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Enterprise Architecture: Enabling Digital Transformation for Operational Business Process during COVID-19

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Abstract

The SARS-CoV-2 pandemic and the global response to contain its spread and deaths have been unprecedented, according to UNICEF research on COVID-19 released in 2021. Many steps had been taken by countries worldwide, particularly those in South Asia. As of May 17th, 2020, Indonesia reported a total of 17,514 daily positive cases. It has been confirmed that the majority of cases throughout the archipelago occur primarily on Java, particularly in the Greater Jakarta, Greater Bandung, Semarang, Solo, and Greater Surabaya areas. The research object of this paper is a system integrator company located in, Central Jakarta. The company's business is badly impacted by this pandemic. The company provides nearly all ICT solutions, yet improving their internal systems is an issue that has never been brought up. Due to physical distance regulations, leading workers to work from home. To keep the business running, the company began using email as their only tool to run the whole system, which is not effective and causing a crisis for the company. The purpose of this paper is to propose a digital transformation plan as a solution and to support business continuity by utilizing TOGAF ADM.

Keywords: Enterprise Architecture; TOGAF ADM; Digital Transformation; COVID-19.

1. Introduction

In 2021, UNICEF issued a report on COVID-19. The SARS-CoV-2 pandemic and the global response to restrict its spread and the mortality caused by COVID-19 were unprecedented in terms of a global health catastrophe and the efforts adopted by countries around the world, particularly South Asian nations, to battle its spread. In response, physical distancing, school closures, travel restrictions, and nationwide lockdowns have been implemented, resulting in limited access to vital healthcare services and considerable economic damage. As of February 2021, over 12 million cases of COVID-19 had been reported in South Asia, especially in Afghanistan, Bangladesh, Bhutan, the Maldives, Nepal, India, Pakistan, and Sri Lanka. India alone has reported over 10.9 million cases [1].

As of May 17, 2020, Indonesia had confirmed 17,514 cases of COVID-19. Throughout the archipelago, confirmed cases have been documented, with the largest portion of disease transmission occurring on the island of Java, mainly in Greater Jakarta, Greater Bandung, Greater Semarang, Greater Solo, and Greater Surabaya [2]. Numerous government actions, including social distancing, double-mask wearing, and work-from-home policies, have been taken. Large-scale social restrictions (PSBB/PPKM) have been applied in regions with a high number of COVID-19 cases and deaths. This restriction has led to lockdowns of schools and offices, as well as restrictions on religious, social, and cultural activities. This has led to the online transformation of these various fields. Professor Caroline Chan said again in 2020 that Indonesia needs to focus on three things to make the most of this potential. One of these is improving its ICT and digital-skilled workforce.

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This paper will perform research on a system integrator company located at Central of Jakarta. They offer a complete enterprise infrastructure solution, from databases to endpoint solutions. They are divided into two division, which one another located at separate building. "Solution Provider" or "SP", is responsible for all network solutions; the other is referred to as "Enterprise", which is responsible for all infrastructure solutions. Even though they provide nearly all ICT solutions, digitizing their own processes has never been a priority. Due to physical separation and work-from-home regulations, object research uses email to conduct business operations. Last year, the first weakness identified was a "lack of efficiency" in operational business. There are four main problems with their current system:

- **Time-Consuming:**

Even though the workers work from home, didn't mean they always bring their work laptop everywhere they go. So, the chance to get more delayed time is bigger. Some of the high-level management didn't even know of the email unless they had been notified or reminded by phone.

As it goes on, it takes a longer time to process customer orders, so most of their projects didn't fulfil the project timeline.

- **Ineffective:**

The communication still manual by email. Before pandemic, email maybe effective in supporting their need. After the pandemic, workloads got higher with a higher pressure, departments will blame on each other whenever any tiny problem occurs.

- **Disorganized & Bad Documentation:**

Email is a communication tool and didn't have an organizing function. All of the emails will be sent to one containment only, known as the inbox. The emails will be mixed up and so leading to bad documentation. Microsoft Outlook didn't have any capabilities to sort things well enough for company documentation with no standardization.

- **Low of Security:**

Not few times, the approver approved the process by delegating it to other people. As shown as below, the note of the approval is "Approved by WA". Which means the approval approved it by WhatsApp and other people put those note on the email. With no authentication, this kind of situation is very easy to be manipulated by the wrong person.

The majority of their customers are public-sector institutions that require them to release multiple purchase orders (POs) per day and to be able to clarify each action taken when necessary. Occasionally, in exceptional circumstances, an invoice may be disputed, necessitating confirmation from the Head of Delivery regarding the services and goods delivery documentation. Additionally, they utilize email as a tool, hoping that all individuals who are in the loop will read the email and thus become aware of the condition. With delayed POs will affecting delayed on project's plan and timeline, in which company will have to lose few projects since they wouldn't be able to fulfill the timeline. As shown on Table 1 is the data comparison of projects handled by company from year 2019 and 2020.

Table 1. Data project 2019 and 2020

Description	2019 (Before Pandemic)	2020 (After Pandemic)	↓ Potential Opportunities/Projects (annual)	%
Opportunity	492	342	-150	30.49%
Project	196	137	-59	30.10%
Failed Project	0	10	-10	

Table 1 shows that after the pandemic, the number of their sales team's prospects decreased by 30%. This number raised concerns with their Board of Directors (BOD). As time passes, all businesses accelerate and operate in an increasingly demanding environment. The Financial Times, which recently published an article on this fast-paced pressure, feels compelled to warn business leaders to exercise caution when it comes to their employees' health. According to one of their statements, the primary beneficiary of this unprecedented period of change is undoubtedly Big Tech companies, as their customers are forced to accelerate online plans, adopt new networking tools, and hire remote workers. Additionally, the Financial Times reported that the combined market value of the leading technology companies reached a new high this week. The technology companies are leading the way in terms of changing workplace practices [3].

Based on this background, this research will propose a solution for business continuity and help optimize the company's operational business process, which involves eight departments: Marketing Department, Sales Department, Finance-Controller Department, Finance Department, Procurement Department, Implement Department, Support Department, and Delivery Department. The next section will describe the literature review of this paper, which the author uses as the theoretical foundation of this paper. Section 3 will present the research methodology of this paper. The data gathering and architecture analysis will be explained in Section 4. And the last section will conclude the paper as a guideline for the company's IT blueprint.

2. Literature Review

This section discusses the relationship between how COVID-19 is causing digital transformation and the reason the author chose TOGAF ADM as the framework. Prior to proceeding further, the author will present related works in various fields as a foundation for this research.

2.1. COVID-19: A Disaster that Enhanced Global Technology

Before 2019, no one would have believed that a single, lethal danger could alter lives irrevocably in the blink of an eye [4]. The coronavirus, or COVID-19, is the leading cause of the recent changes in our lives; for instance, we must adjust to the "new normal" as if it were our "normal". The pandemic has disrupted corporate productivity [5], forcing adjustments to business procedures [6]. Many admit that the regulation compelling us to remain at home is the most difficult adjustment to this new norm. As indicated in the introduction, every employee has experienced an increase in stress due to the epidemic. People must labour longer hours for less income each day. Tokazhanov et al. [7] corroborated this assertion in a research investigation in 2020. The author underlines the various ways in which the current COVID-19 pandemic is influencing society. Other research investigates important aspects affecting an organization's operational viability and ability to overcome adversity in the case of a COVID-19 pandemic. Combining current theoretical frameworks with actual success case studies, the researchers highlight the important characteristics and tactics that organizations should adopt to survive and prosper during and after crises. Examining organizational features, operations, digital transformation, and financial planning, this essay presents a novel strategy for COVID-19. Researchers concluded that with increased digitization and internet technology, operations may be maintained throughout pandemics [8]. Since the introduction of COVID-19, the tendency toward digital applications has risen [9].

2.2. Digital Transformation

The digitization process combines the virtual sector of the economy with the physical sector. A digital platform integrates digital resources that offer services and metadata. It generates value by establishing a connection between the entrepreneur and the customer. Digital platforms are the pinnacle of digital infrastructure. Included are the Internet, data centers, smart phones, and tablets. New, high-risk digital endeavors require access to a robust digital infrastructure [10]. A study on cross-cultural trends sheds light on the globalization of the business environment each year. According to their research [11], digitalization and the increasing influence of new generations facilitate such processes. The primary spheres of influence of digital transformation are as follows: digital transformation of society; digital transformation of the corporate environment; digital transformation of personnel; digital transformation of management; and digital transformation of operating activities [12]. Due to the vastness of the land, research guidance from Loughborough University indicates that design decisions can be made using excellent architectural modeling, where different solutions can be modeled and explored [13]. Digital transformation is typically administered as a separate program or division from enterprise architecture, notwithstanding the contentions of some researchers within an organization. Others argue that this circumstance will realize the full potential of the digital revolution. Digitalization should be extensively connected with all enterprise levels and services, or it will cause digital disruption. Digital disruption will have a significant influence on businesses, and all company levels must take steps to adapt to rapid change [14].

2.3. Enterprise Architecture as the Digitalization Guideline

Digitalization is a very complex process to do, especially for enterprise companies. As demonstrated by Trad & Kalpi [15], enterprise architecture provides the tools and approaches to manage the complexity of digital transformation. Additionally, they mention that involving EAs early in the digital transformation will benefit them. The various aspects of an enterprise possibly affected by digital transformation include organizational structure, business processes, information systems, and infrastructure, which together form an Enterprise Architecture (EA) [16]. Other research in Budapest also underlined that to successfully manage digital transformation, current enterprise architectures and IT governance processes must be revisited [17]. Enterprise architecture (EA) defines the current and desired future states of an organization's processes, capabilities, application systems, data, and information technology infrastructure, as well as a roadmap for achieving the desired future state from the current state [18]. This allows the business unit to innovate in order to gain a competitive edge, while simultaneously fostering synergies between business units. The benefits of a good enterprise architecture include [19]:

- Improved IT operations efficiency;
- Lucrative investments;
- Reducing risk associated with rule violations;
- Company operations that are more efficient, straightforward, and quick.

2.4. The Best Practices of The Open Group Architecture Framework (TOGAF)

To this very present day, numerous frameworks have been developed to design enterprise architecture. In 2017, the research team at Conexiam presented a technique for enterprise architecture (EA) teams to leverage The Open Group's standards, best practices, snapshots, and publications to facilitate digital business transformation. They demonstrate how this approach can be applied to expedite the delivery of value to the organization and how it shapes conversations at all business levels regarding business strategy, IT delivery, governance, and digitization [20]. Moving to 2021, Liao and Wang performed a study on manufacturers in the chemical industry [21]. As a conclusion to their research, Liao and Wang offered an in-depth TOGAF analysis of an actual business transformation occurring at a large worldwide chemical corporation, extracting the architectural framework that this company may have employed to change into a lean enterprise. TOGAF generates a comprehensive image of an organization [22]. TOGAF also helps Intel IT execute the company's digital transformation plans, and Intel is investing in resources with expertise in this framework [23]. Some authors refer to TOGAF as a de facto industry standard in EA practice. Other studies show that TOGAF is the most cited and widely discussed publication in the field of enterprise architecture, and about how it represents a modern understanding [24–30]. TOGAF is a framework that provides methodologies and tools for constructing, managing, implementing, and maintaining corporate architecture. Preliminary, Architectural Vision, Business Architecture, Information Systems Architecture, and Technology Architecture are the phases utilized in this architectural framework [31]. And for digitalization to happen, research shows that change agents must be aware of, understand, and know the most important requirements and principles of both the current and future (company-intended) models [32], which are the basis of TOGAF.

Based on the presented literatures, author concludes that enterprise architecture is the appropriate tool for digitizing internal operational processes. From many success stories of digital transformation using TOGAF framework, author believes that TOGAF is a comprehensive framework for this research.

3. Research Methodology

This section will discuss the methodology used to conduct this research from the start. The first section contains the framework for the research that will be used to answer the research question. The second section and the remainder of the document contains the explanation.

3.1. Research Frameworks

As shown on Figure 1 is the research framework for this paper. This research focus on preliminary phase up to technology architecture phase of TOGAF ADM.

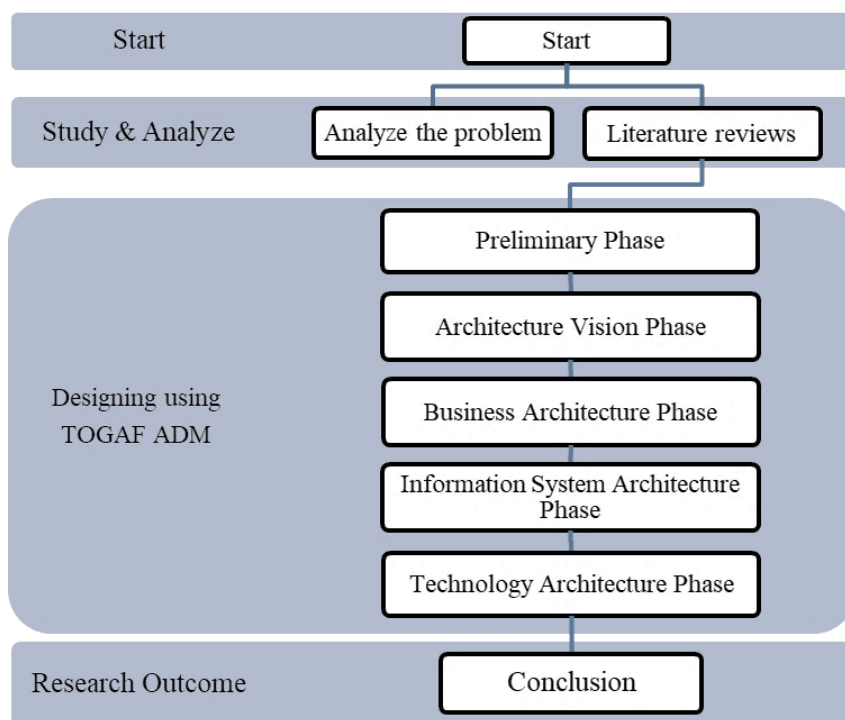


Figure 1. Research framework

Author currently is working at a system integrator company that becomes the object research. Lately, the company business really took the effect from the pandemic. Each employee always on the edge and feels an enormous pressure. If this situation keeps going, the company will be collapsed soon. That is when author starts this research.

3.2. Problem Identification

By interview and observation, the author will identify the problem that occurs during the pandemic. The company will pick two business head units that will represent the company from a business and technical perspective.

3.3. Literature Reviews

This is the author's first research project from the ground up. This research-based theory requires a review of the literature. Researching the past literature, the author realized that the internal systems are still conventional. And as discussed in the literature review, the author decided to use the enterprise architecture framework to propose a solution for companies to overcome the difficulties caused by COVID-19.

3.4. Designing Enterprise Architecture using TOGAF ADM

In the preceding chapter, author had already analysed the problem and reviewed the past literature. After that, this research will be processed using the following steps from TOGAF ADM phases.

- The Open Group Architecture Framework: Architecture Development Meth

The research method used to design the enterprise architecture in this paper is a review of the TOGAF ADM literature. TOGAF ADM is the result of on-going contributions from a diverse group of architecture practitioners [33]. It defines methods for developing and managing Enterprise Architecture throughout its lifecycle and serves as the foundation for TOGAF. It incorporates the TOGAF elements Figure 2.

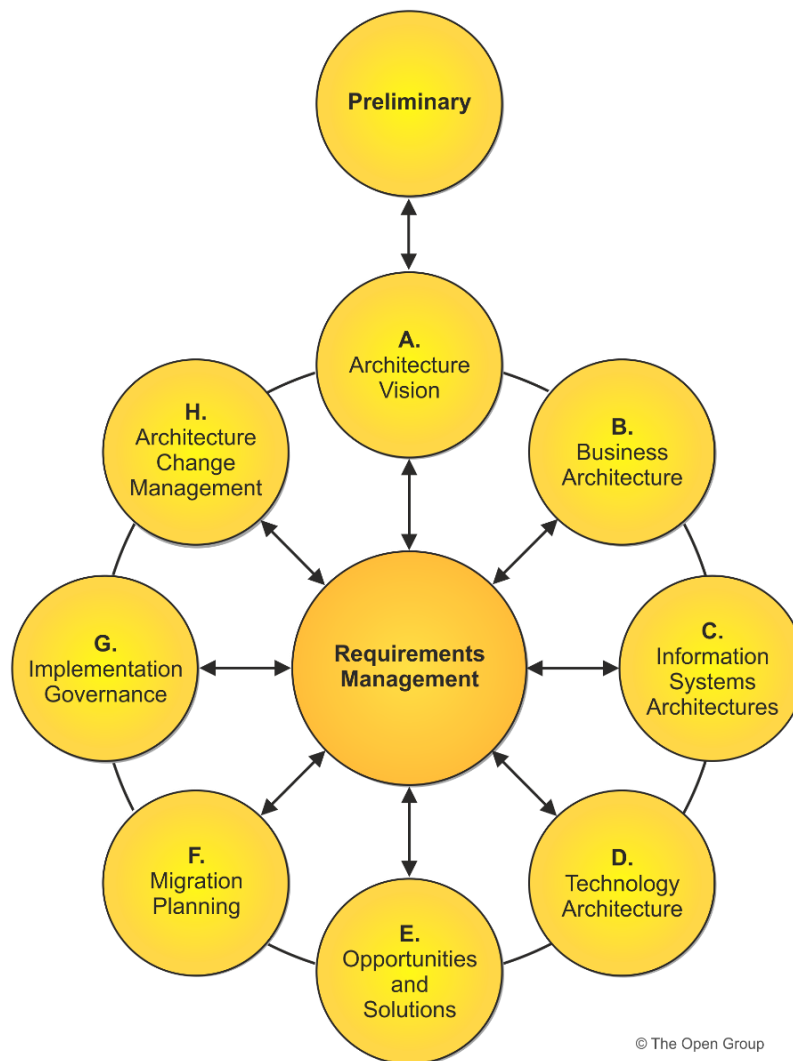


Figure 2. The nine phases of TOGAF

a) Preliminary Phase

This is the initial phase of designing the research framework, beginning with the scope of the organization, forming teams and organizations, identifying and establishing principles, and selecting and modifying the architectural framework.

b) Architecture Vision

This phase promotes coherence across diverse viewpoints on the enterprise architectural needs required to achieve organizational objectives. This phase involves an analysis of strategic requirements and the effectiveness of business processes.

c) Business Architecture Phase

This phase defines the initial conditions of the business architecture by outlining the hierarchy of each business model to ensure that it includes all essential business activities based on the needs and scenarios for each business process. Utilizing a value chain model, as shown in Figure 3, architectural vision strategies are developed.

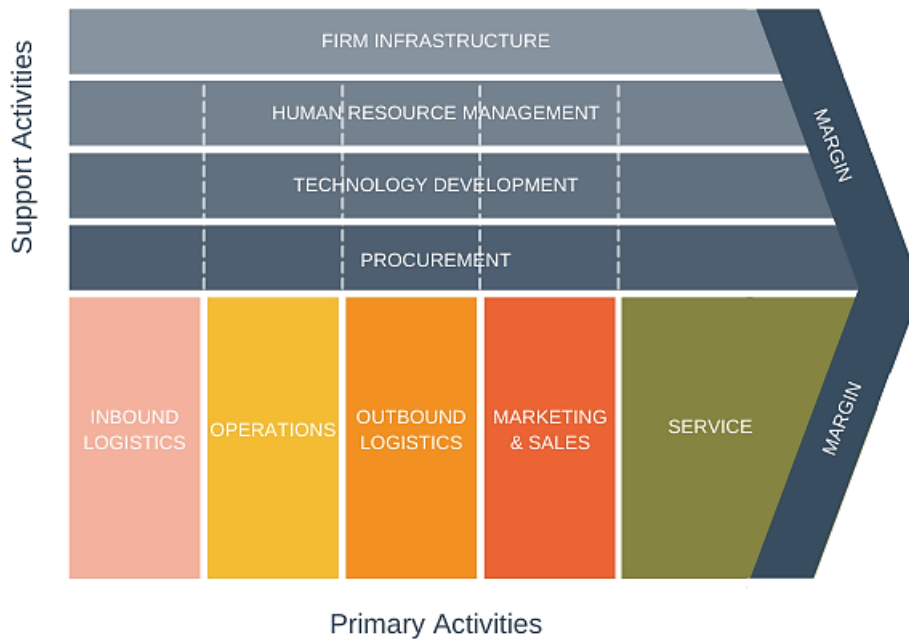


Figure 3. Michael Porter's value chain model

d) Information System Architecture Phase

Information system architecture phase creates the framework for the information system architecture's development. This step describes the activities related to developing the data and application systems of an organization. Data architecture concentrates on the required business tasks, processes, and services. While application architecture emphasizes how important it is to plan the information architecture for all information systems and procedures that will be built as part of the application portfolio.

e) Technology Architecture Phase

The technology architecture prioritizes the technical composition of hardware and network technology. This is to ensure the seamless flow and connectivity of all data generated by each business process within the scope of the technology portfolio, which includes both software and hardware.

After following each phase, author will compile all of the output data and propose the solution to the representatives of the company to analyse the collected data for the reliability and validity. Finally, this paper will summarize the output into a proposed solution to the business's problem.

A research instrument is a data collection tool used by researchers to collect data. Examples include tests, questionnaires, interview guides, and observation guidelines [34]. Author will collect data in this paper via interview with the Head of Marketing and Head of Business Development department and through observation.

4. Results and Discussions

The results after interviewing the BOD representative combined with observations during conducting the research is that COVID-19 had brought some limitations that decreased the quality of the company's current internal system with the new regulations. This regulation brought physical distancing restrictions and didn't allow employees to work from office they used to. Customers would not tolerate this limitation as the reason for delaying the project timeline. In order to keep the business running, the company has to solve the root cause, which is basically to find a solution from the enterprise architecture to keep the business continuity with integrated system between departments. This research is to help companies solve this problem by digitalizing their internal processes using TOGAF ADM.

4.1. Preliminary Phase

4.1.1. Stakeholder’s Concerns

The identification of stakeholder’s concerns was defined after the FGD conducting interview and discussion. They come up with 3 objectives and 12 principals that will be the architecture foundation, as below:

- Objectives: (1) Business Continuity; (2) Integrate System; (3) IT Blueprint Guidelines.
- Business Architecture Principles: (1) Business Continuity; (2) Optimal Benefits for Company; (3) Comply with Laws & Regulations.
- Data Architecture Principles: (4) Data is an Asset; (5) Data is Shared; (6) Data is Secure.
- Applications Architecture Principles: (7) Independent; (8) Easy to Use; (9) Interconnected Applications.
- Technology Architecture Principles: (10) Simple Configuration; (11) Meet with Industry Standards; (12) Redundant Capabilities.

Author will use these objectives and principals as the guidelines on every phase of the research using TOGAF ADM.

4.2. Architecture Vision

Company already has their vision and mission since 1997. And after interview and discussion, they want the architecture vision to be in line with their vision. The current vision is, “To be the top leading Information Communication Technology (ICT) service provider, and trusted service provider in the region”. They stated that they want this EA to focus on delivering value to their 3 most important components that keep their business running, which are: their customers, their employees, and their partners. Finally, they decided that their architecture vision is, "Maximizing service for value creation that satisfies customers, a comfortable environment for employees, and a trusted partner."

4.2.1. Scope of Work

The primary concern that needs to be focus on this research is the primary activities, whereas the core internal operational business process is.

4.2.2. Identifying the Stakeholders

As shown on Figure 4 is the overview of company organization structure Stakeholders are parties with an interest in the EA design work, as well as parties affected by the work. The influence of stakeholders as drivers or barriers to EA design work. The definition of a stakeholder class is based on the matrix of the relationship between influence (power) and level of interest (level of interest), which is manifested as a Stakeholder Power Grid. Based on both classifications the results of the stakeholder analysis are shown on Table 2.

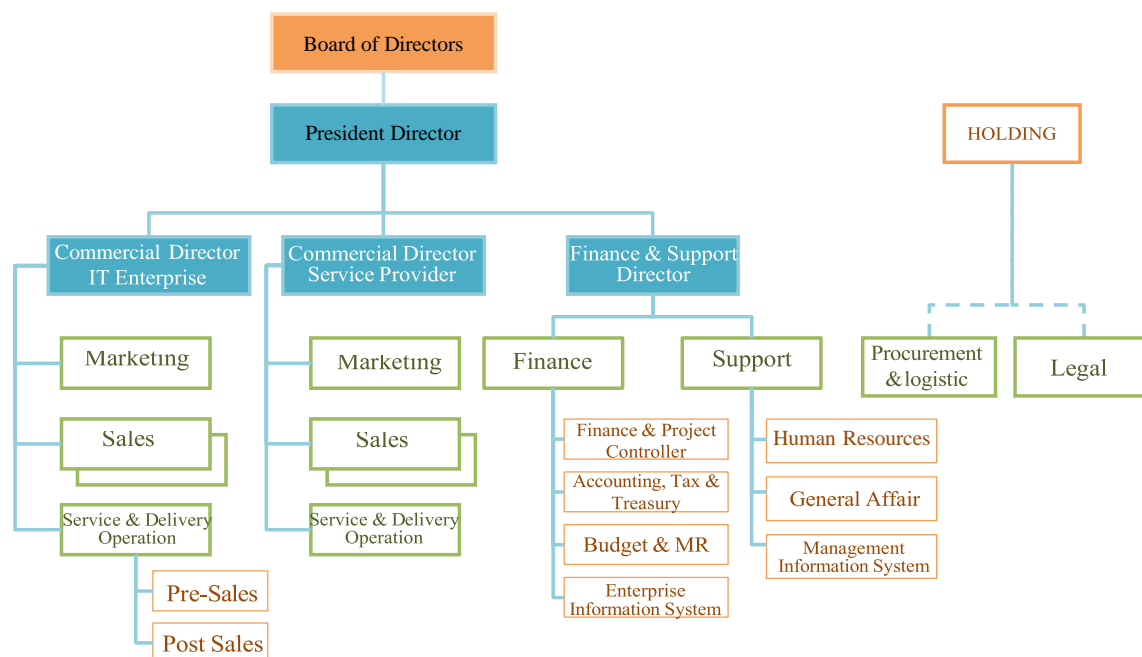


Figure 4. Organization structure

Table 2. Stakeholder identification and classification

Stakeholders Classification	Stakeholder	Context of Interests	Grade
CxO	President Director Commerce Director Finance & SupportDirector	A high-level view of how business drivers and enterprise goals are translated into effective IT architectures and processes to improve business performance.	Keep Satisfied
Line Management	GM Marketing GM Sales GM Service & Delivery GM Finance GM Procurement & Logistic	Top-level understanding of organizational functions and processes, and how applications support processes.	Key Players
Human Resources	GM Human Resources & Support	Management of human resource arrangements related to the transition to achieving the target architecture.	Keep Informed
QA/SOP	Management Development (MD)	Ensure that organizational procedures and governance are consistent with business architecture, data, applications, and technology.	Key Players
IT Operations	MIS EIS	Ensure IT services meet the level of service required by the company to support business success. Ensure that the developed application components and technology infrastructure are in good working order.	Key Players

4.2.3. Key Requirements

The key requirements for EA design in this study include the following types of information:

- Business architecture information, including core business processes and supporting business processes;
- Information data architecture based on data requirements in business processes;
- Application architecture information to support business processes;
- Architecture of information technology.

4.3. Business Architecture

The object research is a system integrator company located in Central Jakarta. As a system integrator, the main job is to deliver, implement, and maintain the customer’s infrastructure within the expected timeline. The most important system to keep the business running in the company is their internal process. The expected solution from this layer is a business architecture that will bring a company maximum benefit at a minimum cost. Currently, the primary activities involve eight departments: Sales, Marketing, Finance-Controller, Finance, Procurement, Receive and Delivery, Implement, and Support Department.

4.3.1. Identification of Business Problems and Targeted Solutions

After analyzing the current business process, the author found that the process is quite complex for maintaining primary activities. The complexity cause activities line between each department are not clear. For example, there are sales and marketing team activities involved in support activities, which should be handled by the project operational team. The line between each department has to be clear, or each department's territory will be biased (Table 3).

Table 3. Business problems and targeted solutions

No.	Problem Area	Problem	Targeted Solution
1	Department activities	There are too many departments involve in the primary activities.	Consolidate the department that is redundant with another department.
2	Project Ownership	There is no Person in Charge that took ownership of each project.	Propose a project owner based on their responsibility.
3	Project plan	There are no hands over project plan between the pre-sales team to field team	Proposed an internal kick-off meeting in SOP.

4.3.2. Value Chain Diagram

As the solutions have already been identified, the company will want to know if the proposed solutions meet the architecture expectations. A value chain diagram will establish the proposed conditions for the business architecture by mapping the structure of each business model to ensure that it encompasses all necessary business activities based on the requirements and scenarios for each business process (Figure 5).

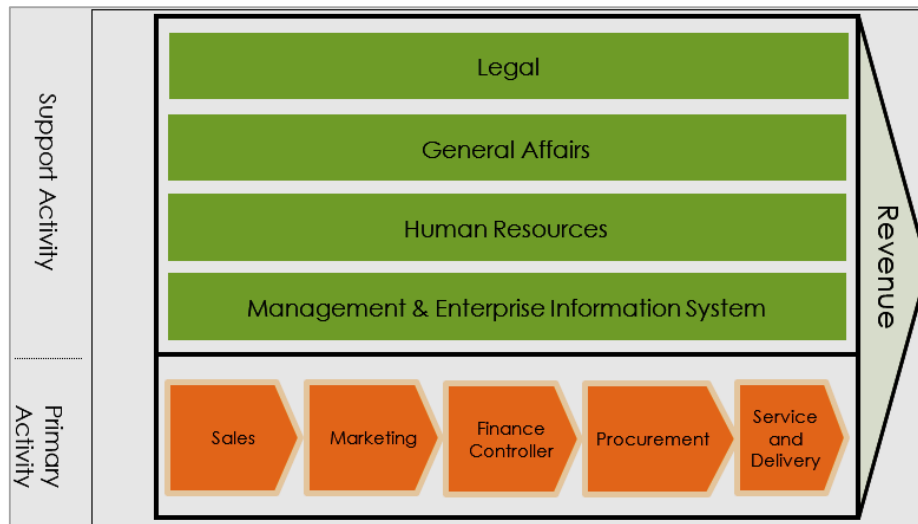


Figure 5. Proposed value chain model

With the proposed solutions and value chain, author tries to illustrate on Figure 6 the future workflow as the guideline for each department that includes on primary activities.

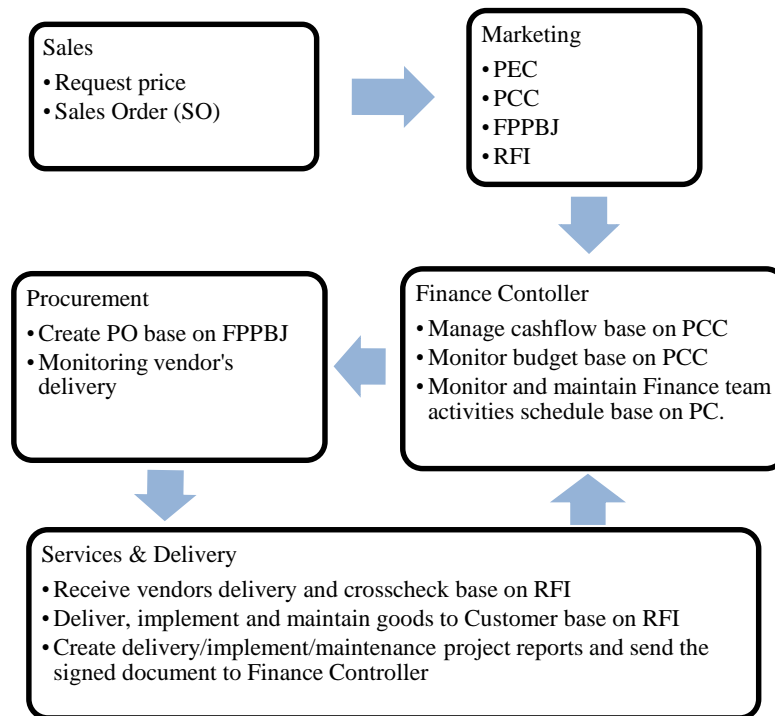


Figure 6. Target operational business process

Among the many benefits of enterprise architecture is the ability to streamline business processes and decrease repetitiveness in corporate operations. This repetition is caused by the organization's divergent perspectives on data or business processes [35].

4.4. Information System Architecture

In the next section, identification and creation of data and applications architecture will be carried out, which is derived from the primary activities.

4.5. Data Architecture

Based on the target value chain, the data from each department based on their new business activities process will be listed on Table 4.

Table 4. Target data architecture

Business Actor	Business Process	Data
Sales	Sales is in charge of promoting and selling products & services to prospective customers.	Leads data; Opportunities data; Pipeline data; Customer data.
	Sales is in charge to inform all departments that involved of all aspects of project administration such as input Sales Order, project details and Customer data.	Project contract/agreement; Sales Order (SO); Proposed project technical proposal; Project Cost Calculation (PCC) Data.
Marketing	Marketing is responsible for validating project cost.	Customer data; PCC data;
	Marketing is in charge of processing and validating the Sales Order. Marketing is responsible to inform the Delivery and Implement team about the project details through RFI form.	SO with PO; Form to Request Goods and Services (FPPBJ) data; Request for Installation (RFI) data.
Finance Controller	Finance controller is responsible to monitoring and maintain cashflow for each project are on track.	Customer data; Signed PCC document with SO and PO; Profit and Loss data report;
	Finance controller is responsible for all financial reports.	Account Payable (AP) schedule and data; Account Receivable (AR) schedule and data; Signed project handover document.
Procurement	Procurement places product orders once got the Marketing request that has been approved.	Customer data; Signed FPPBJ;
	Procurement is in charge to keep the delivery time from vendor is on track. Procurement manages and evaluates supplier data.	Purchase Order (PO) to Vendor; List of Estimate Time Arrival (ETA) of the ordered goods; Vendor data; Vendor agreement.
Service and Delivery	S&D receives goods (products) purchased from a vendor.	Customer data; List of Estimate Time Arrival (ETA) of the ordered goods;
	S&D manages the expansion and modification of goods in storage. S& D deliver the goods to Customers. S&D starts the project and implements the work on the products and solutions offered. S&D in charge of handing over work and closing projects.	Project proposal data; Signed RFI with PO; Delivery Order (DO) data; Goods Received Document (NPB) data; Stock data; Project Documentation such as Project Plan, Change Request, and Handover document.

Based on data identification, to help understanding the alignment between the target business architecture with the target data architecture will be illustrated with a diagram on Figure 7.

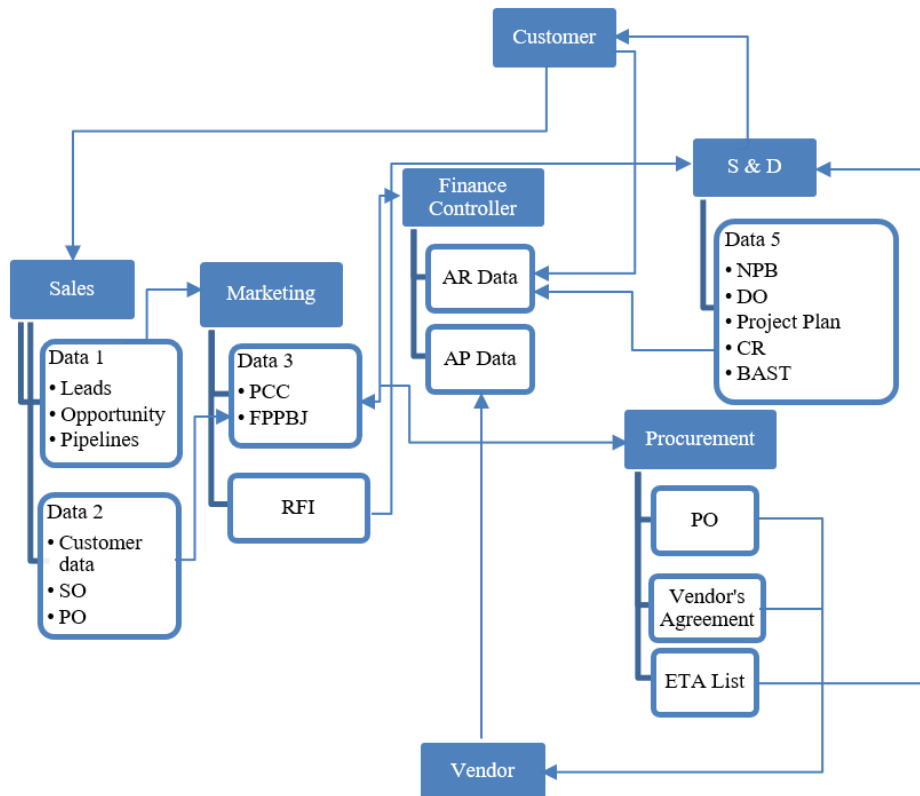


Figure 7. Target data architecture diagram

4.6. Application Architecture

The company's current application architecture is still unable to support the expected solution from the main architecture objectives. The company is still using conventional technology, which will not support the employees to work from any other place. They are still using LAN to access the production servers. To enable the digital workplace, the author proposes additional applications on Table 5.

Table 5. Applications architecture gaps

No.	Application	Current	Discard	Upgrade	New
1.	I-MAM	✓	-	-	-
2.	Online Timesheet	✓	✓	-	-
3.	DingTalk	-	-	-	✓
4.	Orlansoft	✓	-	✓	-
5.	CMR	✓	-	-	-
6.	MS Office	✓	-	✓	-
7.	MS Project	✓	-	-	-
8.	MS Outlook	✓	-	-	-
9.	MS Exchange Antivirus	✓	-	✓	-
10.	Kaspersky	✓	-	✓	-
11.	Citrix Workspace	✓	-	-	-
12.	Sales Force	-	-	-	✓
13.	Anydesk	-	-	-	✓
14.	Zoom	-	-	-	✓
15.	FortiClient SSL	-	-	-	✓

DingTalk, Zoom, and Sales Force are new applications that are proposed to enable companies to digitize their systems (Figure 8). DingTalk is an intelligent mobile workspace for business administration and operations, team collaboration, and business expansion. DingTalk's APIs can be used to construct applications for messaging, phone and video conferencing, file sharing, and remote office access [36]. Despite the fact that DingTalk supports video conferencing, the author recommends Zoom as the supporting app platform for the company's virtual meeting room. Not only does Zoom have better quality since it is mainly focused on virtual conference platforms, but it also utilizes less bandwidth.

The other application is Sales Force, a customer relationship management (CRM) tool to support sales, marketing, and business operations (Figure 9). Salesforce services enable cloud technologies that help organizations improve relationships with partners, customers, and prospects [37]. Due to the limits of the research, the author focuses primarily on Sales Force: Sales Cloud as an application supporting internal operational business activities. The sales force automation software of Sales Cloud aids sales managers in highlighting team-wide insights that can impact the entire sales strategy, including target achievement, territory management, and sales forecasting.

The result is a holistic view of individual and team performance that managers can use to enhance sales resources and processes. By using analytical data to sketch out the future market's potential, companies will not only be able to keep an eye on their sales operations, but they will also be able to reach more customers and make better decisions.

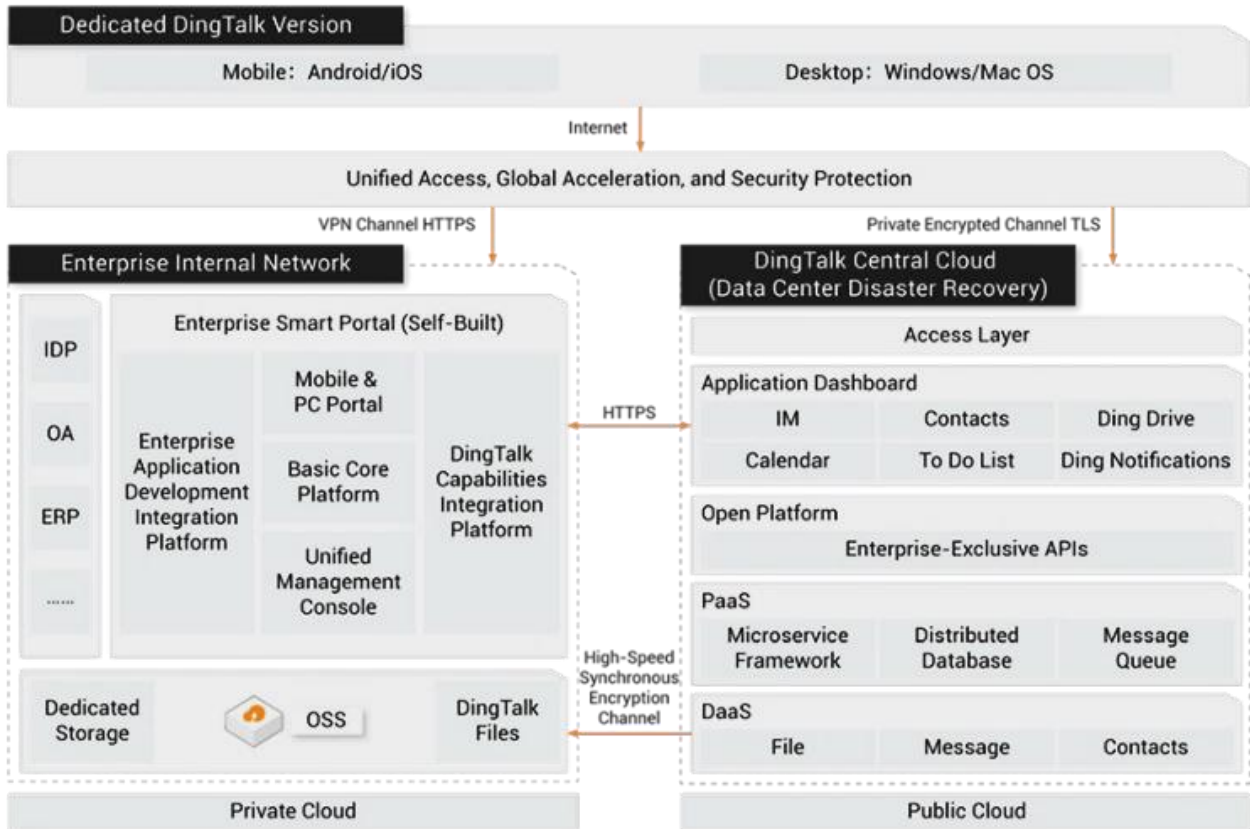


Figure 8. DingTalk dedicated architecture

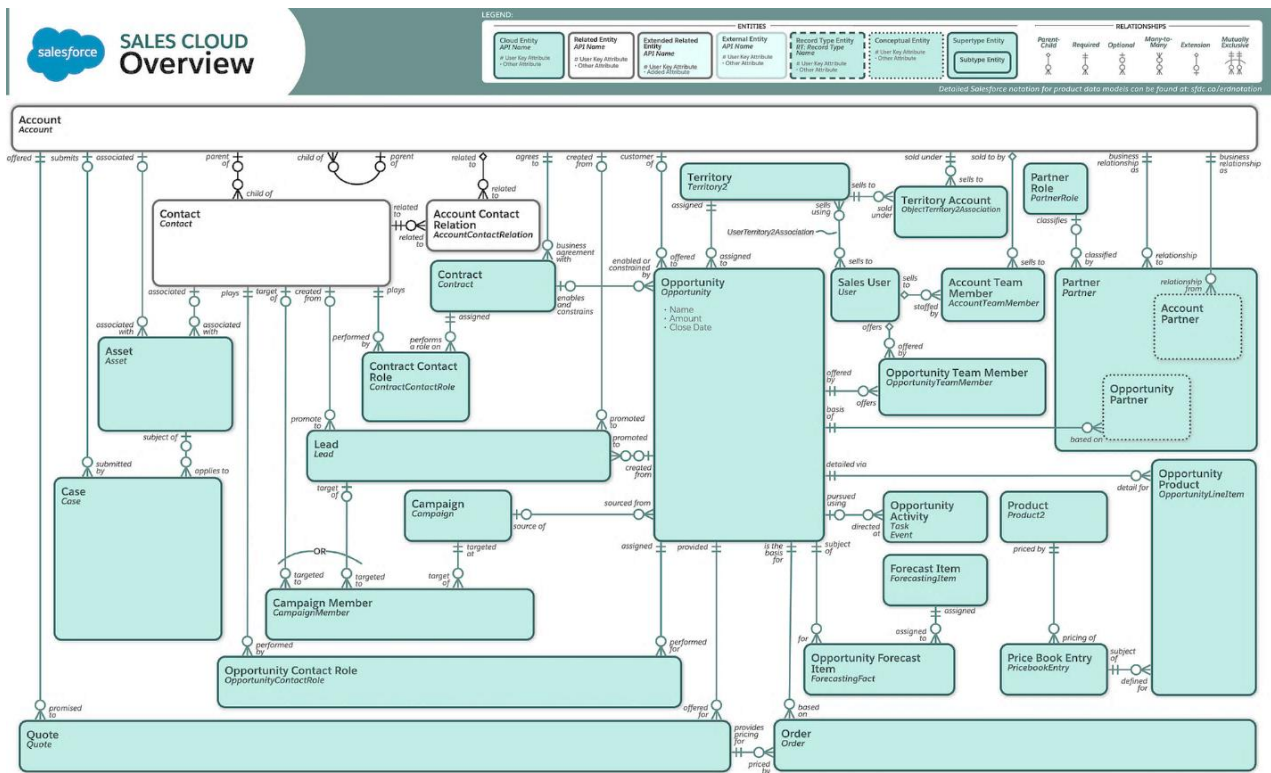


Figure 9. Sales Cloud architecture overview

Based on the new data and applications architecture, on Figure 10 is the IS architecture design by using TRM as the reference.

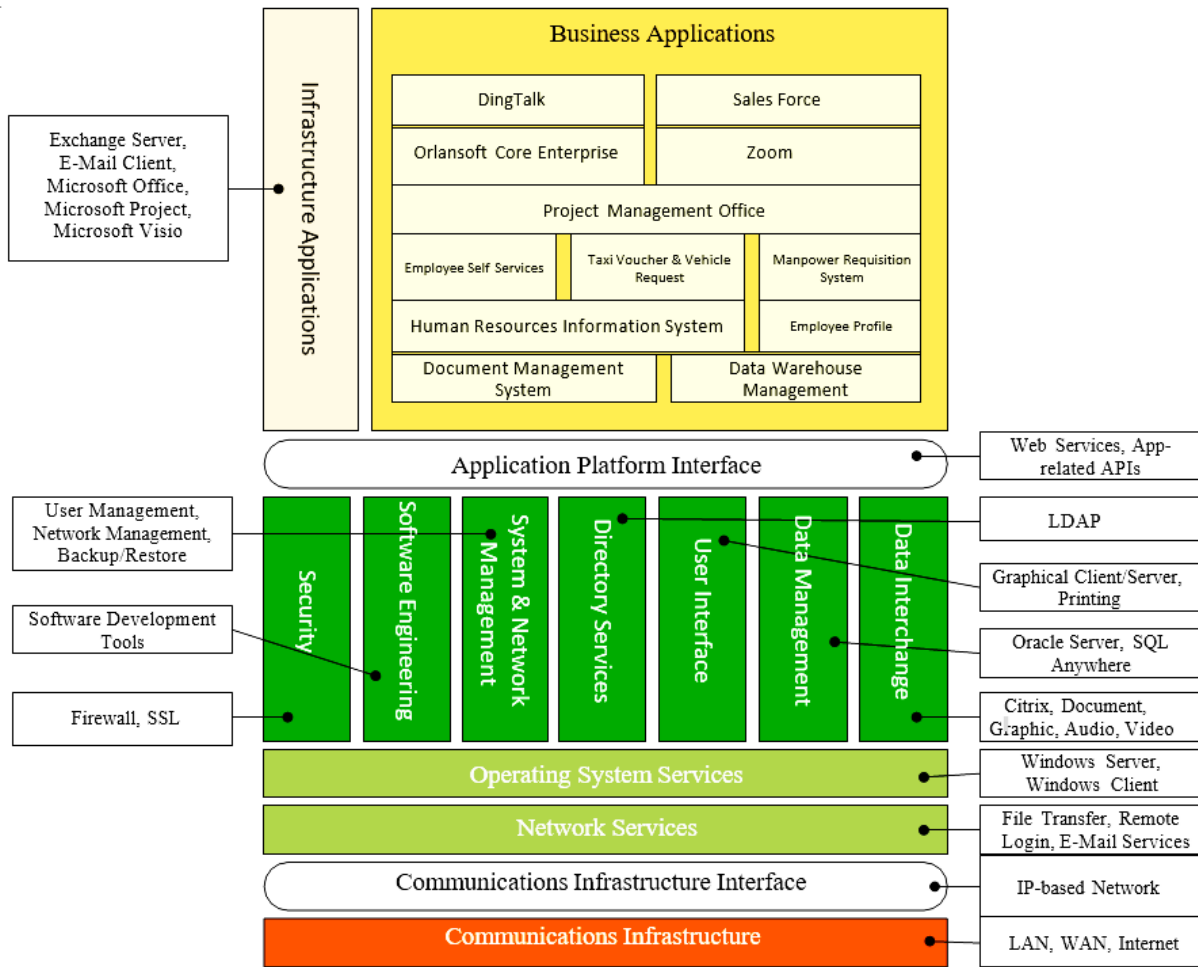


Figure 10. Target application architecture taxonomy

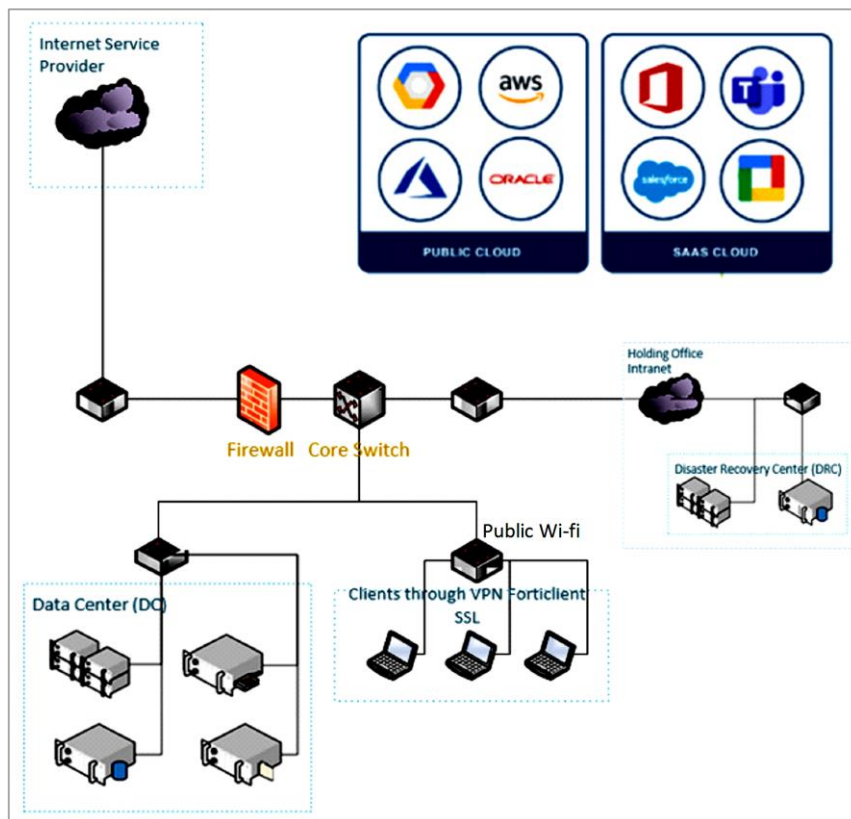


Figure 11. Target network architecture

The purpose of the TRM is to facilitate the organized definition of the standard application platform and its accompanying interfaces. The Technical Reference Model solely addresses the other elements, which are required in any certain design, to the extent that they impact the application platform. The main goal of this strategy is to make sure that the higher-level building blocks of business solutions work on a complete, strong foundation [38].

4.7. Technology Architecture

The company targets technology architecture related to the network configuration and infrastructure that support the IS architecture. One of the important technology architecture principles is redundant capability. Therefore, companies need a technology architecture that has high availability features that can be provided by the DC and cloud-based storage. To support business continuity, data center management and troubleshooting have to be capable of being done from anywhere and anytime using a VPN connection, even from public infrastructure.

4.7.1. Target Network Architecture

To meet the architecture objectives, the target network architecture has to provide a DC-DRC and be open for cloud-based applications that digitize a company’s system. It also needs a virtual private network with SSL to keep the network safe, as shown in Figure 11.

4.7.2. Target Client Access Endpoint

Since COVID-19 hit Indonesia, the company has slowly moved to mobile working. In that case, the PC is not an effective endpoint anymore. The target client access endpoint in this research is an upgraded version of a notebook for their employees. And it will be differentiated into two types: sales (standard) and technical (better specs) on Table 6.

Table 6. Target endpoint specifications

Client type	Notebook: Sales	Notebook: Technical
Processor	Intel® Core I5-1135G7, Intel Soc (System on chip) platform	Core i7 1165G7
Memory	16 GB (16GBX2) DDR4	8GB DDR4 3200Mhz(onboard)+ 16GB DDR4
Harddisk	1TB SSD NVME	1TB SSD NVME
Operating System	Win 10 Pro 64 BIT OEM	Win 10 Pro 64 BIT OEM

4.7.3. Target Server

With the new architecture, current servers have to be updated to comply with the standard. Table 7 shows the catalog of the servers to meet the new IS architecture.

Table 7. Target servers’ catalogue

No.	Type	Application/ Database	Operating System	Processor, HD, Memory
1	Controller	Domain Controller	Win Sever 2008 R2 Enterprise	Xeon E5506 2.13Ghz, 500 GB, 8 GB
2	DC	DC / DHCP Server	Win Server 2008 R2 Standard	Xeon E5 20403-1,80Ghz, 300 GB, 8 GB
3	Database	Database CRM	Win Server 2008 R2 Standard SP1	Xeon E5506 2.13Ghz, 465 GB, 6 GB
4	Database	Sales Force	Win Server 2008 R2 Standard SP2	Xeon E5405 2.0Ghz, 80 + 300 GB, 4 GB
5	File + DC	File Server + DC	Win Server 2008 R2 Standard X64 SP 2	Xeon 3,20Ghz, 300 GB, 2 GB
6	Application	SMTP Server	Win Server 2008 R2 Standard X64 SP2	Intel Pentium E2160, 500 + 160 GB, 1.5 GB
7	File	File Server	Win server 2008 R2 Standard edition	Xeon 2.8Ghz, 40+320 Gb, 1 GB
8	Application	WSUS Server	Win Server 2008 R2 Standard 64	Xeon E 1220 -3,10Ghz, 1.5Tb, 4 GB
9	Application	Print Server	Win Server 2008 R2 Standard SP2	Xeon 3,20Ghz, 250 GB, 2 GB
10	Monitoring	CCTV	Win Server 2008 R2 Standard 64	Intel Xeon 3.20Ghz, 300 GB, 4 GB
11	File	File Sharing	Win7 64 Bit	Intel Pentium 4, 80GB, 2 GB
12	File	File Sharing	Win7 64 Bit	Core i3 3.50Ghz, 3 TB, 4GB
13	Anti-virus	Antivirus Server	Win7 64 Bit	Core i3 3.50Ghz, 6 TB, 4GB
14	Mail	Mail Server	Win Server 2008 R2 Standard	Xeon 2.8Ghz,500 HB, 8 GB

4.8. Solutions and Opportunities

4.8.1. Solutions

Based on the architecture's main objectives, there are 3 expected outcomes, which conclude with moving into a company that adapts digital transformation systems (Table 8).

Table 8. Consolidated architecture solutions

Objective		Proposed Solution	Architecture Layer	Remarks
Aligning Business and Technical Perspective with IT Blueprint Guidelines	Optimized Business Process	1. Consolidate the value chain	Business Architecture	Upgrade
		2. Simplified the workflow	Business Architecture	Upgrade
	Business Continuity	3. Implement Sales Force applications	Application Architecture	New
		4. Implement DingTalk enterprise collaboration and communications application	Application Architecture	New
		5. Zoom Virtual communications platform	Application Architecture	New
		6. Upgrade Hardware & OS	Technology Architecture	Upgrade
	Secure, Reliable and Integrated System	7. DC	Technology Architecture	New
		8. DRC	Technology Architecture	New
		9. Cloud-based storage application	Application Architecture	New
		10. VPN FortiClient SSL	Technology Architecture	New
	Cost saving	11. Remove PMO	Application & Technology Architecture	Discard
		12. Remove timesheet	Application & Technology Architecture	Discard

4.8.2. Opportunities

The proposed enterprise architecture will also provide the business with additional prospects. The Sales Cloud platform allows sales teams to work from any location while monitoring their leads and opportunities with real-time data from their mobile devices. Thus, the sales staff will be in a position to prioritize possible leads and close the deal.

This application will provide corporate leaders with a real-time glimpse of the team's projections. Management can get business insights rapidly, enabling them to concentrate their efforts and make decisions in reaction to market movements. In addition, it offers overriding visibility, which helps the company gain a competitive edge in their respective markets.

5. Conclusion

This research provides the enterprise architecture guideline for digital transformation during COVID-19. With TOGAF ADM, the author found out that the current systems weren't optimal and were unable to support the internal process under the new regulations effectively, nor meet with company expectations. Even though digital transformation is a very complex process, this framework is able to keep the project focused on the objectives and principles of each architecture layer. At the end of this enterprise architecture framework, this research provides a clear yet simple guideline for building an IT blueprint with standardization that aligns the business view with the technical view.

By adding an enterprise collaboration and communication platform combined with the CRM application, the company's operational business systems will be digitalized to overcome the limitations that are created by new regulations in order to maintain business continuity. This solution already developed on company where author currently working at. The authors propose to use ISO 27001: 2013 for information security [39] to maintain security standardization. As of today, the applications did maintain the company's expectations, complied with the existing infrastructure environment, and were able to integrate with the current departmental systems. TOGAF ADM also shows that the current systems lack IT governance and need an improvement in human resources with an awareness of the importance of standardization for their infrastructure.

6. Declarations

6.1. Author Contributions

Conceptualization, K.V.; methodology, K.V.; validation, N.L.; formal analysis, K.V.; resources, K.V.; writing—original draft preparation, K.V.; writing—review and editing, K.V.; supervision, N.L.; project administration, K.V.; funding acquisition, K.V. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

Data sharing is not applicable to this article.

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6.5. Institutional Review Board Statement

Not applicable.

6.6. Informed Consent Statement

Not applicable.

6.7. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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