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ENTERPRISE ARCHITECTURE PLANNING USING TOGAF ADM FOR FUEL DISTRIBUTION OPERATIONS

Putri Kaneshia Rahmadina[*1], Nining Ariati[2], Agustina Heryati[3]

[1,2,3]Sistem Informasi, Fakultas Ilmu Komputer dan Sains, Universitas Indo Global Mandiri, Palembang, Indonesia
Email: [1]2022210021@students.uigm.ac.id , [2]nining@uigm.ac.id, [3]agustina.heryati@uigm.ac.id

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Abstract

PT Dian Aristy Energi Palembang is a company engaged in the distribution of industrial fuel oil (BBM). The current operational processes are still conducted manually and are not integrated, leading to data duplication, reporting delays, low information accuracy, and difficulties in monitoring distribution activities, which affect managerial decision-making. This study aims to develop a strategic Enterprise Architecture plan based on TOGAF ADM to improve the alignment between information systems and fuel distribution operations. The research method used is qualitative descriptive with a case study approach, with data collection techniques including interviews, observations, and documentation. The TOGAF ADM phases applied consist of Preliminary Phase, Architecture Vision, Business Architecture, Information System Architecture, and Technology Architecture. The results of this study produce an Enterprise Architecture design that describes the current condition (AS-IS) and the proposed condition (TO-BE), including business process modeling, data architecture, application architecture, and supporting technology architecture. The proposed design enables the integration of operational processes through digital systems such as purchase order processing, distribution monitoring, and complaint management. This study concludes that the implementation of Enterprise Architecture based on TOGAF ADM can improve operational efficiency, data accuracy, information transparency, and support better decision-making, as well as provide a reference for the development of integrated information systems

Keywords: enterprise architecture; togaf adm; information systems; fuel distribution; business and it alignment.

1. INTRODUCTION

The rapid development of information technology has significantly influenced industrial operations, including fuel distribution services[1]. The implementation of integrated Information Systems (IS) is essential to improve operational efficiency, data accuracy, and managerial decision-making[2], [3]. PT Dian Aristy Energi Palembang, a company engaged in industrial fuel oil (BBM) distribution, still manages several operational activities manually, including delivery reporting, complaint handling, fleet monitoring, and administrative documentation using Microsoft Excel and WhatsApp communication. These conditions create risks of data duplication, reporting delays, weak document traceability, and difficulties in real-time monitoring of fuel distribution activities[4].

Previous studies indicate that Enterprise Architecture implementation using TOGAF ADM can improve business process integration and align information systems with organizational objectives[5]. However, studies specifically addressing strategic enterprise architecture planning in industrial fuel distribution operations remain limited, particularly for integrating operational workflows, logistics monitoring, and customer complaint management[6], [7]. In the logistics and transportation domain, several studies have demonstrated the effectiveness of enterprise architecture in optimizing operations. Falcão et al. [8] applied enterprise architecture in a logistics company and showed improvements in process efficiency and data integration. Similarly, Ilin et al. [9] emphasized that TOGAF ADM enables better coordination of logistics processes and supports decision-making in transportation systems. In the context of fuel and gas distribution, Rachmandany et al. [10] demonstrated that TOGAF-based enterprise architecture improves service delivery and operational coordination. Furthermore, recent studies highlight that enterprise architecture contributes significantly to digital transformation in transportation sectors by enabling integrated data environments and improving strategic performance management [11].

Despite these advancements, studies specifically addressing strategic enterprise architecture planning in industrial fuel distribution operations remain limited. Most existing research focuses on general logistics, transportation, or smart systems, with limited attention to integrating operational workflows, logistics monitoring, and customer complaint management within a unified architecture. This gap highlights the need for a more domain-specific enterprise architecture approach tailored to fuel distribution operations.

To address these issues, this research applies The Open Group Architecture Framework (TOGAF) using the Architecture Development Method (ADM) to design enterprise architecture strategically[12]. The phases used include Preliminary Phase, Architecture Vision, Business Architecture, Information System Architecture, Technology Architecture, and Opportunities and Solutions[13], [14]. Therefore, this study aims to develop strategic enterprise architecture planning to improve the alignment between information systems and fuel distribution operations at PT Dian Aristy Energi Palembang, thereby enhancing operational efficiency, data transparency, and service responsiveness[15], [16].

This study develops a domain-specific enterprise architecture model tailored to industrial fuel distribution operations by integrating logistics workflows, fleet monitoring, and customer complaint management within a unified TOGAF ADM framework. Previous studies have largely focused on general logistics systems and high-level enterprise architecture implementation, with limited attention to the specific operational complexities of fuel distribution, particularly in real-time monitoring, complaint handling, and the use of fragmented communication tools. In response to these gaps, this research proposes a comprehensive architectural blueprint that aligns business processes, information systems, and technology infrastructure while addressing operational inefficiencies in fuel distribution activities. The resulting design provides a more integrated and practical approach to improving data transparency, operational control, and service responsiveness within the organizational context.

2. RESEARCH METHODS

This study employs a qualitative descriptive method with a case study approach to analyze business processes and develop enterprise architecture planning for fuel distribution operations at PT Dian Aristy Energi Palembang. The research methodology includes data collection activities and the implementation of TOGAF ADM as the main framework for enterprise architecture design.

2.1. Research Approach and Data Collection

This study applies a qualitative descriptive approach using a case study at PT Dian Aristy Energi Palembang. Data were collected through observation, interviews, and documentation to identify operational workflows, information system constraints, and organizational needs related to fuel distribution services.

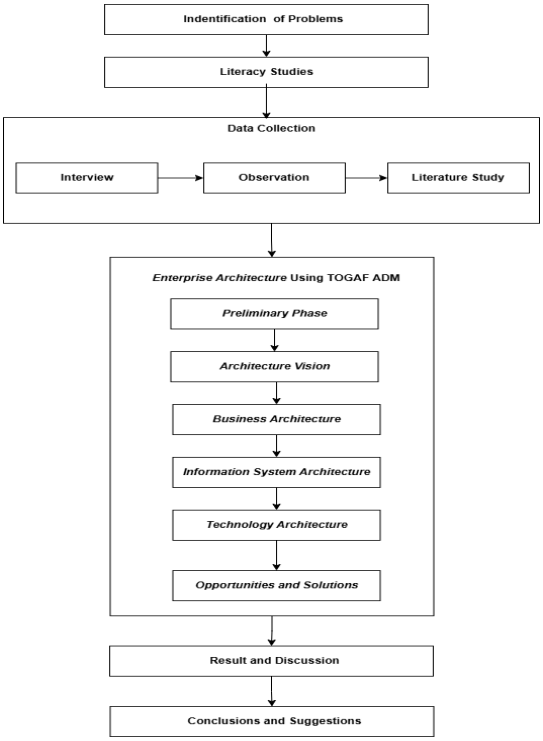

Figure 1. Research Stages

2.2. Togaf Implementation

The enterprise architecture design adopts The Open Group Architecture Framework (TOGAF) using the Architecture Development Method (ADM). TOGAF ADM was selected because it provides a structured methodology for aligning business processes, information systems, data management, applications, and technology infrastructure[17]-[18]. The implementation stages of TOGAF ADM in this research are as follows:

a. Preliminary Phase
Defines enterprise scope, identifies stakeholders, determines architectural principles, and analyzes organizational problems using the 5W+1H approach.

Table 1. 5W+1H Problem Identification

Driver	*Description*
What	TOGAF ADM-Based Enterprise Architecture Strategic Planning to Improve Alignment of Information Systems and Fuel Distribution Operations at PT Dian Aristy Energi Palembang
Who	Employees involved in fuel distribution operations and company information system management
Where	PT Dian Aristy Energi Palembang, South Sumatra
When	Data collection was conducted in 2025 through interviews and observations of the operational process of fuel distribution
Why	This research was conducted because the operational process of fuel distribution at PT Dian Aristy Energi Palembang is still manual and not yet integrated, resulting in data duplication, reporting delays, information inaccuracies, and low operational efficiency. This condition impacts the company's difficulty in making strategic decisions, so that targeted information system planning is needed to improve alignment between business processes and technology
How	The design was carried out using the TOGAF ADM framework

b. Architecture Vision
Formulates strategic objectives for integrated information systems to improve operational efficiency, transparency, and service responsiveness.
c. Business Architecture
Analyzes current business processes (AS-IS), including Purchase Order processing, fuel distribution, delivery reporting, and customer complaint handling, followed by improved process design (TO-BE).
d. Information Systems Architecture
Designs data architecture and application architecture, including digital PO systems, distribution monitoring systems, and complaint ticketing systems.
e. Technology Architecture
Identifies infrastructure requirements such as centralized databases, cloud servers, GPS tracking, and mobile-based monitoring.
f. Opportunities and Solutions
Conducts gap analysis between current and proposed conditions, followed by implementation recommendations and development roadmap planning.

Through these stages, TOGAF ADM supports systematic enterprise architecture planning to improve alignment between operational fuel distribution processes and integrated information systems at PT Dian Aristy Energi Palembang[19].

3. RESULTS AND DISCUSSION

The implementation of TOGAF ADM in this study produces enterprise architecture planning recommendations to improve fuel distribution operations at PT Dian Aristy Energi Palembang.

3.1. Business Architecture

Analysis of current business processes (AS-IS) shows that Purchase Order processing, delivery reporting, fleet monitoring, and customer complaint handling are still performed manually. Administrative recording relies on Microsoft Excel, while operational communication depends on WhatsApp. These conditions cause reporting delays, duplicated data, weak document traceability, and limited real-time monitoring. The proposed business process model (TO-BE) introduces integrated digital workflows for Purchase Order verification, distribution scheduling, Proof of Delivery reporting, and complaint management.

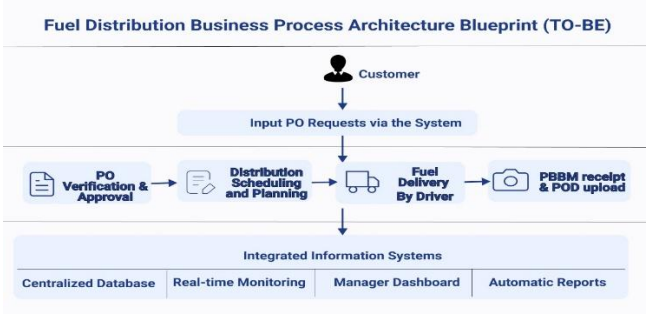

Figure 2. BPMN AS-IS Fuel Distribution Process

3.2. Information System Architecture

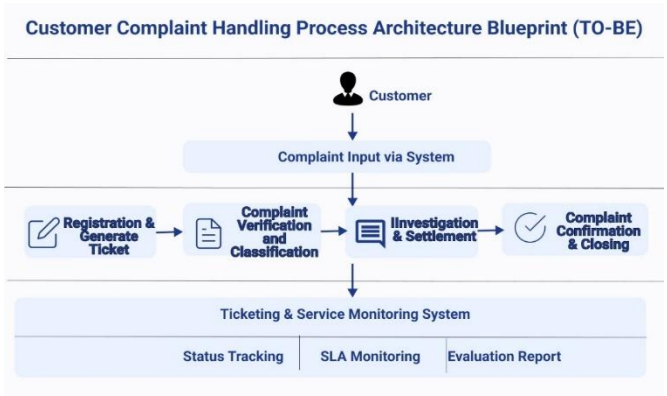

Figure 3. BPMN TO-BE Fuel Distribution Process

The proposed application architecture consists of:

1. Digital Purchase Order System
2. Fuel Distribution Monitoring System
3. Customer Complaint Ticketing System

These systems are designed to improve coordination between operational, administration, finance, and customer service units.

Figure 4. Use Case Diagram

3.3. Data Architecture

The designed data architecture identifies main business entities including Customer, Purchase Order, Delivery, Driver, Invoice, and Complaint. These entities support integrated data management across fuel distribution activities.

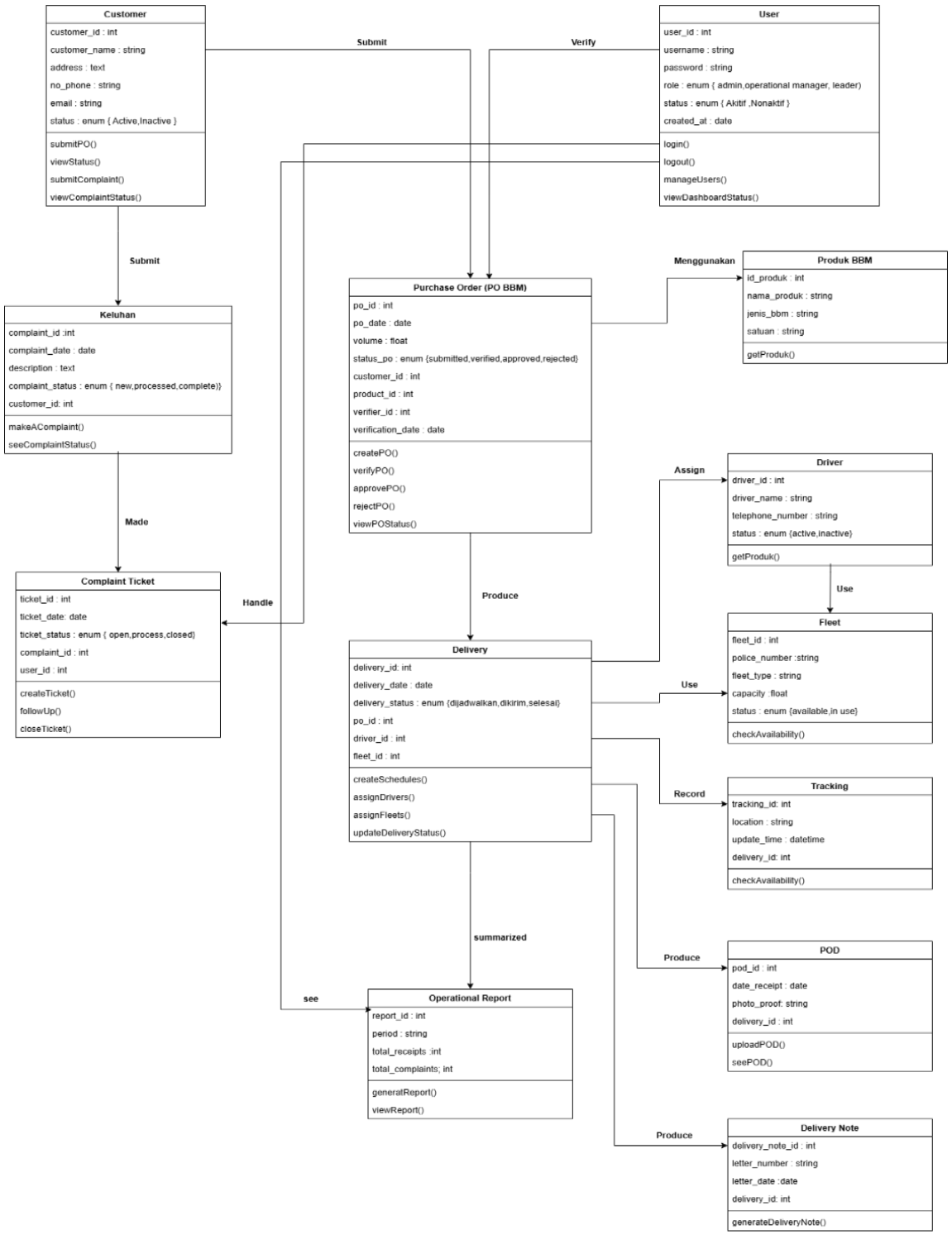

Figure 5. Class Diagram / Data Architecture Model

3.4. Technology Architecture

Technology recommendations include centralized databases, cloud servers, GPS tracking integration, and mobile-based monitoring to support real-time operational visibility.

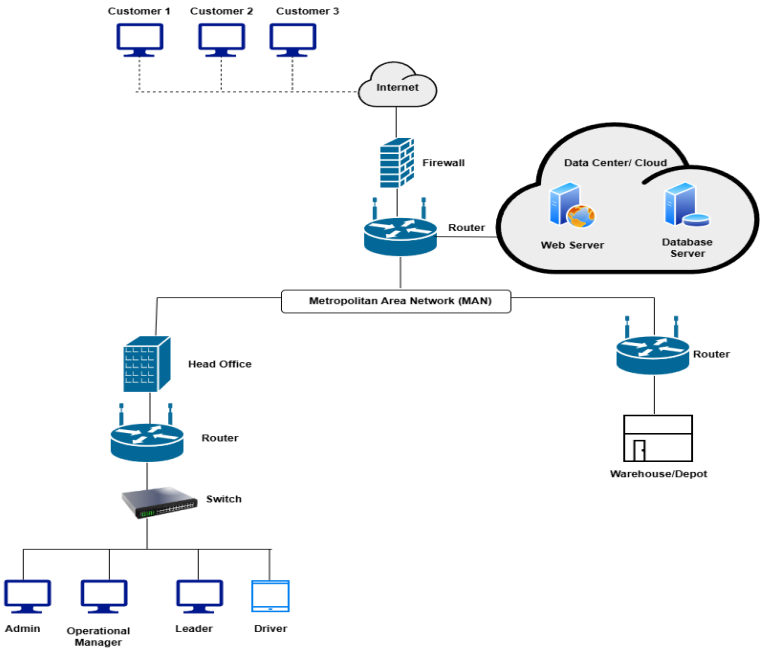

Figure 6. Technology Infrastructure Blueprint

3.5. Gap Analysis

Gap analysis identifies major areas for improvement by comparing current and proposed conditions:

a. Manual recording → Integrated digital system
b. Excel-based reports → Centralized database
c. WhatsApp monitoring → GPS-based tracking
d. Manual complaints → Ticketing management system

Table 2. Gap Analysis AS-IS vs TO-BE

TOGAF ADM Aspects	As-Is condition	To-Be Condition
Business Architecture	Manual and separate process	Integrated and automated processes
Information Systems Architecture	The system is not integrated	Fully integrated system
Data Processing	Manuals	Digital and real-time
Monitoring & Control	Limited	Centralized and real-time
Technology Architecture	Infrastructure is not optimal	Standardized and secure infrastructure

3.6. Strategic Implementation Plan

The enterprise architecture development is supported by a strategic implementation plan based on phased system priorities. In accordance with the enterprise architecture planning strategy in this research, implementation begins with digital Purchase Order processing, followed by distribution monitoring systems, customer complaint management, and supporting infrastructure integration.

Table 3. Enterprise Architecture Strategic Planning Roadmap

No	Stage	TOGAF ADM Focus	Activity
1	Stage 1	Preliminary Phase & Architecture Vision	Identification of organizational problems, determination of the scope of Enterprise Architecture planning, and formulation of architectural vision and principles that are aligned with the company's strategic objectives.
2	Stage 2	Business Architecture	Analysis and modeling of the current fuel distribution business process (AS-IS) and the design of the proposed business process (TO-BE) using BPMN.
3	Stage 3	Information System Architecture	Planning data architecture and application architecture that supports the fuel distribution business process and identifying the needs of an integrated information system.
4	Stage 4	Technology Architecture	Planning technology infrastructure needs including hardware, software, networks and system security to support application implementation.

5	Stage 5	Opportunities and Solutions	Preparation of gap analysis between AS-IS and TO-BE conditions and formulation of opportunities, implementation solutions, and development packages (work packages) as recommendations for gradual enterprise architecture planning.

3.7. Discussion

The proposed enterprise architecture demonstrates how TOGAF ADM effectively supports the alignment between business processes, information systems, and technology infrastructure in fuel distribution operations. According to TOGAF principles, alignment is achieved through a structured approach that integrates Business Architecture, Information Systems Architecture, and Technology Architecture. In this study, business processes such as Purchase Order processing, distribution scheduling, delivery reporting, and complaint handling are directly supported by integrated application systems and enabled by appropriate technological infrastructure. This alignment ensures consistency, reduces redundancy, and improves overall operational efficiency.

The effectiveness of the proposed solution can be explained through TOGAF ADM concepts, particularly in the systematic transformation from AS-IS to TO-BE conditions. The integration of digital systems reduces manual intervention, minimizes data duplication, and improves real-time data accessibility. These improvements are consistent with previous studies that highlight the role of enterprise architecture in enhancing business-IT alignment and operational performance[5], [7]. However, this study provides additional value by focusing specifically on fuel distribution operations, integrating logistics monitoring, operational workflows, and customer complaint management into a unified architecture.

Compared to previous research, this study offers a more applied approach by addressing operational challenges in industrial fuel distribution. While earlier studies mainly focus on general enterprise architecture implementation, this research emphasizes practical integration across operational units, including administration, logistics, and customer service. This indicates that the proposed architecture not only aligns systems but also enhances cross-functional coordination.

To evaluate the success of the proposed architecture, several performance indicators can be considered, such as reduction in processing time for Purchase Orders, decreased data entry errors, improved accuracy of reporting, and enhanced real-time monitoring capability. Additionally, customer service performance can be measured through faster response times and improved complaint resolution efficiency. Although this study is conceptual, these indicators provide a basis for future evaluation after system implementation.

From a practical perspective, the implementation of this architecture can significantly impact the organization. Operationally, it improves workflow efficiency and reduces dependency on manual processes. From a managerial perspective, it enhances decision-making through real-time data availability and accurate reporting. In terms of customer service, the implementation of a complaint management system improves responsiveness and service quality. However, several challenges may arise, including high implementation costs, the need for skilled human resources, user resistance to new systems, and integration complexity. These challenges must be addressed through proper change management strategies.

4. CONCLUSION

This study demonstrates that the application of Enterprise Architecture using the TOGAF ADM framework provides a structured and systematic approach to improving fuel distribution operations at PT Dian Aristy Energi Palembang. The results show that the proposed enterprise architecture successfully aligns business processes, information systems, and technology infrastructure through the transformation from manual (AS-IS) conditions to integrated digital systems (TO-BE). The designed architecture integrates key operational components, including Purchase Order processing, fuel distribution monitoring, and customer complaint management, resulting in improved data accuracy, reduced duplication, enhanced real-time monitoring, and better operational control.

Furthermore, the gap analysis highlights significant improvements in all architectural layers, particularly in business process automation, system integration, and centralized data management. The implementation roadmap also provides a practical guideline for gradual system development, ensuring alignment with organizational priorities and resource capabilities. Overall, this study confirms that TOGAF ADM is effective in supporting business-IT alignment and enhancing operational efficiency in fuel distribution environments.

However, this study is limited to conceptual design and has not yet been validated through full system implementation and quantitative performance measurement. Therefore, future research is recommended to focus on the implementation and evaluation of the proposed architecture using measurable performance indicators, such as processing time reduction, system reliability, and user satisfaction. In addition, further studies may explore the integration of advanced technologies, such as Internet of Things (IoT) for real-time fleet tracking, big data analytics for demand forecasting, and artificial intelligence for decision support systems. Expanding the research to other sectors within energy distribution or conducting comparative studies across multiple organizations could also provide broader validation and generalization of the proposed enterprise architecture model.

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