Tender Monitoring Plugin for follow up on Awarded Tenders by Organizations

Student Name: Mukwaya Trevor

Admission Number: 094919

Supervisor: Ms. Esther Gathenya

An Information Systems Project Documentation Submitted to the Faculty of Information Technology in partial fulfillment of the requirements for the award of a Degree in Bachelor of Science in Informatics and Computer Science.

Date of Submission: 26th May 2019

Declaration

I declare that this project has not been submitted to any other university for the award of Bachelor of Science in Informatics Degree.

Student Name: Mukwaya Trevor

Admission No: 094919

Signature: …… Date…….

I certify that this work is being submitted for examination with my approval.

Supervisor Name: Ms. Esther Khakata

Signature: ……..... Date: ……

Abstract

No organization or institution can be fully self-sufficient to the extent that it can provide all its own services required at a given time. Therefore, organizations or government institutions in Kenya usually give out tenders to other companies in order to receive a good or service they do not have or cannot do. The whole process of giving out a tender usually involves bidding by the different interested entities after which one or more entities is awarded the tender.

Unfortunately, after the bidding process, there is usually limited follow up during or after the project that was listed. In a given organization, a tender may be listed on a website or in more traditional media like newspapers requesting for bidders to send in their applications. These applications are usually sent in and the whole bidding process goes on uninterrupted and a company is selected. The problem is that most of these processes are manual and these applications are sent in via email. There is no proper follow up on progress of the project once a successful candidate is selected and no feedback is given once the project is finalized for other departments to use in the future.

The proposed system is a tender registration and monitoring system that enables monitoring of awarded tenders and it will be a plugin for an organization, private or public. Agile software development methodology will be used because it responds to changes favorably. The Laravel framework based on PHP is the language of choice that will be used for development combined with other technologies that will be added along the way to improve the application and user experience.

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Chapter 1: Introduction

1.1 Background of Study

It is usually difficult for a company or organization to be fully self-sufficient, i.e. it has all resources to carry out its daily activities without hiring outside contractors. This is usually why some companies give out tenders to receive services they cannot provide at an affordable rate with the best quality. A tender is an offer to do or perform an act which the party offering, is bound to perform to the party to whom the offer is made ("Legal Definition of Tender | UpCounsel 2019," 2019). Different companies submit their bids in accordance with a tender document that is provided by the owner of the tender usually on a website or other forms of traditional media such as newspapers.

The tendering process is an effective way for companies to determine whether they are receiving the best value for money for the services offered by a given company (Muckle, 2015). At the same time, it does not deter the current company offering the service from competing as well. All this stimulates healthy competition and innovation from all different companies in order to win the tender.

A tender is advertised by a given organization for different tenderers to submit their bids for the contract being advertised with all the necessary requirements. For public institutions in Kenya, declare to the public that they intend to contract out to a suitable supplier ("Procurement Process in Kenya," 2015). The time taken to advertise a tender is set by the organization or can be up to 52 days (Mohamed, 2017). Tender documentation is procured from the relevant offices and suppliers prepare their proposals which are submitted before the deadline date. Usually all submissions of the required documents are sent as hard copies to a given address or the headquarters of the organization or a specified email address.

There are multiple steps after the required documents are submitted including reviewing each company that has submitted a bid and determining the best value for money bid. These steps are not always streamlined across different companies and organizations. The tender is awarded, and the successful bidder is notified depending on the most competitive price as well as the right documentation is submitted. This documentation depends on the magnitude of the tender and the organization. It can include Bank statements, financial proposals among others and one missing

detail can delist a potential bidder entirely (Arunga, 2015) After all paperwork and timelines are set, the contract is fulfilled depending on the requirements. From this point forward, there is usually limited accountability and follow up on the status of the contract.

1.2 Problem Statement

The tendering process in Kenya has been characterized by several scandals related to the poor handling of procurement information, lack of transparency in the process and poor linkages between procurements and expenditures (Mohamed, 2017). All these issues have created poor tender practices and an increase in corruption especially with tenders in the public sector. There is no transparency in most tendering processes as they are done behind closed doors and there is limited feedback given to the bidders. Submission of the documents required is a tedious process and can easily lead to the disqualification of a potential bidder.

1.3 Research Objectives

i. To investigate the challenges faced by entities looking for and applying for tenders.
ii. To analyze the existing tendering process used by most companies and government organizations.
iii. To propose a tender monitoring system that can ease the process of applying and tracking tenders without any compromise.
iv. To design, develop and test a tender monitoring system that can be used by different companies offering tenders to the public.

1.4 Research Questions

i. What are the challenges faced by entities looking for and applying for tenders?
ii. What is the existing tendering process used by most companies and government organizations?
iii. What is the proposed system?
iv. How will the tender monitoring system be developed?

1.5 Justification

Feedback and timely response are very critical in any business setup. A platform that requires bidders to have accounts with a certain organization gives them a chance to receive the latest tender notices as well as start the bid process instantly. This platform is to ease the submission of

documents by bidders and prevent bidders from missing any crucial documents during the application process. There are various documents that need to be in the hard copy form but some of these documents can easily be submitted to the inviting organization without the need for the physical paperwork.

An automated fulfillment option could also be necessary to easily alert all stakeholders of a given tender that certain clauses have been met so that there is a clear understanding of the terms of payment at a given time.

There is also a need to tell unsuccessful bidders the reason as to why their bids were not considered as well as provide instant information via email updates on the status of the process. Most importantly, the platform is to create a transparent atmosphere for the tendering process and ensure accountability over the course of the contract and after the duration of the contract for future reference.

1.6 Scope and Limitations

This proposed platform is to be limited to private institutions mainly because the of the bureaucracy in some government institutions that would hinder development especially in terms of government information required to complete the system. The main goals for the platform are transparency and accountability within the whole process. Any payments to contract holders will only be monitored but will not be handled by the system. This also holds for any purchase of documents required for the tender. Change in some of the methodologies and techniques used in development is to be expected in order to provide the best optimal solutions to the problem at hand and therefore, the system will be developed as a plugin and not a standalone application to meet the academic year deadlines.

Chapter 2: Literature Review

2.1 Introduction

This chapter highlights the literature and existing platforms that have a relation to the proposed tender monitoring system as well as the pitfalls and gaps in these platforms.

2.2 Existing Tender platforms

The following platforms do not necessarily monitor tenders but have a vast library of existing tenders by different entities, both private and public. They are mainly informational, and their core functionality is uploading the documents and general details required for a tender.

2.2.1 Public Procurement Information Portal.

This is an online platform for publication of contract awards and tender notices by procuring entities. It was created as a result of a presidential order in 2018 where all government agencies were to publish information about government contracts in order to promote transparency and accountability (Muia, 2018).

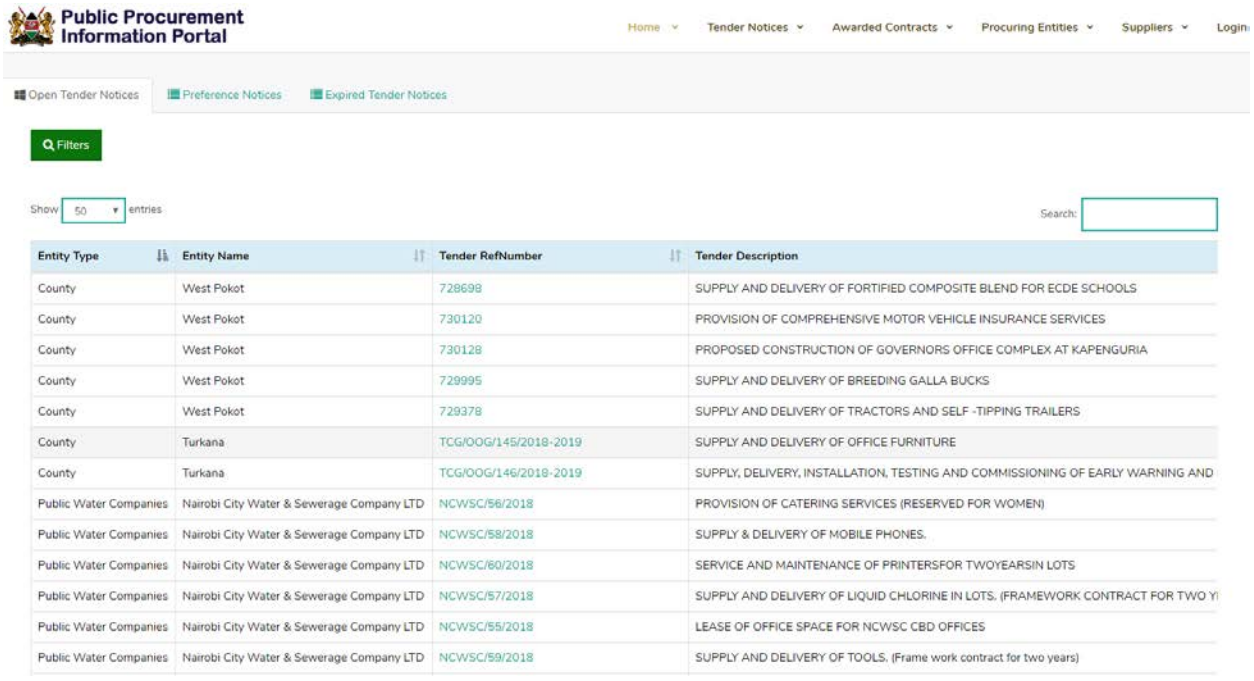

Figure 2.1 Listing of all Tenders ("Procurement Portal," 2019)

This is the closest system that is available and provides information on all government tenders both current and past. It shows all tenders that are logged into the system and once one is

selected, all that specific tender's details are listed including the entity that listed the tender, the deadline for submission of documents among other details. It is an informational setup where all documents are provided with no further actions on the side of those wishing to apply for those tenders. It also provides a comprehensive listing of all companies that are registered by the government and have been approved by the relevant authority.

The active and past tenders both provide information on which company won the tender and supplied the goods or service required by the government entity. It also contains important information like the company details, list of directors of the company and previously won contracts of that supplier or company.

2.2.2 Tenders Kenya

Tenders Kenya is a subscription-based website that provides early information on all procurement information. It provides information on different kinds of tenders from the smallest to the largest kind. It supports youth entrepreneurs and business owners by posting small or medium sized contracts that are normally not publicized in traditional media like newspapers.

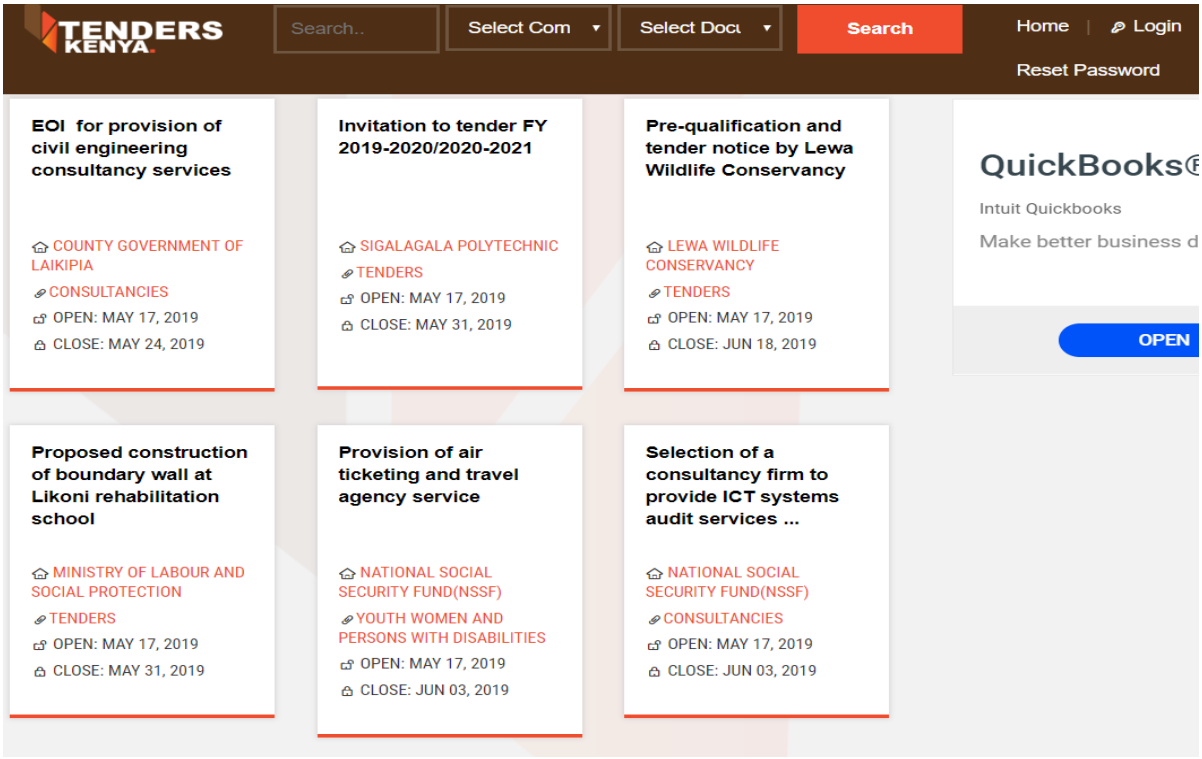

Figure 2.2 Tender listing for Tenders Kenya website ("Tenders Kenya," 2019)

Tenders details are only accessible once the annual subscription is paid and this can be paid using VISA card or local mobile money options like Mpesa. Once this subscription is paid, one has access to the documents and can download all documents included by the owner of the tender.

There is no further follow up once you have gotten the document as you this is upon anyone interested in the opportunity being offered. The goal of Tenders Kenya is to provide information on all the latest tenders available.

2.2.3 Tender 24/7

Tender 24/7 is an Indian based company based in India that provides information on different tenders in Asian Countries. An app available on both the Google Play Store and App store is available for download for instant access of these tenders. Like Tenders Kenya, this is an informational platform and it is also subscription based. This means one needs to pay an access fee in order to view details of all tenders available on the platform by different organizations.

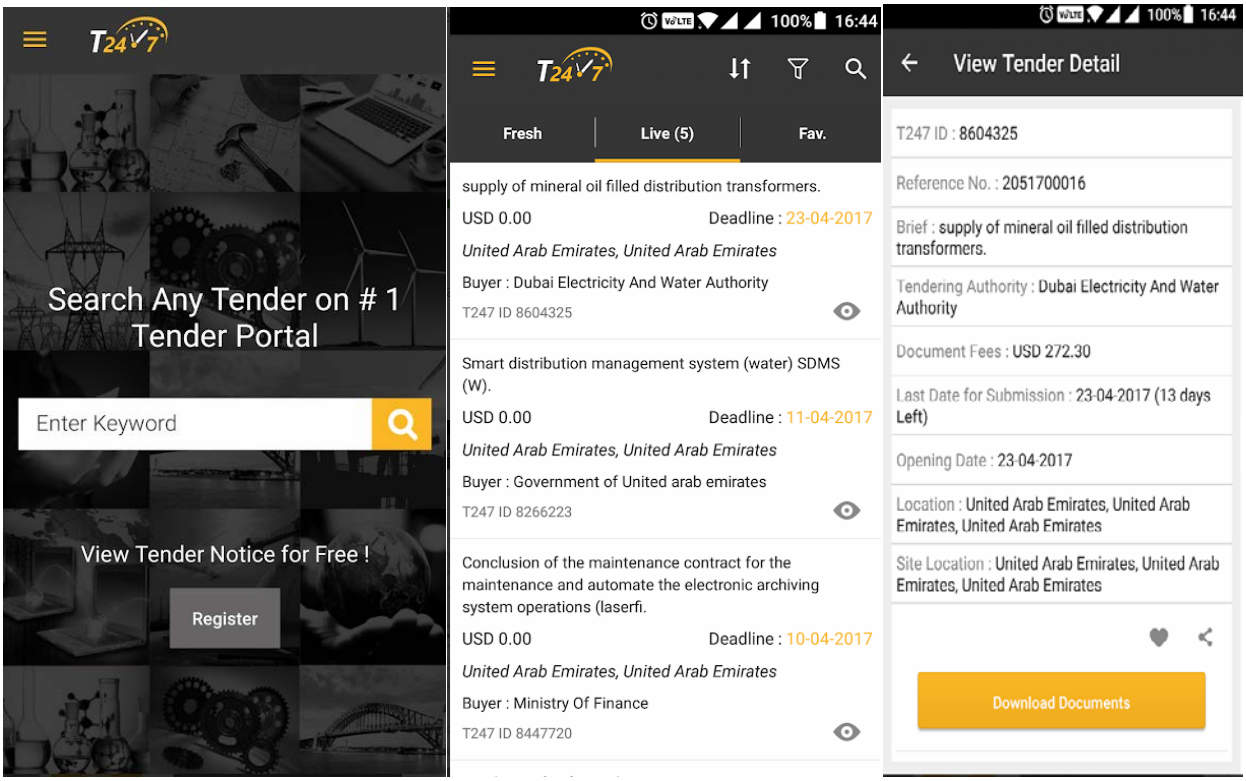

Figure 2.3 Tender 24/7 App for Android

Tender 24/7 provides more detail compared to Tenders Kenya even before payment of the subscription fee. It is however not available for use in Kenya as no tenders were available for the Kenyan market.

2.3 Gaps in Existing systems

This section highlights the gaps that have been discovered during the research process.

2.3.1 Tenders Kenya

The website provides a great deal of information on various tenders but unfortunately this information is only available when a subscription is paid. Although a subscription is paid, there is no follow up by Tenders Kenya on the progress of a tender once applications are done.

All tenders can only be viewed once a subscription fee is paid. This means that even tenders that have documents that do not need to be purchased will also fall in this category. This is a private initiative therefore, there is no need for the proprietors of Tenders Kenya to follow up on any tender as their business strategy is just to provide information as readily as it is uploaded.

2.3.2 Public Procurement Information portal

The information portal has more functionality than Tenders Kenya. For one, it provides detailed information on a tender without a subscription fee mainly because it is a government-based platform. It also shows all details of an awarded tender including which company won it, when the tender was awarded among other details.

It unfortunately does not provide any follow up information on the tender to the public for example, progress of the tender, duration or payment for services or goods. According to public knowledge currently available, there is no option for automation of feedback if specific milestones are met at any given time during implementation of the tender.

2.3.3 Tender 24/7

Tender 24/7 has similar problems to Tenders Kenya such as an inability for the owner of the tender to monitor the tender through the app. The owner is unable to know which the interested parties and must move out of the app to monitor the tender right after that.

2.4 Conceptual Framework

The conceptual framework of this project takes into consideration the different parties involved in the tendering process and how each of the parties interacts with the tendering platform. This is illustrated in figure 2.7.

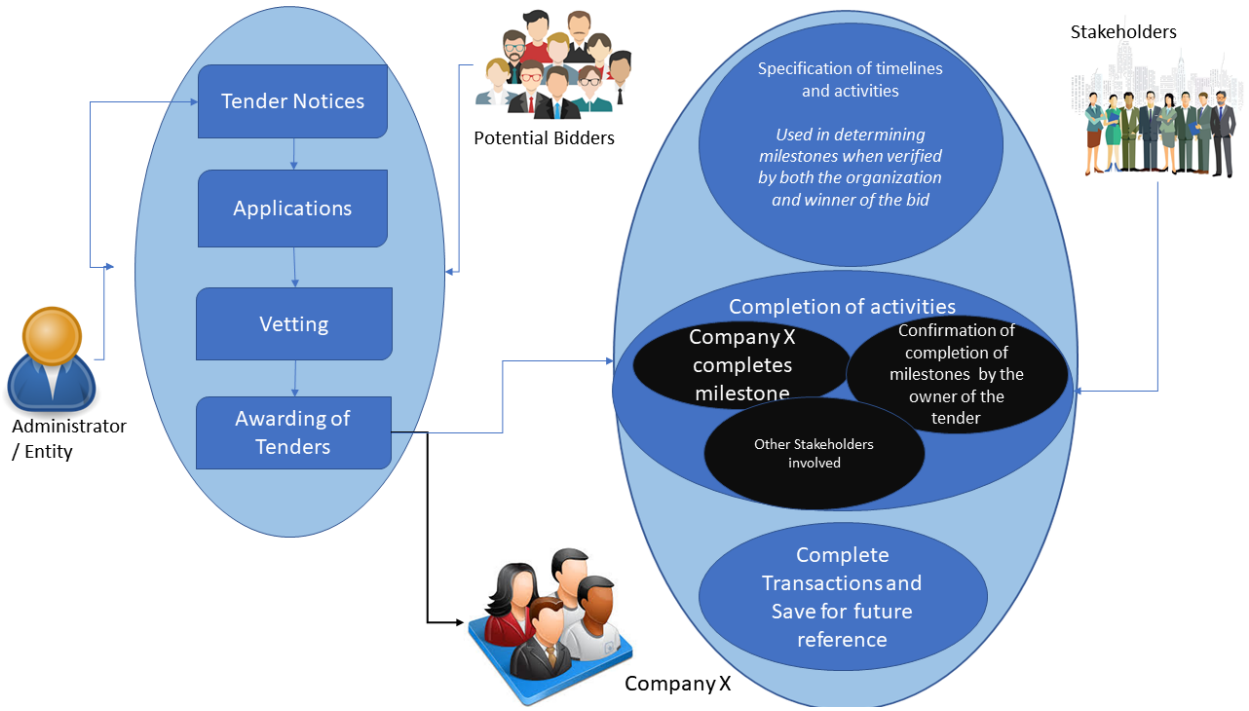

Figure 2.4 Conceptual Framework for the Tender monitoring plugin

The platform will have mainly 4 users of which 1 of them will be in the system for a short while and they are all explained below.

The entity or owner of the tender will advertise the tender on the platform allowing different potential bidders to see and apply for the tenders. The advertisement will consist of all tender documents or an Invitation to bid document like with most tenders. These documents can be downloaded by all potential bidders so that they can find see the requirements necessary.

All potential bidders will then submit their Interest to bid based on the requirements of the initial document by the Administrator or entity offering the tender. The interest to bid is considered as the application for the tender. There are various steps that will be followed from then on like the vetting process which is more of manual as there have to be background checks on all these bidders to authenticate their validity. The awarding of a tender, at least in government institutions,

is a series of meetings and negotiations which must be documented for future reference especially in the event of any doubts in the process of awarding to a given company X. In some of these meetings, different bidders are invited to negotiate so that the owner of the tender can find the best deal available to them. The tender monitoring starts when a bidder(s) is(are) selected and when all deliverables and milestones have been made clear to all parties involved. This is meant to be a robust platform that can accommodate all this back and forth by providing control on how many procedures are to be involved.

Company X is informed automatically of their win and all other bidders are notified of their position in this process. From this point forward, the bidders are discarded from this specific tender but are still allowed to view any current or future tenders that are available or could appear respectively. Company X is then involved in a series of post bid meetings where all milestones are made clear and entered into the platform. Some of these milestones include deadlines or achievements that must be met.

A tender usually has different stakeholders who could be providing other services or technical details for the example, the World Bank is a funder of multiple tenders in Kenya therefore during the tender, they are a crucial stakeholder. All these stake holders have a say in whatever processes if they are provided access to this platform. In the unfortunate case of any discrepancies, reference can be easily made to all the tender documents and all these formal complaints can be made directly on the platform. This ensures visibility and transparency.

Before any payments can be made, all stakeholders must assert that a specific milestone has been met and if a financial platform is available, there can be an automated transfer of funds once all parties agree.

All these transactions are made available and saved for future reference in automated documents that are generated.

Chapter 3: Methodology

3.1 Introduction

A software methodology is a framework that is used to structure, plan and control the process of developing an information system. There are several methodologies that software developers use during development each with its own advantages and disadvantages (“Software Development Methodologies,” 2019)

For this project, the agile model will be used for development. Agile development model is a combination of several iterative and incremental process models which embraces the constant changes that occur in the development of different technologies. It consists of different stages such as planning, requirements analysis, design, coding, unit testing, and acceptance testing.

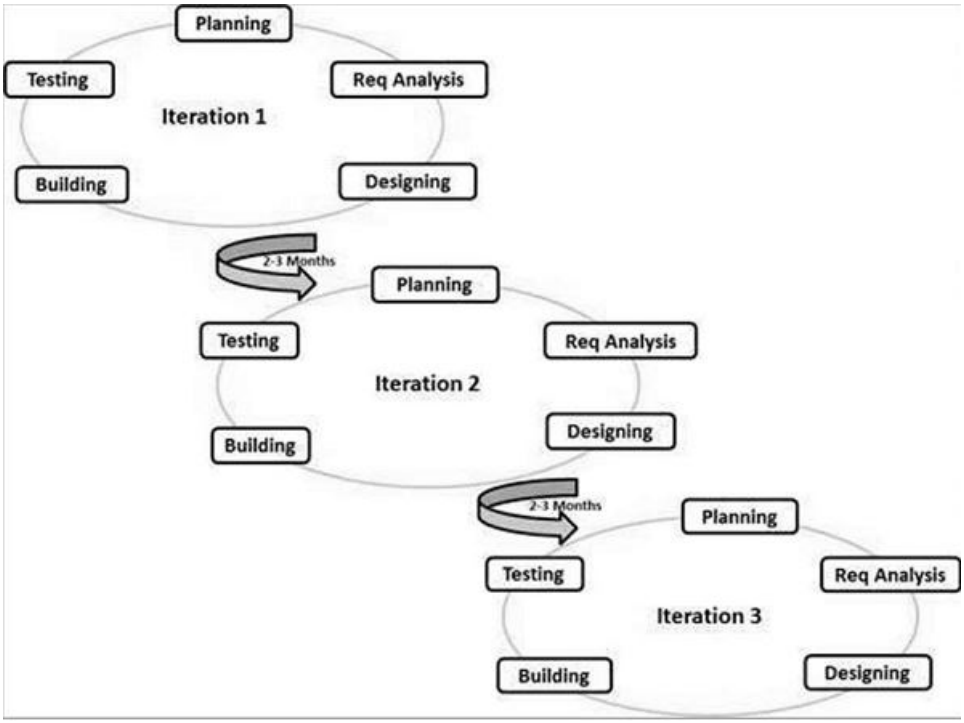

Figure 3.1 Agile Development method

3.1.1 The Planning Phase

It entails discussing how different components of the application will be able to work together as well laying out a time schedule for each of the other phases.

3.1.2 Requirements Analysis Phase

This phase enables developers to clearly lay out all necessary tools and technologies which may be needed to easily develop the application and meet their targets.

3.1.3 The Design Phase

It makes sure the customer's design specifications are met to the point of satisfaction. It ensures that the organization's or customer's defining features are included in the application.

3.1.4 Coding/Building Phase

The functionality and working of the application are done in the coding phase. This is where all the back-end programming is carried out to make sure the application meets its required use. This phase usually takes the longest time period and requires the most iterations.

3.1.5 Unit Testing

All bugs and errors must be rectified during the unit testing stage because each individual module of the application is tested individually to make sure that all its functionality is spot on.

3.1.6 Acceptance Testing

This phase involves giving out either a prototype of final product to a specified number of people to use and feel the application. This stage is important because it provides user feedback which is very important to a developer.

3.2 System Analysis

This section majorly discusses what functional and non-functional requirements the platform will be able to perform.

3.2.1 Functional Requirements

i. Entity Sign up – Platform should allow different entities to sign up in order to participate in any of the tenders listed. There should also be an invitation option for owners of the tender to invite different stakeholders of a specific tender.
ii. Cross platform Validation – Validation of all documents and tender listings should be mandatory.
iii. Publish/Re-Tender/Draft options – The owner of the tender should be able to publish, save as draft or re-advertise a tender if not satisfactory with the results.

iv. Email Notifications – There should be email notifications for all involved parties including but not limited to the owner of the tender, the winner of a tender, all potential bidders in the case of the bidding process being active, other stakeholders. Every transaction that occurs on the platform must notify the involved parties

v. Access Control – All Users on the platform should be able only to view the tenders they are participating in. This spans across the entire platform for all the given users. This is a sensitive platform therefore there should be no meddling in any of the processes.

vi. Report Generation – There should also be option to generate fully fledged reports on all the active tenders as well as toned reports for specific reports.

vii. Payment API – Since this platform is not met to handle payments, there should be an API that enables administrators or owners of the tender to automatically make payments to a given entity once certain milestones are achieved and have been confirmed by all the different parties involved.

viii. Continuance – A user should be able to resume from where they stopped in case of an occurrence that interrupts their workflow

ix.

3.2.2 Non-Functional Requirements

i. Availability – The platform should be available from any device and should be up at least 90% of the time.

ii. User interface – It should be user friendly to use.

iii. Consistency and Reliability – All results produced by the platform should be consistent and reliable with no abnormalities

3.2.3 Narrative

This is a detailed narrative of the whole process from the start

An administrator creates a tender by uploading a tender document or an invitation to bid. There can be multiple administrators on a specific tender if they are provided access to the platform through their email addresses. All these other administrators can be easily invited, and their accounts are created as soon as they accept their invitation. All administrators involved should give a go ahead for the tender to be listed onto the platform. Failure of one administrator to confirm the listing of a tender means the tender is not listed.

A tender listing contains of different items including but not limited to the tender document, any fees that need to be paid in order to acquire the document, deadlines for submission of bids, minimum requirements for an entity, among other details that the administrator will add.

Once a tender is listed, it is easily sharable across different social media platforms that the administrator has initially setup and it also appears on the home page. Different entities can view this listing but in order to apply or submit a bid, they should have an account for with the organization listing the tender. After creation of any account, an entity can also invite different team members so that they can all view the proceedings of the tender. Registration of an entity involves submitting documents and entering proper physical addresses of the entity's primary location. This information is not available to the organization until a given entity wins the bid for a tender.

Applying or bidding for a tender usually involves several documents being submitted and these will be specified by the administrator/owner of the company. The submissions are uploaded, and the entity can change and edit their submissions until the deadline date. None of these submissions are available to the owner of the tender until the deadline is past at which point, a notification is sent out to all bidder, the owner of the tender and other stakeholders involved that the deadline has been passed. This officially starts the vetting process for all bidders which then leads to the different meetings between the owner and the different entities involved in the bidding process. All these meetings are documented and uploaded so that each entity can view the minutes of their meeting with the owner of the tender.

Internal deliberations continue within the owner of the tender alongside any meetings that are setup with the bidders in case of any clarifications. The winning bid is selected, and the winning entity is notified alongside all other stakeholders involved. This officially starts the tender and the owner can setup different milestones with deadlines if needed.

3.3 System Design

System Design refers to the defining of components, modules, interfaces and data for a system to satisfy specified requirements. (*System Design and Development*, 2013) Here all entities and relations are outlined to give a broad aspect of how the system functions.

3.3.1 Use Case Diagram

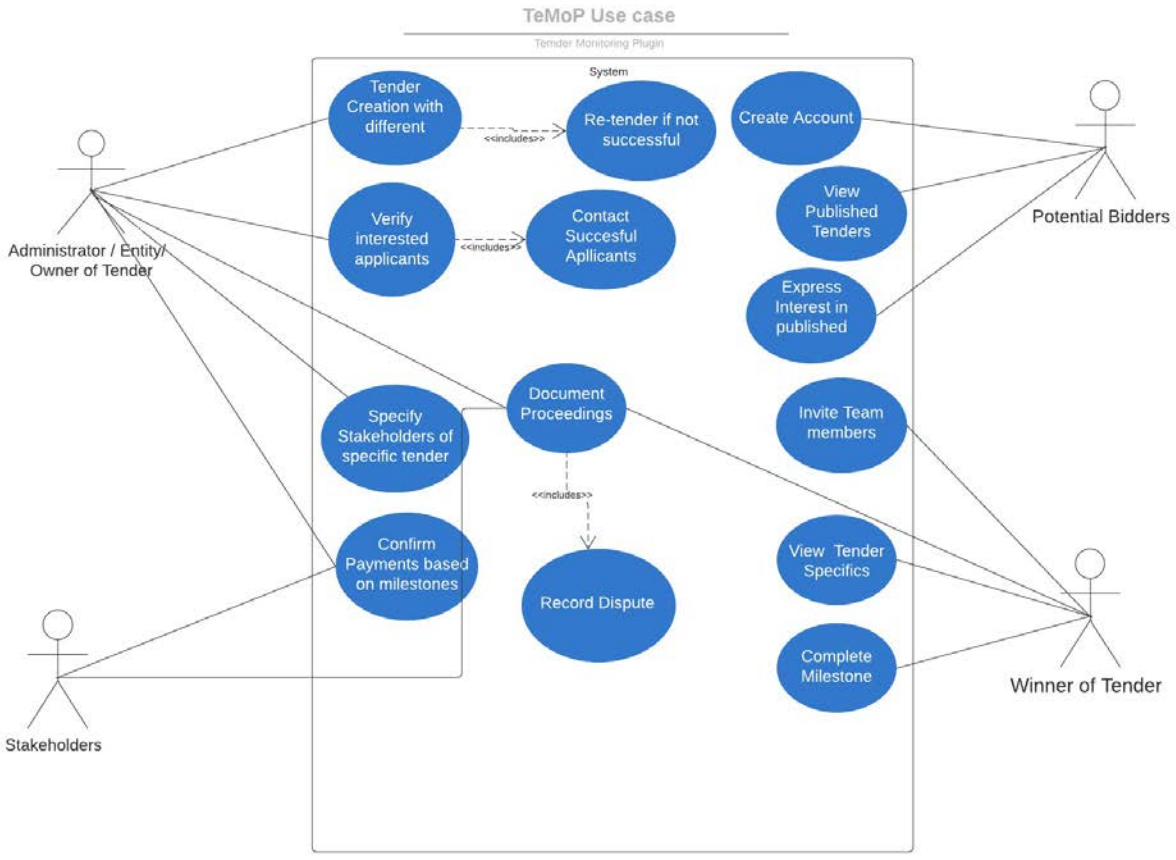

Figure 3.2 Use Case Diagram

3.3.2 Data Flow Diagram

A Data Flow Diagram illustrates how data is processed by a system in terms of inputs and outputs.(“Data Flow Diagrams,” 2017) There are multiple levels of a data flow diagram. In this case there are two levels namely context and level one. Context Level shows basic data between entities and the overall system. The Level one diagram illustrates how different processes or modules in the system interact with data items sent and received by entities.

3.3.2.1 Context Level Diagram

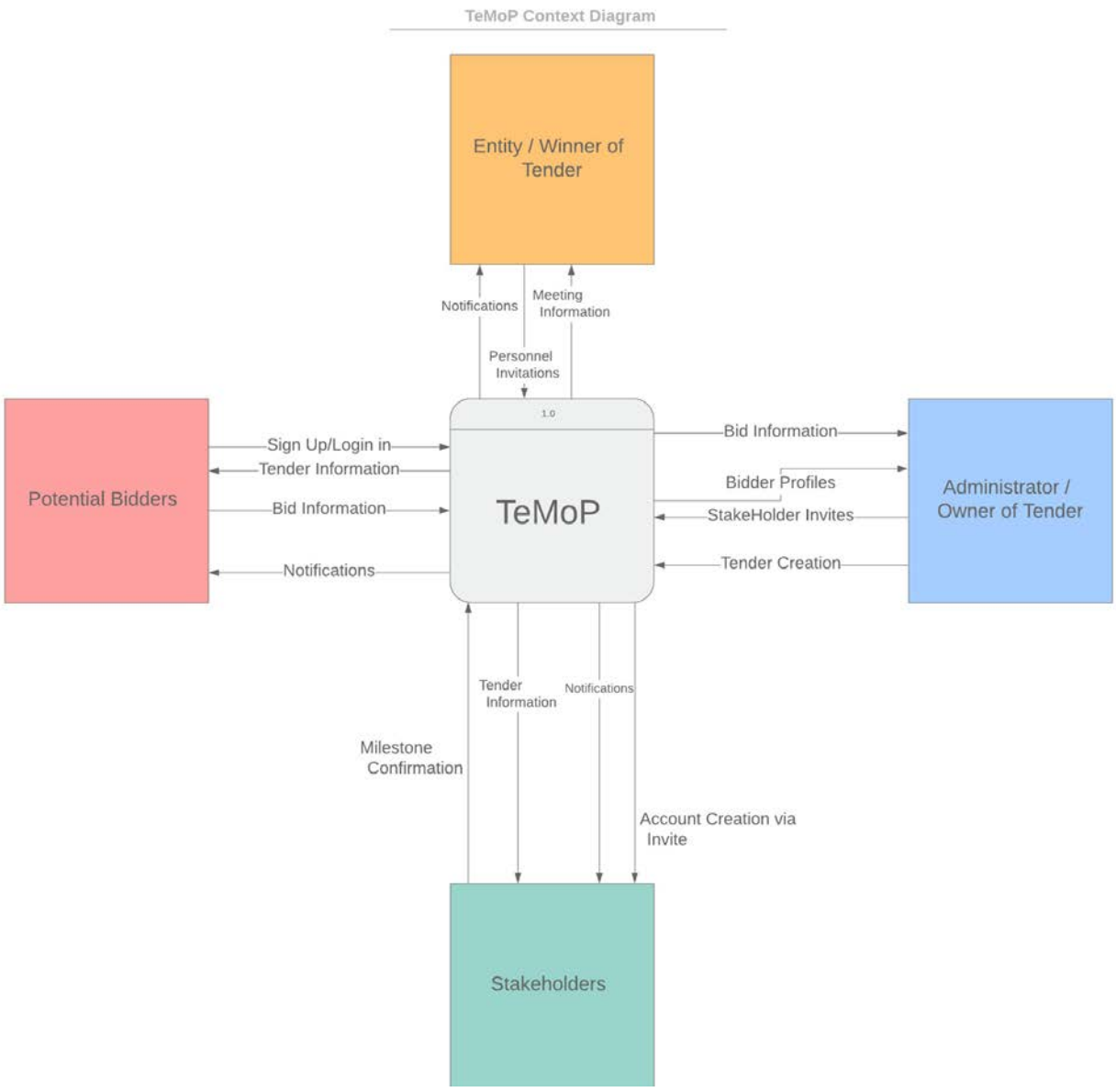

Figure 3.3 Context Level Diagram

3.3.2.2 Level 1 Diagram

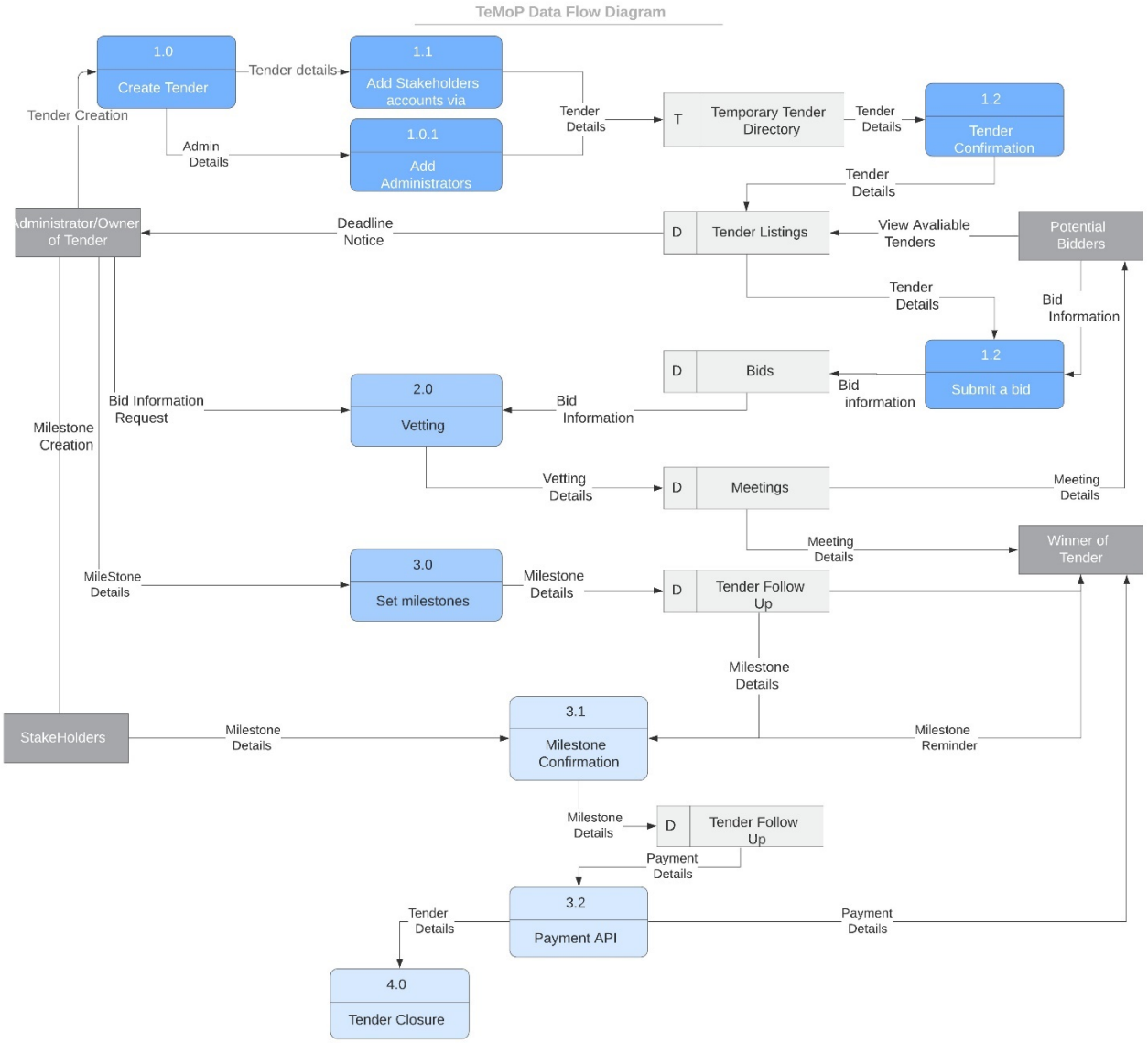

Figure 3.4 Level 1 Diagram

3.4 System Development Tools and Technique

3.4.1 Laravel Framework

The Laravel framework is a PHP framework that is built on the MVC (Model, View, Controller) architecture and make it easy to rapidly prototype web applications (“What is Laravel and Why You Should Learn it?,” 2018). It is a widely used PHP framework because of the many features that come built into it for example, Mailing, routing, authentication among other features that make it easy to get started and learn. It will be the main development tool for the platform.

3.4.2 MongoDB

To provide the highest level of customizability and uniqueness, MongoDB will be used as the database as different organizations have different structures for their tenders. MongoDB is a document-oriented NoSQL database used for high volume data storage. NoSQL refers to Not Only SQL which means that there is no need to have a predefined schema ("What is MongoDB? Introduction, Architecture, Features & Example," 2019). All fields can be easily created on the fly.

Instead of having tables with rows and columns like in a Relational database, MongoDB has Collections with Documents and Fields.

3.5 Deliverables

3.5.1 Tender Creation Module

This will enable an organization to create a tender with specific components tailored to what they will require from an entity. It will also allow tenders that are not yet ready for listing to be saved as drafts until all details are finalized allowing continuity. It will also enable entities to submit their different documents during the application process.

3.5.2 Administrative module

This module will enable administrators view all running tenders as well as add information on a given tender provided, they have the permission to do so. After the deadline for submitting applications, the administrator will be able to view all existing applications but not be able to modify them.

3.5.3 Sign Up Module

This will enable different entities to sign up to an organizations platform in order to apply for the existing tenders. Every organization will probably have different requirements for an entity to sign up therefore the administrator will be responsible to setting up what is required by the organization for an entity to be enrolled onto the platform.

3.5.4 Bidder Module

This will enable all entities that have signed up to the platform to view and apply for tenders that are listed.

3.5.5 Entity Module

Entities will be able to manage their profiles and be able to view all tenders they have participated in or are currently applying for.

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