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# CHAPTER 3: ANALYSIS

## INTRODUCTION

The analysis phase addresses the most crucial questions that the stakeholders are keen to know the answers to while venturing into the development of the system. *A. Dennis and BH Wixom 2015* notes, “the analysis phase answers the questions of *who* will use the system, *what* the system will do, and *where* and *when* it will be used”. The analyst at this stage will carry an in-depth analysis of the current systems, identifying needed improvements and develop a new concept of the system. The three primary activities involved in the analysis phase are as follows:

1. Requirements gathering.
2. Creating process diagrams
3. Performing a detailed analysis.

## REQUIREMENT GATHERING

A. Kahate (2004), compares requirements gathering to the way the doctors examine the patient before prescribing the medication or to the way the lawyers study the case before they defend, which means at this stage the analyst is studying the problems (as a doctor) with the current system to clearly understand what demands for changing the current system. Dr. Ralph R further defines a requirement as a necessary attribute in a system in order for it to have value to the intended user, therefore, this is one of the most important stages in the development of the proposed system since this is a stage where the analyst will look in the best ways to offer value to the intended users.

Requirements analysis includes three types of activity:

* + **Eliciting requirements:** the task of communicating with customers and users to determine what their requirements are. This is sometimes also called requirements gathering.
  + **Analyzing requirements:** determining whether the stated requirements are unclear, incomplete, ambiguous, or contradictory, and then resolving these issues.
  + **Recording requirements:** Requirements might be documented in various forms, such as natural-language documents, use cases, user stories, or process specifications.

Following are requirement elicitation techniques that the researcher conducted in order to complete the Analysis phase of the development of Great Zimbabwe University Mobile Application.

### Interviews

An interview is the most widely used information-gathering technique because of its simplicity and also the fact that the responses came instantly and makes it easy for the analyst to make a quick decision. Questions such as, "How many times do you access the portal", "What problems do you usually face when accessing your portal", among others were responded through interviews.

However, when the analyst was conducting the interviews, other responses were biased due to many factors such as:

* Age – Older students, especially in block release, don’t understand much about technology
* Experience and Understanding – People process information differently, others were not able to give a response right there and others ask for a different interview time after they think.
* Relationships – Friends were not providing their true view as they were respecting the interviewer.

Above disadvantages and other influence, the information obtained hence the need to use it alongside other techniques.

Unstructured interviews were also used and they helped in avoiding prejudicing the responses. An unstructured interview is an interview in which there is no specific set of predetermined questions, which set most of the respondents at easy and give them the freedom of expressing themselves. Students were able to interact with the research, freely air their views of how the application should do, i.e. The functional and non-functional requirements.

The following are some of the requirement that the analyst was able to record from the interviews:

* Good User Interfaces that offers great User Experience
* Functionality to add events to the mobile phone’s calendar for reminders
* Notifications without visiting the website among other requirements.

### Document Analysis

Business plans, market studies, websites, proposals, existing guidelines and analysis of the current system are some of the documents that can be used by the analyst to gather the requirements since they mostly based on the system that works.

The analyst was able to come up with the database design by analyzing the UNDERGRADUATE Application form that he downloaded from the Great Zimbabwe Website and he was also able to get organization colors from the current student portal and the main website. Analyzing the 2019 accepted students and the acceptance letter was very helpful in recording the applicant module design

However, the problem with document analysis is that some documents need interpretation, for example, coming up with a database from a single document is not feasible as it might have left out some fields and it lacks the relationship with other modules of the system hence it must be used alongside other techniques like workshops and interviews to give effective results.

### Prototyping

Prototyping is a technique for building a quick and rough version of the desired system or parts of that system. The prototype shows the capabilities of the system to users and designers. It serves as a communications mechanism to allow reviewers to understand interactions with the system. The advantage of developing a prototype is that it is cheap, risk-free and usually took less time to give the users how the proposed system will work.

The analyst developed the prototype using software called MOCKPLUS and was able to gather both functional and nonfunctional requirements. The prototype was also used alongside interview technique, demonstrating how the finished product will look like.

### Requirement Workshops

One of the most effective technique that the analyst used was the requirement workshop when he was presenting the project to a few staff and students at Great Zimbabwe, this technique made some of the staff to air their views which helped in requirement gathering. Workshops were designed to encourage consensus concerning the features and functionality of the proposed system.

As the advantages of this technique, the analyst was able to get better results since they were experts in software development among the staff and it did not cost anything as compared to interviews. The workshop was also dynamic and interactive.

### Findings

Mobile calendar functionality, offline result view, organizational colors and push notifications among other functional and non-functional requirements were gathered by the four techniques and observations that the analyst conducted. These findings reaffirm the importance and the need for developing the proposed system. Also, the results clearly show that the larger percentage of students are using mobile phones, the majority are facing internet speeds problem and are eagerly waiting for a much better solution which is a user-friendly, responsive and fast response, a solution that will be able to integrate easily with their mobile features like alarms and calendars.

## CURRENT SYSTEM ANALYSIS

*Batson (2019)* suggests that a learning portal expands on traditional academic space by eliminating physical boundaries, and performs an important socialization function for both learners and teachers. However, judging with the current student portal at Great Zimbabwe University, the definition is far from fitting. In this section, the analyst will give a detailed analysis of the current system.

Below is the context diagram of the current system. Provides the simple picture of how the system works without providing information about the timing, sequencing, or synchronization of processes such as which processes occur in sequence or in parallel. The following are the advantages of using a context diagram:

* Shows the scope and boundaries of a system at a glance including the other systems that interface with it
* No technical knowledge is assumed or required to understand the diagram
* Easy to draw and amend due to its limited notation
* Can benefit a wide audience including stakeholders, business analyst, data analysts, developers

### GZU student portal Context diagram

GZU STUDENT PORTAL WEBSITE

STUDENTS

IT DEPARTMENT

LECTURERS

ACCOUNTS

* Login
* Register
* Payments

▪ Academic results

▪ Notices

▪ User’s response

▪ User’s content

▪ Update system

▪ Maintain system

Enter Students Results

Registered Students

Financial Data

Financial Reports

### The strength of the current system

When accessing the current system, all you need is the URL and the browser which means there is no need to install an application in user’s devices and does not require extra memory. The current system also has the strength in that, the updating of the system is easy since the users refresh the whole system every time when accessing hence getting the latest system which is different to the mobile application as the user needs to download and install the new version.

### Problems with the current system

Measuring the current system in terms of understand-ability, completeness, timeliness, currency, accuracy, and relevance of the information it offers, there is a gap that can be improved for example

* It is web-based which means it depends on the user's browsers, that is if the users don’t have a user-friendly browser it also affects the user’s experience on the website.
* The website takes about 1 and a half to 2 minutes to load when accessing it with the popular 3G network which is not user-friendly, an impatient person close it without getting the intended information.
* It is not responsive. Responsive means adapting to the screen size and platform it opens on. The current portal when opened on mobile gives a really bad User Interface and some icons are missing with altogether gives a bad user experience
* There are no features like notifications and calendar which are very crucial especially during examination times and in case of emergencies.
* No informative help on how to use it as seen in many cases when older people ask for help on what to put where?
* The URL (<https://studentportal.gzu.ac.zw/index.php>) is too long to remember, most people start to google first to get the link which gives extra work every time when a student wants to visit the portal.

## REQUIREMENTS ANALYSIS

Dr. Ralph R (2002) estimates that 85 percent of the defects in development software originate in the requirements. Therefore, it is crucial that this step is taken thoroughly. The analyst at this section was guided by the following goals of a requirement: Each requirement should be necessary, verifiable, attainable, unambiguous, complete, consistent and traceable.

The result of the requirement analysis is a document called Software Requirements Specification (SRS) with a complete description of the behavior of the system to be developed. It describes all the interactions and includes a set of use cases that the users will have with the software. The document also contains nonfunctional requirements. Non-functional requirements are requirements which impose constraints on the design or implementation (such as performance requirements, quality standards, or design constraints).

Requirements are categorized in several ways. The following are used in the requirement analysis of the proposed system:

### Users Requirements

Users are those that will be affected by the implementation of the new system and they are more concerned about how the system will operate. The following will define the basic user requirements:

* + Operational deployment – Where will the system be used?
  + Mission – how will the system accomplish its mission and objectives
  + Performance – what are critical system performance
  + Effective – How effective and efficient must the system be.

### Functional Requirements

Functional requirements explain what has to be done by identifying the necessary task, action or activity that must be accomplished. Functional requirements analysis will be used as the top-level functions for functional analysis. And on the proposed system, the analyst discovered that the functional requirements include push notification that shows on the mobile notification bar.

### Non-functional Requirements

These specify the criteria that can be used to measure the operation of the proposed system, rather than specific analysis. For example, one of the non-functional requirement is responsiveness and adaptability to the platform.

### Performance Requirements

The extent to which a function must be executed; generally measured in terms of quality, coverage, timeliness or readiness. During requirements analysis, performance (how well does it have to be done) requirements will be interactively developed across all identified functional requirements.

### Challenges in Requirements Analysis

According to Steve McConnell, problems in requirement analysis arises because:

* Users do not understand what they want or users don't have a clear idea of their requirements
* Users will not commit to a set of written requirements
* Users insist on new requirements after the cost and schedule have been fixed
* Communication with users is slow
* Users often do not participate in reviews or are incapable of doing so
* Users are technically unsophisticated
* Users do not understand the development process
* Users do not know about present technology

These challenges lead to a situation where the requirements keep changing even when the development phase begins. Challenges can also happen from the technical side, i.e. Developer tries to make the requirements fit the currently existing system to avoid work and also communication problems among developers.

## ACTIVITY DIAGRAM

An activity diagram visually shows a series of actions or flow of control from one activity to another within the system, Felici (2009). Below is the Student activity diagram

|  |  |  |  |
| --- | --- | --- | --- |
| USER  Submit Details  Verify Details  Accept  Login  Logged in  Access Academic Info, results and notices  Logout  Admin Posts Notices,  Lecture add results | GZU STUDENT PORTAL MOBILE APPLICATION | ADMIN & LECTURERS | END |
|  | No  Yes | No  Yes |  |

**Key**

|  |  |  |  |
| --- | --- | --- | --- |
| Decision | Action | Control flow |  |

## SYSTEM ALTERNATIVES

Diving straight into the development phase without evaluating all the possible alternatives for achieving the same goal may lead the organization or business into jeopardy. According to *B Hughes and M Cotterell (2008*), the alternatives or decisions involved include whether to buy an off-the-shelf package, or whether a bespoke package may be better and if so whether it's development is to be carried out "in-house" or outsource from external developers. At this section, the research will look into alternatives stating both the advantages and disadvantages of each path and a conclusion.

### In-House Developed Software

GZU Information Technology department can develop the proposed system with much benefits such as; The costs are usually cheaper since there won’t be any need to hire more developers or to buy development tools. Without any third party or software houses involved, the organization will have control over the software and the software will be built to fit other in-house systems.

However, In-house development will be more like inventing the wheel, which is costlier in the long run. The in-house team might not have the skill set required for certain areas of development and expertise to create sophisticated software capable of handling all the required tasks. The whole process like research and analysis might take time which is usually limited and modular upgrades unlikely to be available.

### Off-the-Shelf

This is whereby the organization acquires a software that was developed by a team of highly skilled developers to accommodate every user which offers a plug and play capability where they will be no need for a development team, for example, Microsoft Word. This approach has the benefit i.e. The software is extensively tested and used by other businesses which gives a quicker and smoother integration. This approach guarantees that the software is created correctly and can be purchased, configured and installed in a short period of time.

The weakness of this approach is that off-the-shelf softwares are relatively costly and can also accrue high support and maintenance costs. Also, most vendors offer this with monthly subscriptions. There may also be waiting period for support since the vendor will probably have other customers wants support help. Also because the software is developed targeting a large audience, the software's features and functions have to be more generic or more complicates with features that the organization will never use.

### Outsourcing

This is when the organization approach a developer or a software company to create a custom piece of software to meet every business challenge the organization has: a fully-integrated solution that matches the requirements perfectly.

Outsourcing by its definition offers the opportunity to get a software product that meets each of the requirements, which is very powerful. If the costs of developing the system are too high, or if the timeline is too long there is room to start small by just starting with the core functionality and improve over time.

This approach saves time since the staff will not need heavy training, nor will they have to adjust their normal work process.

Advantages of outsourcing include:

* The developer can start with the core-essentials and add features and functions later at any time
* Solution tailored to match business needs, processes, and security requirements
* Easier to orientate staff to the software, because it follows the organization’s business practices and vernacular
* Can be developed using a software language and infrastructure/platform matching your business needs vs. those of a ‘mass market’ nature
* Possible integration with legacy and additional systems
* The organization will own the software
* Possible competitive advantage
* Direct vendor support Unlimited options ultimately provide for an extensible, evolving solution that can stay current with your business
* No obsolescence and investment in updates and enhancements is 100% controlled
* Changes can be made quickly
* Often without any additional licensing fees

In the downside of this approach there is:

* High upfront costs
* Changes and features requests may be billable
* Requires developer sources (with inherited risks)
* Requires developer communication during the software development cycle: requirements, design, development, QA/testing, and training will require business involvement
* No user community to provide self-help.

### Recommendation

The above analysis states clearly without a doubt that taking the outsourcing path in developing the software, Great Zimbabwe University as an organization will be able to get the software at a reduced cost and starting with the core functionality. Therefore, the analyst highly recommends outsourcing as the best alternative.

## CONCLUSION

The above analysis clearly shows that giving the development task to an external developer offers more advantages than advantages and more flexibility to the organization to focus on the business side. This brings us to the next phase of the project development, the Design phase in the next chapter.