figure 1: Third-party integration Architecture**

The architecture above illustrates the mechanism for integration of third-party applications in TeleWeaver. ELearning and eCommerce applications will be integrated into a Teleweaver via an adaptor model. This research is about developing an adaptor that will be used to for the specific integration of osCommerce and Moodle. The adaptor model is needed to connect these eServices into a middleware.

*D. Adaptor model*

To enable requests between legacy applications and the middleware, the adaptor will use more than one mechanism. For adaptor to receive and send request and response to middleware, Simple Object Access Protocol (SOAP) will be used. Since SOAP is platform independent and can be used by different languages, it allows diverse applications to communicate. Assuming that the development of eCommerce uses Model View Controller, for eCommerce to communicate with adaptor, Hypertext Transfer Protocol (HTTP) will be used. As stated in the diagram above, the mechanism that will be used to connect Moodle application and adaptor model is XML-RPC, because of its advantages on integration of applications into a middleware.

## III.CONCLUSION

This paper has identified the problem of application modernization and highlighted the need to provide relevant mechanisms. These mechanisms will be used to integrate legacy applications, specifically Moodle and osCommerce services into new architectures in a manner that will leverage their capabilities while improving their functionality and providing extensibility, scalability and flexibility. The envisaged contribution of this research is to investigate the mechanism that will integrate these applications into the TeleWeaver SOA middleware, while modernizing the old application and enhancing the use of new architectures in Information and Communication Technology for Development in MRAs.

## IV. ACKNOWLEGEMENTS

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**Makaziwe Makamba** received her undergraduate degree in 2009 from the University of Fort Hare. In 2010 she received her BSc (hon.) in Computer Science. She is presently studying towards her Master of Science degree at the same institution. Her research interests include ICT for development, web services, distributed computing and SSO.