**KAIMOSI FRIENDS UNIVERSITY**

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**KAFU E-VOTING SYSTEM.**

**School of Computing and Information Technology**

**Department of Information Technology and Informatics**

**BIT 411-INFORMATION TECHNOLOGY**

**PROJECT PROPOSAL**

**PROJECT TITLE: PATA**

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A project proposal documentation submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Science in Information Technology of Kaimosi Friends University**.**

**October, 2023**

# DECLARATION

This project proposal documentation is my original work prepared with no other than the

indicated sources and support and has not been presented elsewhere for any other award.

Signature……………………… ……………………..Date……………………...

Denzel Gitonga

SIT/0929/2020

# CERTIFICATION

The undersigned certify that they have supervised and coordinated and hereby recommend for

acceptance of Kaimosi Friends University a proposal documentation entitled “PATA”

Signed………………………………………………….. Date……………………..

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# ACKNOWLEDGEMENT

First and foremost, I would like to give thanks to the almighty God who has counted me worthy to develop this project till its completion.

I would like to express our sincere gratitude to all the individuals, and experts who have contributed their time, knowledge, and support to the development of the PATA project. Their invaluable insights and unwavering commitment have been instrumental in shaping the vision and objectives of this project.

I extend my heartfelt appreciation to the communities and individuals who have shared their experiences and perspectives on missing persons cases, which have provided the essential foundation for PATA's development.

Furthermore, we acknowledge the guidance and support of our academic and research institution, Kaimosi Friends University, which has played a significant role in nurturing our project and providing the necessary resources to turn our vision into reality.

Finally, I would like to thank our families and loved ones for their understanding and encouragement during the course of this project. Their unwavering support has been a constant source of motivation.

# DEDICATION

This project, PATA - the Missing Persons Reporting and Response System, is dedicated to all the individuals who have faced the distress of a missing loved one. Your strength, resilience, and hope have been the driving force behind this endeavor. May PATA stand as a beacon of support and compassion, embodying the belief that technology can be harnessed for the betterment of humanity in its most vulnerable moments.

I dedicate this project to the communities and individuals who come together to support one another during times of crisis, demonstrating the incredible power of unity and shared responsibility. Your unwavering commitment to helping one another serves as an inspiration to us all.

PATA is also dedicated to the idea that technology, when used with kindness and empathy, can create a positive impact on society. May it serve as a reminder that innovative solutions can bring hope, even in the face of daunting challenges.

This project is dedicated to the countless missing persons and their families, whose stories have touched our hearts and ignited our passion to make a difference. We are committed to working tirelessly to bring hope and reunite those who are lost with their loved ones.

Lastly, I dedicate this project to the belief that compassion and technology can intersect to address vital societal issues. It is a testament to the extraordinary possibilities that emerge when we come together to support one another, particularly during times of distress.

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# CHAPTER ONE: INTRODUCTION

## 1.1 Introduction—Background of the Study

In today's rapidly evolving, technology-driven world, we possess an extraordinary capacity to confront profound challenges with empathy and care.

The genesis of the project, PATA - the Missing Persons Reporting and Response System, can be traced back to the anguish that grips our hearts when a loved one goes missing. It's a situation fraught with pain and bewilderment, casting a long shadow of uncertainty.

Conventional methods of reporting missing persons, as identified by the (Centre, 2003), often seem frustratingly slow and unresponsive, leaving families in a state of anguished uncertainty.

In these trying moments, they yearn for a swift and effective means to reconnect with their missing loved ones.

PATA emerges as a response to this pressing need for a solution that is not just efficient but also profoundly compassionate. Its mission is crystal clear: to simplify the process of reporting missing persons, expedite the response, and infuse hope into the lives of those who are on a mission to reunite with their missing loved ones.

This is where modern technology, with its incredible capabilities, converges with a deep sense of understanding and empathy.

PATA is more than just a technological innovation; it's a helping hand extended precisely when it's needed the most. It exemplifies the belief that technology, when harnessed with compassion, can address critical societal issues and provide unwavering support in times of vulnerability.

As we delve deeper into the ensuing sections, we will unravel the complexity of the problem at hand, elucidate our ambitious goals, and underscore the profound impact we aspire to create.

PATA stands as a testament to the idea that technology, when employed with a compassionate heart, has the power to illuminate the darkest corners of our lives and pave the way for hope and reunification.

## 1.2 Problem Statement

The issue confronted by PATA revolves around the heart-wrenching experience of a loved one's disappearance, evoking feelings of confusion and deep sadness. Traditional methods of reporting missing persons (Quora, 2017) tend to be encumbered by lengthy procedures, often leaving families feeling utterly helpless. This issue, however, extends its reach beyond the boundaries of individual families, casting a collective shadow of distress on entire communities.

PATA emerges as a simple and profoundly compassionate solution, with the overarching objective of expediting the reporting process and providing swift assistance. Its ultimate purpose is to reunite missing persons with their families, imbuing their hearts with hope during these testing and uncertain times.

## 1.3 Objectives

## 1.1.1 General Objective

To swiftly reunite missing persons with their families and loved ones is the paramount goal of PATA. We are dedicated to achieving this by establishing a straightforward and rapid reporting system that ensures help arrives promptly when needed most. Our unwavering commitment lies in minimizing the profound anguish that accompanies prolonged separations, fostering a brighter, more hopeful path towards reunification.

## 1.1.2 Specific Objectives

1. To create a user-friendly platform:

Our foremost objective is to design a user-friendly platform that simplifies the process of reporting a missing person, ensuring that crucial information about the missing individual can be sent swiftly, minimizing any unnecessary delays.

2. To provide instant community alerts:

We aim to implement a system that instantly alerts the community upon the submission of a missing persons report. This approach sensitizes community members to respond promptly if they encounter or identify the missing individual, thereby increasing the chances of a successful reunion.

3. To enhance reunion rates:

Our core mission is to elevate the rate of successful reunions between missing persons and their families. This will be achieved by providing a robust and highly efficient reporting and response system. Our goal is to reunite families as quickly as possible, mitigating the emotional toll of prolonged separation.

## 1.5 Research questions

1. How to harnessing technology for streamlined reporting:

How can the potential of technology be effectively harnessed to create a user-friendly and straightforward process for reporting a missing person, ensuring that the information can be shared swiftly and effortlessly by concerned individuals and communities?

2. What are the critical elements for an effective response system:

What are the essential features and functionalities that must be integrated into a Missing Persons Reporting and Response System to guarantee an immediate response from relevant authorities and active community involvement? How can technology be optimized to achieve these objectives?

3. What is the significance of timely reporting:

What is the measurable impact of timely reporting in cases of missing persons on the probability of successful reunions with their families? How does the prompt initiation of the reporting process influence the outcome of such challenging situations, ultimately fostering quicker reunifications and reducing emotional distress?

## 1.6 Scope of the project

The PATA system is purposefully designed to be accessible and beneficial to a diverse and extensive audience, placing its primary emphasis on extending support to individuals and families who find themselves in the depths of distress due to the unexplained absence of a loved one.

Its fundamental aim is to provide a beacon of hope and assistance in times of despair.

This system is conceived to be adaptable and deployable in various community settings, spanning across regions and even national borders, breaking free from the constraints of geography.

Its potential beneficiaries are not confined to any particular demographic or location, as it is conceived as a universal solution to the pervasive issue of missing persons.

PATA is deeply committed to inclusivity and user-friendliness, making its services accessible to anyone who may find themselves in need, ensuring that no one is left unsupported during the harrowing experience of a missing loved one.

It stands as a symbol of empathy and technology working hand in hand to bring solace to those in distress.

## 1.7 Limitations of the study

While the PATA project is dedicated to addressing the pressing issue of missing persons and providing a comprehensive reporting and response system, it is paramount to acknowledge certain inherent limitations (met.police.uk):

1. Technological Access:

PATA relies on internet connectivity and the availability of digital devices for reporting and response.

This may pose a challenge for individuals in remote or underserved areas with limited technological infrastructure. Consequently, these individuals may not have immediate access to the benefits offered by the system, potentially leaving them without the much-needed support.

1. Language and Literacy Barriers:

The platform is primarily designed for users who are literate and can navigate digital interfaces with ease.

Language barriers may prove to be an obstacle for individuals who are not proficient in the language in which the platform is available.

This limitation underlines the importance of considering linguistic diversity to ensure inclusivity.

## 1.8 Benefits and beneficiaries of the study

The PATA study envisions a wide array of benefits for diverse stakeholders and beneficiaries (FindLaw, 2022):

1. Families and Individuals:

At the heart of the PATA system are the families and individuals who grapple with the profound anguish of a missing loved one. They stand as the primary beneficiaries, as PATA extends a ray of hope and unwavering support.

By facilitating rapid reporting and fostering community engagement, the system aims to increase the chances of reuniting missing persons with their families, thus relieving them of the emotional distress and uncertainty that accompanies such trying situations.

2. Communities:

PATA extends its benefits to entire communities, promoting enhanced safety and collective action. The platform serves as a catalyst for community engagement, motivating individuals to actively participate in the search for missing persons.

This not only fortifies community cohesion but also nurtures a sense of shared responsibility for the well-being of fellow community members.

3. Authorities and First Responders:

Law enforcement agencies, search and rescue teams, and other relevant authorities emerge as significant beneficiaries of the PATA system. They gain access to timely and accurate information, thereby streamlining their efforts to locate missing persons.

This system plays a pivotal role in enhancing the coordination and communication among these entities, ultimately bolstering their capacity to respond efficiently to missing persons cases.

## 1.9 Project justification

The implementation of the PATA project stands on a solid foundation, driven by several significant and compelling reasons:

First and foremost, it centers around the noble purpose of providing assistance precisely when people need it the most.

The distress experienced when a loved one goes missing is immeasurable, and PATA is dedicated to alleviating this distress and infusing hope into the lives of affected families and communities.

Secondly, PATA harnesses the transformative power of technology for the greater good. In today's world, technology has the potential to be a force for positive change, and PATA leverages this potential to expedite and simplify the process of reporting missing persons, bringing efficiency and swiftness to a critical endeavor.

Another pivotal rationale for this project lies in its ability to foster unity within communities. The impact of a missing person is not confined to a single family but resonates throughout the entire community.

PATA serves as a catalyst for collective action, encouraging individuals to come together, share responsibilities, and extend help to one another during these trying times.

By enhancing the efficiency and effectiveness of reporting missing persons, PATA significantly heightens the chances of reuniting them with their families, underlining its overarching mission to bring hope and empowerment to those navigating challenging circumstances.

Ultimately, this project is a testament to the virtues of kindness, compassion, and the benevolent application of technology for the betterment of society.CHAPTER TWO: LITERATURE REVIEW

# 2.1 Introduction

This section serves as the bedrock upon which the PATA project is constructed, delving into the existing body of knowledge that serves as the guiding light for our endeavors in addressing missing persons cases (Google, 2005).

Through a comprehensive exploration and analysis of previous research, studies, and technology-based solutions, we glean invaluable insights into the intricate landscape of challenges posed by missing persons incidents.

This chapter assumes a pivotal role in providing the necessary context for the operation of PATA, illuminating the gaps and opportunities that our project endeavors to address.

The literature review embarks on its journey by shedding light on the prevalence and profound consequences of missing persons cases, offering a glimpse into the harrowing experiences endured by individuals, families, and entire communities (Wikipedia, Google Person Finder, 2022).

We also embark on a comprehensive exploration of traditional reporting methods and the evolving role of technology in these cases, contemplating the tangible impacts of timely reporting and community engagement.

As we progress through this chapter, the intention is to meticulously identify the pivotal factors and issues intertwined with missing persons cases, as well as the diverse technological and community-driven responses that have emerged to address them.

By accomplishing this (ICRC, 1863), we effectively lay the cornerstone for the forthcoming chapters, where it will unveil the blueprint, development, and execution of the PATA project, all meticulously informed by the profound insights extracted from the existing literature.

# 2.2 Technology-based Solutions

## 2.2.2 Google person finder

Google Person Finder is a notable example of a technology-based solution designed to address the challenge of locating missing individuals following natural disasters. (Google, 2005)

This open-source web application was developed in response to the devastating earthquake in Haiti in January 2010. It serves as a registry and message board that allows survivors, family members, and friends to post and search for information about the whereabouts of their loved ones in the aftermath of such events.

The application has been deployed in several natural disasters, and it has successfully collected information on more than 200,000 individuals (Wikipedia, Google Person Finder, 2022). This showcases the platform's potential in helping to reunite missing persons with their families and loved ones during times of crisis.

Google Person Finder highlights the role that technology can play in facilitating the exchange of critical information in disaster-stricken areas, emphasizing the significance of rapid reporting and response in increasing the chances of successful reunions.

By examining the success and challenges of such technology-based solutions, we can draw valuable insights for the development of the PATA project and its objectives.

## 2.2.3 National Missing and Unidentified Persons System (NamUs)

The National Missing and Unidentified Persons System, commonly referred to as NamUs, stands as a pivotal player in the realm of addressing the challenges associated with missing persons and unidentified decedents (NamUs, 1984).

This multifaceted platform serves as an online database and a comprehensive resource center, driven by the overarching goal of streamlining the resolution of these critical issues.

NamUs operates through two interlinked databases, each devoted to a specific facet of the problem at hand.

The first database focuses on missing persons, collating essential information and serving as a repository for relevant data. The second database, equally significant, deals with unidentified decedents, providing a dedicated space for information related to these individuals.

Through its user-friendly interface and advanced functionalities, NamUs brings together law enforcement agencies, medical examiners, and the public, fostering collaboration and data sharing that is crucial in the search for missing persons and the identification of unidentified bodies.

This pioneering system has played a transformative role in enhancing the coordination and cooperation among various stakeholders involved in addressing these critical issues.

NamUs stands as a testament to the power of technology and collective action in contributing to the resolution of missing persons cases, underlining the value of a comprehensive approach to this pervasive challenge.

## 2.2.4 The UK Charity Missing People

The UK Charity Missing People has embraced technology to create a real-time information resource that offers insights into individuals reported as missing. (Charity, 1986)

This information is accessible through a clickable map of the UK regions. Through this map, the public can gain visibility into who is missing from various areas, view statistics on the annual helpline calls received from each region, and actively participate in the search for missing individuals.

While this technology-based solution provides a valuable means of engaging the public and facilitating the search for missing persons, it's important to note that it presents a partial view.

The database primarily comprises individuals known to the charity and reported through family and kinship networks. This example underscores the role of technology in enhancing public participation and engagement in the effort to locate missing individuals.

However, it also highlights the need for a more comprehensive and inclusive approach, as it focuses on individuals within the charity's network.

## 2.2.5 The Boston Mayor’s 24 Hour Constituent Service

The 2013 Boston Marathon bombings (Wikipedia, Boston Marathon bombings, 2013) presented a compelling case for the importance of effectively managing missing persons reports within the framework of emergency management.

The incident (Wikipedia, Boston Marathon bombings, 2013) prompted a surge in calls to the Mayor's 24 Hour Constituent Service, an entity initially expecting around 80 calls on that fateful day. To their surprise, they received a staggering 8,600 calls within 24 hours, representing a thousand percent increase.

To manage this influx, they created a makeshift Google Doc that recorded approximately 2,400 records.

The outcome of this sudden surge in calls underscored the challenges associated with such situations. Despite the high volume of calls, only 28 matches of missing persons were identified. Callers experienced delays and busy signals for extended periods, some waiting 10 to 20 minutes before connecting with an operator.

This hasty response highlighted the inadequacies of hastily constituted systems. Such systems often lack robust measures to protect sensitive information.

In addition, poorly coordinated systems result in inefficiencies, as friends and family members are compelled to report missing persons to multiple organizations. The concern extends to the duplication of entries for the same missing individuals, necessitating a system's ability to identify and manage duplicate records.

Moreover, there's the issue of public perception regarding government systems that collect identifying information. The example of undocumented residents in California (Wikipedia, Boston Marathon bombings, 2013) serves as a pertinent illustration.

In disaster aftermaths, individuals may be hesitant to share their information with government entities, even if the purpose of data collection seems clear. It is imperative that the public believes that their information will be used in alignment with its intended purpose and that their privacy will be safeguarded.

This case from the 2013 Boston Marathon bombings (Wikipedia, Boston Marathon bombings, 2013) highlights the challenges of efficiently managing missing persons reports during crises, particularly when facing an overwhelming volume of calls and rapidly established systems. It serves as a real-world illustration of the complexities and considerations involved in information management and public perception in the context of disaster response and missing persons cases.

## 2.2.6 The Unified Victim Identification System (UVIS)

The Unified Victim Identification System (UVIS) (NYC, 2020) stands as a noteworthy exemplar of a comprehensive disaster management system, dedicated to efficiently managing missing persons reports and victim identification following large-scale incidents.

In the wake of the September 11 attacks, New York City officials recognized the pressing need for a system that could adeptly collect missing persons reports and facilitate the exchange of critical information between emergency responders and investigators in the wake of mass casualty incidents.

The immediate aftermath of September 11 saw New York City grappling with approximately 40,000 missing persons reports recorded on paper. The challenge of tracking down leads on missing individuals and identifying the remains of decedents took months and, in some cases, years. In response to these challenges, the New York City Office of the Chief Medical Examiner (OCME) secured grant funding from the Department of Homeland Security. They partnered with Connecticut-based consulting firm ICRA Sapphire Inc. to develop UVIS.

Notably, the development of UVIS was federally funded, and as a result, the New York City OCME licenses UVIS to government agencies across the nation free of charge. In New York City (NYC, 2020), UVIS operates as a centralized communications and data collection system, connecting multiple agencies, including the city's 311 Call Centre, OCME, and the New York Police Department. This interconnected system aims to create an accurate manifest of potential victims following a disaster.

One of the critical features of UVIS (Wikipedia, UVIS, 2020) is its ability to consolidate information about missing persons. By generating a single report for each missing individual, UVIS establishes a centralized manifest of potential victims.

This manifest is accessible to all agencies involved in the victim identification process.

It streamlines and refines data, allowing for the consolidation of multiple reports about the same missing person as law enforcement, medical examiner personnel, and other stakeholders gather and analyze data.

The significance of UVIS lies in its ability to address one of the crucial challenges in disaster response — the lack of a centralized system for collecting, disseminating, and analyzing information. In the absence of such a system, issues related to integrating various lists arise. Databases are often distinct, both technologically and in terms of the information they contain.

This fragmentation makes it difficult to swiftly and definitively determine who is missing, who has been found, or who is deceased in the aftermath of a disaster.

The UVIS example showcases the transformative impact of technology in addressing the complex issue of missing persons during large-scale disasters and underscores the necessity of effective data management and coordination in emergency response.

This case serves as a powerful reference for the development of the PATA project, emphasizing the need for a centralized and efficient reporting and response system.

# 2.3 Theoretical Review

## 2.3.1 The International Committee of the Red Cross (ICRC) Central Tracing Agency

The International Committee of the Red Cross (ICRC) Central Tracing Agency, a longstanding player in this domain, has leveraged technology to enhance its tracing operations. (ICRC, 1863)

Founded in the late 1800s, the ICRC's Central Tracing Agency initially aimed to notify families about the whereabouts and well-being of detained relatives.

Today, (ICRC, 1863) it serves as a powerful platform for relaying hundreds of thousands of messages, connecting families during moments of separation and providing the peace of mind that is often elusive in times of crises.

In 2009 alone, the agency collected and delivered more than 253,000 messages. These messages played a pivotal role in scenarios such as the repatriation of Congolese prisoners of war and facilitating nearly 200 video calls between detainees and their families in Afghanistan. (Agency, 2006)

Additionally, the ICRC's Family Links website has played a critical role in tracing and reuniting missing individuals. Within just two weeks of the devastating earthquake that struck Haiti in January 2010 (Agency, 2006), the website assisted in locating more than 26,000 missing people. It also serves as a platform for people to search for missing loved ones and submit information on the whereabouts of survivors.

The ICRC's data system has collected over 83,000 names of people seeking to contact relatives or individuals with clues about missing loved ones since 2009. This data system enables communication among separated family members, helps locate missing relatives, and aids in the recovery and identification of human remains. The success of the ICRC's tracing operations highlights the transformative impact of technology in addressing missing persons cases during crises and conflicts.

## 2.3.2 The Dutch Cell Broadcast

The Dutch government has adopted a mobile phone danger alert system known as Cell Broadcast (Wikipedia, NL-Alert, 2001).

This system utilizes GSM technology to pinpoint cell phone users within a specific geographical area. In the event of a natural disaster or a terrorist attack, the Cell Broadcast system sends text messages to all mobile phones within the affected area, effectively warning individuals of the impending danger.

This technology not only enhances the timeliness of emergency alerts but also supplements other existing warning systems, including sirens and emergency broadcasts on radio and television.

Cell Broadcast (WordPress, 2007) acts as an additional and more instantaneous medium for communicating directly with people during disasters, ensuring that critical information reaches them in real-time.

The Dutch Cell Broadcast system serves as an example of how technology, particularly mobile communication, plays a pivotal role in emergency response and disaster management.

It showcases the capacity of modern technology to provide rapid and targeted alerts to individuals in danger, underlining the significance of swift reporting and response in addressing critical issues like missing persons during crises.

This example further illustrates the broader context of technology's role in enhancing emergency communication, which can provide valuable insights for the development of the PATA project.

## 2.3.2 Los Angeles Emergency Preparedness Foundation

Hurricane Katrina's impact in 2005 (WorldVision, 2019) emphasized the critical role of a coordinated and government-led missing persons protocol. Brent Woodworth, then the President of the Los Angeles Emergency Preparedness Foundation, highlighted the shortcomings of ad-hoc missing persons systems during the crisis.

While these systems were well-intentioned, they suffered from significant challenges. They operated independently, lacking communication with one another, leading to confusion and compromising public safety.

Moreover, the systems were characterized by a high degree of inaccuracy and the inability to collect essential data for effective missing persons management. A lack of privacy measures further exacerbated these issues (WorldVision, 2019).

This example from the Los Angeles Emergency Preparedness Foundation underscores the necessity of organized and coordinated efforts in addressing missing persons during crisis situations. It illustrates the significance of accurate data, inter-system communication, and privacy safeguards in ensuring the effectiveness of such systems.

## 2.3.3 The Commons Lab and the Fordham Centre on Law and Information Policy (CLIP)

The Commons Lab and the Fordham Centre on Law and Information Policy (CLIP) at Fordham Law School (Fordham, 2012) have jointly produced a report that addresses the intricate legal and policy considerations surrounding privacy in the realm of missing persons after natural disasters. Titled "Privacy and Missing Persons after Natural Disasters," this report serves as a roadmap for understanding the legal and policy complexities related to the privacy of missing individuals in diverse jurisdictions.

The report offers strategies that can be pursued by a range of stakeholders, including humanitarian organizations, private sector entities, volunteers, and policymakers.

One notable recommendation within the report urges governments to leverage their existing legal authority to support the appropriate sharing of personal information concerning missing persons in the aftermath of natural disasters (Fordham, 2012).

Moreover, the report encourages those involved in developing technologies for sharing information about missing persons to adhere to design principles that carefully balance privacy considerations with existing legal obligations. It underscores the importance of achieving this balance to ensure that privacy rights are respected while enabling effective information sharing for the purpose of locating missing individuals.

The report also calls upon privacy policy makers, legislators, and regulators to take proactive steps in clarifying how privacy rules and regulations apply to missing persons activities, particularly in key areas. This clarity is essential to ensure that activities related to missing persons can proceed without the looming threat of legal liability.

This example underscores the intersection of technology, privacy, and legal considerations in the domain of missing persons cases.

It highlights the need for thoughtful and well-informed policy development to create a framework that respects privacy rights while facilitating effective missing persons response and recovery efforts.

In the context of the PATA project, this example can serve as a valuable reference for addressing privacy concerns and legal considerations in the design and implementation of the system.

# 2.4 Conceptual Framework

The existing landscape of applications addressing missing persons cases reveals several important lessons.

While these applications have demonstrated some success, the overall impact remains limited. A critical aspect to consider in this context is the accessibility of such systems, particularly in times of emergency.

The fundamental requirement for an emergency communication system is that it should be easily and readily accessible, ensuring the highest level of effectiveness.

Statistics have shown that a significant portion of the population accesses the internet through a diverse range of devices. With a variety of devices readily available, more individuals can access internet-based applications even in critical situations.

Recognizing the importance of accessibility, the development of the PATA system has emerged as a responsive solution to bridge the gaps observed in existing applications.

PATA takes inspiration from the insights gleaned from prior systems, but it adapts and refines these concepts to offer a more inclusive approach. The need for a comprehensive, easy-to-access system has led to the development of PATA.

This system empowers both missing persons and their family members to communicate and reunite with the aim of significantly enhancing the usage and, consequently, the success of the system.

PATA is built on a foundation of inclusivity, emphasizing the importance of enabling more individuals to access a supportive system with ease and convenience. In a rapidly evolving digital world, PATA responds to the contemporary need for accessible, comprehensive reporting and response in missing persons cases.

By addressing the limitations inherent in existing systems and providing a practical, user-friendly approach to support missing persons and their families, PATA seeks to contribute to a more effective, compassionate, and inclusive solution to the challenge of locating missing individuals.

In summary, PATA's emergence as an accessible and user-friendly system takes inspiration from past applications but is designed to address their limitations. It aligns with the modern need for inclusive and comprehensive reporting and response in cases of missing persons, contributing to the overall goal of reuniting individuals with their loved ones efficiently and with a sense of compassion.

CHAPTER THREE: METHODOLOGY

# 3.1 Introduction

This chapter serves as the methodological (Merriam-Webster, 2023) blueprint for the implementation of the PATA project, illustrating the systematic approach taken to achieve our objectives. It is within this framework that we outline the methodologies, procedures, and tools employed in the design, development, and deployment of the Missing Persons Reporting and Response System.

The introduction, provides a roadmap for the reader to navigate the intricate process by which PATA will come to fruition. As we embark on this journey, we detail the research design, data collection methods, and analytical tools that will guide the efforts to address the complex challenges associated with missing persons incidents. This chapter (Merriam-Webster, 2023) is crucial for understanding the structured approach taken to ensure the effectiveness, efficiency, and ethical considerations embedded in the PATA project's implementation.

## 3.1.1 Purpose of methodology

The purpose of this methodology is to systematically outline the strategies, processes, and approaches employed in the execution of the PATA project.

By delineating the research design, data collection methods, (Simplilearn, 2003) and analytical tools, this section aims to provide clarity on how the project's objectives will be achieved. The methodology serves as a structured guide, ensuring that the development and implementation of the Missing Persons Reporting and Response System adhere to rigorous standards of accuracy, efficiency, and ethical considerations.

Through this comprehensive approach, the methodology aims to establish a robust foundation for the successful execution of the PATA project, facilitating a clear path toward achieving our overarching goals.

## 3.1.2 Importance of Methodology in System Development

The importance of methodology in system development cannot be overstated, as it serves as the guiding framework for the entire project lifecycle (Merriam-Webster, 2023).

One primary role of methodology is to provide clarity and direction to the development team. It outlines a systematic approach, detailing the steps, processes, and procedures necessary to achieve the project's objectives. This clarity ensures that the team remains focused on the end goals, fostering efficiency and reducing the likelihood of deviations from the project plan.

Consistency and reproducibility are key outcomes of a well-defined methodology. It establishes standardized practices, making it easier to replicate successful results in future projects. Additionally, methodology contributes to efficient resource utilization by providing a structured plan for allocating time, personnel, and technology. It helps the development team optimize their efforts, leading to more effective use of resources and reduced project costs.

Moreover, methodology plays a crucial role in risk management, incorporating strategies for identifying and mitigating potential challenges (Simplilearn, 2003). By addressing risks early in the development process, teams can avoid setbacks and ensure smoother project progression. Ethical considerations are also embedded in many methodologies, ensuring that system development adheres to legal and ethical standards.

In essence, a robust methodology contributes to the overall success of system development by promoting clarity, consistency, efficiency, and ethical practices throughout the project lifecycle.

## 3.1.3 Overview of The Methodology Chapter

In this section, we provide a comprehensive overview of the Methodology chapter, offering a glimpse into the structured approach that will be followed in the development and implementation of the PATA project. (Merriam-Webster, 2023) The Methodology chapter serves as a detailed guide, outlining the systematic strategies, processes, and tools that will be employed to achieve the project's objectives.

The chapter begins by introducing the purpose of the methodology, (Merriam-Webster, 2023) emphasizing its role in establishing a clear and structured framework for the project. It highlights the importance of the methodology in ensuring consistency, resource efficiency, risk management, and ethical considerations throughout the system development process.

Subsequently, the overview delves into the specific components of the methodology, including the research design, data collection methods, (Simplilearn, 2003) and analytical tools that will guide the project. This section acts as a precursor to the detailed discussions that follow, providing readers with a roadmap for navigating the intricacies of the methodology chapter. As we proceed, the methodology will be unpacked, revealing the step-by-step processes employed to bring the PATA project to fruition.

# 3.2 Target Users of The Product

The primary target users of the PATA system encompass a broad spectrum of individuals and entities, each playing a crucial role in the effective functioning of the platform.

Foremost among these users are the families and individuals (Agency, 2006) facing the distress of a missing loved one. PATA is meticulously designed to provide these users with a user-friendly and accessible platform for reporting missing persons swiftly. The system aims to offer a source of hope and support during challenging times, alleviating emotional distress and uncertainty by facilitating rapid community engagement and response.

In addition to families and individuals, entire communities stand as significant beneficiaries of the PATA system (Charity, 1986). The platform encourages community engagement and collective action, fostering a sense of shared responsibility for the well-being of community members.

Through PATA, communities can actively participate in efforts to locate missing persons, thereby enhancing overall community cohesion and safety. The inclusive nature of the platform ensures that anyone within a community, regardless of their background or technological proficiency, can contribute to the collective mission of reuniting missing persons with their families.

Furthermore, the PATA system extends its utility to authorities and first responders involved in missing persons cases. Law enforcement agencies, (Fordham, 2012) search and rescue teams, and relevant authorities gain access to timely and accurate information through PATA, streamlining their efforts to locate missing persons. The system facilitates efficient coordination and communication among these entities, ultimately improving their ability to respond effectively to missing persons incidents. In essence, the target users of the PATA system encompass a diverse range of individuals and organizations, all united by the common goal of swiftly and compassionately addressing missing persons cases within their communities.

## 3.2.1 Target Population

The target population for the PATA system encompasses a broad and diverse demographic, reflecting the universal nature of the issue of missing persons.

Individuals and families facing the distress of a missing loved one constitute the primary target population. PATA is designed to be inclusive and user-friendly, (NYC, 2020) ensuring accessibility for individuals of varying backgrounds, technological proficiencies, and geographic locations.

The system caters to those experiencing the emotional turmoil of a missing person, providing them with a supportive platform for quick reporting and community engagement.

Communities, both local and regional, represent another vital segment of the target population. PATA encourages community participation and collective action, aiming to engage community members in the search for missing persons. The platform facilitates a sense of shared responsibility within communities, emphasizing the importance of collaborative efforts to enhance safety and well-being. As a result, the target population extends beyond individual families to include the broader social units that make up our communities.

Additionally, authorities (FindLaw, 2022) and first responders involved in missing persons cases constitute an essential part of the target population.

PATA serves as a tool for law enforcement agencies, search and rescue teams, and relevant authorities to streamline information sharing, coordination, and response efforts. By addressing the needs of this user segment, the system contributes to the overall effectiveness and efficiency of the response mechanisms in place for missing persons incidents.

In essence, the target population for the PATA system is expansive, encompassing individuals, families, communities, and authorities united by the shared goal of addressing missing persons cases with compassion, efficiency, and collaboration.

# 3.3 Methods of Data Collection

In the development of the PATA system, a combination of observation and interview methods was employed for data collection (Merriam-Webster, 2023). This dual approach aimed to capture both the contextual nuances observed in real-life scenarios and the rich insights obtained through direct conversations with potential users, stakeholders, and experts.

Observation: The observational method involved the systematic and structured analysis of real-life situations related to missing persons incidents. This approach allowed for the identification of specific challenges, patterns, and behaviors associated with the reporting and response to missing persons. Observations were conducted in various settings, including community spaces, law enforcement agencies, (Merriam-Webster, 2023) and search and rescue operations. The objective was to gain a holistic understanding of the dynamics surrounding missing persons cases and inform the development of the PATA system based on actual scenarios.

Interviews: The interview method was concurrently employed to gather in-depth insights and perspectives from key stakeholders (Simplilearn, 2003). Interviews were conducted with individuals who have experienced the distress of a missing person, families directly affected by such incidents, community leaders, and representatives from law enforcement agencies and search and rescue teams. Structured interview protocols ensured consistency and reliability in data collection, with open-ended questions designed to elicit personal experiences, challenges, and expectations regarding the reporting and response to missing persons.

By combining observation and interview methods, the data collection process aimed to provide a comprehensive understanding of the complexities surrounding missing persons incidents. This hybrid approach facilitated the incorporation of both qualitative observations and individual narratives into the design and functionality of the PATA system, ensuring a user-centered and contextually informed development process.

## 3.3.1 Observation

Observation played a pivotal role in gathering contextual insights during the development of the PATA system (Merriam-Webster, 2023). This method involved a systematic and structured analysis of real-life situations related to missing persons incidents.

Observations were conducted in diverse settings, including community spaces, law enforcement agencies, (FindLaw, 2022) and search and rescue operations. The aim was to identify specific challenges, patterns, and behaviors associated with the reporting and response to missing persons.

During the observational phase, key aspects such as the timeliness of reporting, community engagement, and the coordination of response efforts were closely scrutinized. The goal was to understand the dynamics and intricacies of how individuals, families, and communities navigate the challenges of missing persons incidents. Insights gained through observation informed the design of the PATA system by providing a real-world foundation for addressing the identified issues.

The observational data collection method contributed to a nuanced understanding of the human aspects surrounding missing persons cases, complementing the insights gathered through other research methods. This approach allowed for the incorporation of authentic contextual elements into the development of PATA, (Charity, 1986) ensuring that the system is not only technologically robust but also attuned to the lived experiences and challenges faced by those affected by missing persons incidents.

## 3.3.2 Interview

This illustrative interview showcases the qualitative insights gathered from individuals directly affected by missing persons incidents. Their experiences contribute to shaping the user-centered design and functionality of the PATA system, ensuring it addresses real-world challenges and meets the expectations of those it aims to assist.

**Interviewer (Me):** Thank you for participating in this interview. Our conversation today is a crucial part of developing the PATA system to address missing persons incidents effectively.

To start, can you share any personal experiences or challenges you or someone you know may have faced during a missing persons incident?

**Interviewee (Families, and/or Friends):** Certainly. We had a situation where a family member went missing, and the initial process of reporting and coordinating a response was overwhelming.

The traditional methods didn't provide a quick way to communicate the situation, and there was a lack of community engagement. It felt like we were navigating through a maze without clear guidance.

**Interviewer (Me):** Your insights are valuable. Can you elaborate on the specific challenges you encountered in the reporting and response process?

**Interviewee (Families, and/or Friends):** One major challenge was the delay in getting the information out.

The existing systems required a lot of paperwork and steps before the report reached the right authorities. Additionally, there was a lack of community involvement; our neighbors and local networks weren't efficiently engaged in the search efforts. It was a distressing experience.

**Interviewer (Me):** I appreciate you sharing that.

In the context of the PATA system, how do you envision an ideal reporting and response process that could address these challenges?

**Interviewee (Families, and/or Friends):** An ideal system would make reporting simple and quick, leveraging technology for instant communication. Community engagement is key; we need a platform that brings people together, allowing everyone to be part of the solution.

Having a centralized system that streamlines communication between authorities and the community would make a significant difference.

# 3.4 Hardware and Software System Requirements

The development of the PATA system necessitates a clear understanding of the hardware and software prerequisites to ensure optimal performance and user satisfaction.

## 3.4.1 Hardware Requirements

The hardware infrastructure (UMSL, 1963) supporting PATA is designed for widespread accessibility and usability, ensuring optimal performance on various devices.

The system is adept at operating efficiently on commonly used platforms like smartphones, tablets, and computers.

To engage with PATA, users need a device equipped with standard specifications, including internet connectivity, a display screen, and an input interface such as a touchscreen, keyboard, or mouse.

Minimum Hardware Specifications for Users (UMSL, 1963):

- Device with internet connectivity

- Display screen

- Input interface (touchscreen, keyboard, or mouse)

These minimum hardware specifications are fundamental to guaranteeing a seamless user experience, enabling individuals across different devices to access and utilize PATA effectively.

Minimum Hardware Specifications for Development:

In the developmental phase of PATA, (UMSL, 1963) the hardware requirements are tailored to support the creation and testing of the system. The development environment necessitates components that enable efficient coding, debugging, and testing processes. The following specifications outline the hardware requirements for the development of the PATA system:

- Computer or Laptop

- Internet Connectivity

- Storage

- Peripheral Devices

These development hardware requirements ensure that the development team can collaborate effectively, iterate on code efficiently, and create a robust and user-friendly PATA system.

## 3.4.2 Software Requirements

**For the Users:**

PATA's software requirements (UMSL, 1963) are meticulously crafted to ensure broad compatibility and user accessibility.

The system is conceptualized as a web-based platform, guaranteeing versatile functionality across various platforms.

Users can effortlessly engage with PATA through popular web browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.

Embracing responsive design principles, PATA dynamically adjusts to diverse screen sizes, ensuring an optimal user experience.

Furthermore, PATA incorporates a secure and scalable database (UMSL, 1963) system to proficiently store and manage user data, incident reports, and system logs.

The backend leverages robust server-side technologies, adept at handling concurrent user interactions and preserving data integrity.

The specific software requirements for PATA development include (UMSL, 1963):

- Web Browsers: Google Chrome, Mozilla Firefox, Safari, Microsoft Edge

- Database System: Secure and scalable database for user data and incident reports

- Server-Side Technologies: Robust technologies for handling concurrent user interactions

- Responsive Design: Ensuring optimal user experience across various screen sizes

The harmonization of these software requirements with the specified hardware components lays the groundwork for PATA, fostering a seamless and inclusive user experience. This synergy ensures the reliability, security, and scalability of the system, empowering it to fulfill its core mission effectively.

**For the Development:**

The development of PATA will leverage a powerful stack of software tools, (UMSL, 1963) with a focus on Python, Django, and MySQL. The specific software requirements include:

* Integrated Development Environment (IDE): Utilize a reliable IDE such as Visual Studio Code, ensuring a seamless development experience with features like code completion, debugging, and version control integration.
* Programming Language: Python will serve as the primary programming language for backend development, offering simplicity, readability, and a robust ecosystem of libraries and frameworks.
* Web Framework: Django, a high-level Python web framework, will be employed to streamline the development process, providing a secure and scalable foundation for building web applications.
* Database Management System (DBMS): MySQL, a widely used relational database management system, will be the backend database for PATA, ensuring data integrity, efficiency, and ease of integration with Django.
* Version Control System: Implement Git as the version control system to track changes, manage collaborative development, and maintain codebase integrity.
* Frontend Technologies: Utilize HTML, CSS, and JavaScript for frontend development, ensuring a responsive and user-friendly interface.
* Testing Framework: Employ testing frameworks like Pytest for Python to conduct thorough testing, including unit tests and integration tests, ensuring the reliability of the PATA system.

This software stack provides a robust and efficient foundation for the development of PATA, combining the strengths of Python, Django, and MySQL to create a secure, scalable, and user-friendly Missing Persons Reporting and Response System.

## 3.4.2 Skills of The Developer

The successful development of PATA relies on the expertise and skills of the developer, encompassing a diverse set of technical proficiencies and problem-solving capabilities.

The key skills required for the development of PATA include:

1. Programming Proficiency:

A strong command of programming languages such as Python, HTML, CSS, and JavaScript is essential for effective backend and frontend development.

2. Web Development Frameworks:

Proficiency in utilizing web development frameworks, particularly Django for backend development, is crucial for building a robust and scalable system.

3. Database Management:

In-depth knowledge of database management systems, with a focus on MySQL, is necessary for designing and maintaining a secure and efficient database for PATA.

4. Problem Solving:

Strong analytical and problem-solving skills are vital for addressing challenges and optimizing the functionality of the PATA system.

5. Security Awareness:

An understanding of web application security principles is crucial to implement measures that safeguard user data and ensure the system's resilience against potential threats.

6. Testing and Quality Assurance:

Competence in testing frameworks, such as Pytest for Python, is necessary to conduct thorough testing and ensure the reliability and stability of the PATA system.

7. Collaboration and Communication:

Effective collaboration and communication skills are vital for interacting with stakeholders, understanding user requirements, and ensuring a successful development process.

These skills collectively contribute to the development of PATA, ensuring a comprehensive and well-executed approach to creating a Missing Persons Reporting and Response System.

# 3.5 Software Development Methodology

Software development methodology (Synopsys, 2017) is a structured approach guiding the entire software development lifecycle.

It outlines the processes and practices to plan, design, implement, test, and deploy software efficiently.

Different methodologies, such as Waterfall, Agile, Scrum, and Incremental, offer unique frameworks that teams choose based on project requirements and goals. These methodologies influence task organization, role definition, and communication within the development team.

The selection of a methodology plays a crucial role in project success and determines how tasks are sequenced, changes are managed, and collaboration is facilitated.

## 3.5.1 Rationale for Choice of Methodology

The choice of the Incremental Model (Synopsys, 2017) for the PATA project is driven by its suitability for dynamic and evolving requirements.

Unlike traditional methodologies like Waterfall, the Incremental Model allows for the incremental development of the system in manageable, iterative stages.

This aligns well with the nature of the PATA project, where features and functionalities may evolve based on user feedback and emerging needs. Additionally, the Incremental Model fosters early and continuous delivery of tangible results, enabling stakeholders to witness progress at each iteration.

This iterative approach facilitates flexibility, accommodating changes in requirements and ensuring that the evolving system aligns closely with user expectations.

Moreover, the model's emphasis on frequent testing and validation supports the goal of delivering a reliable and user-friendly Missing Persons Reporting and Response System.

The Incremental Model is a systematic and iterative approach (Synopsys, 2017) that divides the software development process into smaller, manageable parts called increments.

Each increment represents a portion of the complete system functionality and is developed and tested independently before being integrated into the existing system.

## 3.5.2 Incremental Model

Key Characteristics of Incremental Model for PATA:

1. Phased Development:

PATA is developed in successive phases, with each phase building upon the functionality delivered in the previous one. This allows for a systematic and structured approach to development.

2. Parallel Development:

Different components or features of PATA are developed in parallel, enabling the team to work on multiple aspects of the system simultaneously. This parallel development accelerates the overall project timeline.

3. Early and Partial Delivery:

The Incremental Model facilitates the early and partial delivery of functional components. This means that certain features of PATA can be deployed and used by end-users even before the entire system is complete.

4. Flexibility and Adaptability:

The model accommodates changes and modifications at various stages of development. Feedback from users and stakeholders can be incorporated into subsequent increments, ensuring that the evolving system meets user expectations.

5. Reduced Risk of Project Failure:

Since PATA is delivered incrementally, there is a reduced risk of project failure. The system is tested and validated at each stage, reducing the likelihood of discovering critical issues late in the development process.

6. Continuous Testing:

Testing is an integral part of each increment, ensuring that the delivered functionality is reliable and meets specified requirements. This iterative testing process contributes to the overall quality of PATA.

7. Customer Feedback Integration:

Regular feedback from users and stakeholders is actively sought and integrated into the development process. This ensures that PATA aligns with user needs and expectations.

8. High Visibility of Project Progress:

Incremental development provides high visibility into the progress of the project. Stakeholders can observe the system evolving incrementally, fostering transparency and confidence in the development process.

The Incremental Model aligns with the goals of PATA, emphasizing continuous improvement, adaptability to changing requirements, and the early delivery of valuable system functionality.

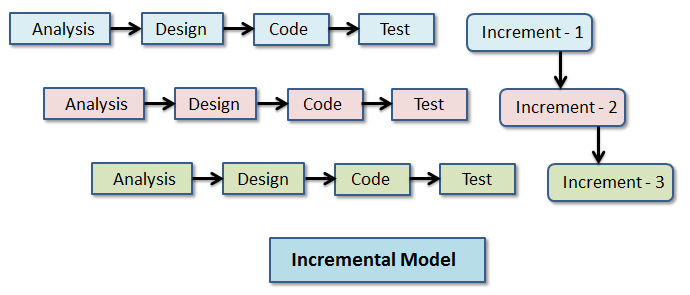
## 3.5.3 The Software Development Lifecycle

The Software Development Lifecycle (SDLC) (Amazon, 2009) for the PATA project follows the Incremental Model, defining a series of well-defined phases to guide the development process.

The lifecycle begins with the identification of requirements, followed by the design, implementation, testing, and deployment of incremental features.

Each iteration represents a self-contained development cycle, allowing for continuous refinement and enhancement. The iterative nature of the SDLC ensures that feedback from stakeholders and users is incorporated at early stages, fostering adaptability and responsiveness to evolving needs.

Throughout the lifecycle, rigorous testing and validation processes are employed to ensure the system's reliability, security, and performance as shown in the image below



The Incremental Model's emphasis on incremental delivery aligns with the project's goal of providing tangible and functional components in each iteration, contributing to the overall success of the PATA system.

### 3.5.3.1 Requirement Gathering

The first phase of the PATA project's Software Development Lifecycle is Requirement Gathering (Amazon, 2009).

In this crucial step, the project team collaborates with stakeholders, including potential users and law enforcement agencies, to comprehensively identify and document the system's functional and non-functional requirements.

This phase involves in-depth discussions, interviews, and surveys to understand the needs and expectations of end-users. By engaging stakeholders early in the process, the Incremental Model allows for the collection of valuable insights that guide subsequent development iterations.

The goal of this phase is to create a detailed and clear blueprint of the system's features, functionalities, and performance expectations, providing a solid foundation for the iterative development process to follow.

### 3.5.3.2 Design and Architecture

The Design and Architecture phase of the PATA project's Software Development Lifecycle (Amazon, 2009) is a critical step in translating gathered requirements into a well-structured and scalable system.

Leveraging the insights from the Requirement Gathering phase, the project team formulates a comprehensive design plan that outlines the system's architecture, user interface, and database structure.

This phase is characterized by creating mock-ups, wireframes, and prototypes to visualize the user experience and overall system flow. The Incremental Model allows for the refinement of design elements in successive iterations, ensuring that each incremental release builds upon the previous one.

The emphasis is on creating a flexible and adaptable architecture that accommodates future enhancements and technological advancements. By focusing on design precision, the PATA system aims to deliver an intuitive and user-friendly experience while maintaining scalability and robustness.

### 3.5.3.3 Testing and Implementation

The Implementation phase (Amazon, 2009) marks the transition from design concepts to the actual development of the PATA system.

Using the Incremental Model, the project team begins coding the various modules and components based on the approved design specifications.

This phase involves writing and testing code, integrating system functionalities, and ensuring that each increment contributes to the overall functionality of the system.

Frequent testing and feedback loops are integral to the Incremental Model, allowing for the identification and resolution of issues at an early stage. The iterative nature of the model enables continuous refinement and enhancement during the development process.

The goal of the Implementation phase (Amazon, 2009) is to progressively build a functional system, providing stakeholders with tangible deliverables at the end of each iteration. This approach ensures a dynamic and adaptive development process, aligning with the evolving needs of end-users and stakeholders.

### 3.5.3.4 Deployment

The Deployment phase (Amazon, 2009) represents the culmination of the development journey as the PATA system is released for use.

Following successful implementation and testing of each increment, the system is ready to be deployed to a live environment. The Incremental Model facilitates a phased deployment strategy, allowing stakeholders to access and benefit from specific functionalities in each release.

This staged deployment approach minimizes disruption (Amazon, 2009) and allows for real-time feedback from users.

The deployment process involves configuring servers, installing software components, and ensuring the system's compatibility with the production environment. Comprehensive testing is conducted to verify the system's stability and performance in the live setting.

The Incremental Model's iterative nature ensures that each deployment incrementally enhances the overall system, addressing any issues identified during earlier phases.

The Deployment phase marks a crucial transition, (Amazon, 2009) making the PATA system available for real-world use and actively contributing to the mission of reuniting missing persons with their families.

### 3.5.3.5 Maintenance

The Maintenance phase of the Software Development Lifecycle (Amazon, 2009) involves ongoing support, monitoring, and improvement of the deployed PATA system. In this phase, the development team remains engaged to address any issues, bugs, or user feedback that arise in the live environment.

Regular updates and enhancements are implemented to refine and expand the system's functionalities based on evolving requirements.

The Incremental Model's (Amazon, 2009) flexibility allows for seamless integration of new features and improvements during this phase. Maintenance activities also include performance monitoring, security updates, and ensuring the system's compatibility with evolving technologies.

Continuous user engagement and feedback collection contribute to the iterative nature of maintenance, ensuring that the PATA system remains responsive to the needs of its users. The goal of this phase is to sustain the system's reliability, security, and effectiveness in achieving its mission of assisting in the rapid reporting and response to missing persons incidents.

## 3.5.4 Programming Languages and Tools

This section outlines the essential programming languages and tools (KDnuggets, 2022) employed in the development of the PATA system.

It provides insights into the technological foundation that enables the creation, functionality, and performance of the system. The choice of programming languages and tools (KDnuggets, 2022) is a critical aspect of the development process, influencing the efficiency, scalability, and maintainability of the PATA software. This section aims to elucidate the technological framework that underpins the system's architecture and user interface, offering a glimpse into the tools that contribute to the realization of PATA's objectives.

### 3.5.4.1 Selection of Programming Languages

The selection of programming languages for the development of PATA is a strategic decision driven by considerations of efficiency, versatility, and community support.

Python (KDnuggets, 2022) has been chosen as the primary programming language due to its readability, extensive libraries, and robust frameworks like Django, which streamline the development process. Python's versatility allows for seamless integration with various components of the system.

Additionally, JavaScript (KDnuggets, 2022) is employed for front-end development, enhancing the user interface with dynamic and interactive features. JavaScript frameworks like React.js contribute to a responsive and engaging user experience.

The combination of Python and JavaScript ensures a well-rounded approach to address both server-side and client-side requirements.

The use of MySQL (KDnuggets, 2022) as the relational database management system complements the programming languages, providing a scalable and efficient solution for data storage and retrieval. The synergy of these programming languages aligns with the project's goals, emphasizing clarity, functionality, and scalability in the development of the PATA system.

### 3.5.4.2 Choice of Development Tools and Environment

The development of PATA involves a careful selection of tools and environments (TechTarget, 2019) to ensure efficiency, collaboration, and adherence to best practices. Integrated Development Environments (IDEs) play a crucial role in streamlining the coding process. Visual Studio Code (VS Code), a lightweight yet powerful IDE, is chosen for its versatility, extensive plugin support, and collaborative features.

Git, a distributed version control system, is utilized for code versioning and collaboration among the development team. GitHub serves as the remote repository, facilitating seamless collaboration, issue tracking, and code review processes.

For the backend development, Django, a high-level Python web framework, is employed to expedite the development of robust and scalable server-side components. React.js, a JavaScript library, is utilized for building dynamic and responsive user interfaces on the front end.

The entire development process is conducted in a virtualized environment using Docker containers, ensuring consistency across development and deployment stages. This choice enhances compatibility, simplifies deployment, and minimizes potential issues related to dependencies.

The combination of these development tools and environments aligns with modern development practices, fostering collaboration, code maintainability, and system reliability throughout the lifecycle of the PATA project.

### 3.5.4.3 Justification for Language and Tool Choice

The selection of Python as the primary programming language (TechTarget, 2019) for PATA is driven by its versatility, readability, and extensive ecosystem. Python's simplicity accelerates development, making it an ideal choice for building the backend infrastructure with the Django web framework. The language's readability enhances code collaboration and maintenance, crucial aspects for a project with social impact.

Django (TechTarget, 2019) is chosen for its high-level abstractions, which streamline the development of complex web applications. Its built-in features, such as an Object-Relational Mapping (ORM) system and an admin interface, expedite the creation of a secure and scalable backend.

On the frontend, HTML, CSS, Bootstrap, and JavaScript are a strategic choice due to its component-based architecture, promoting reusability and modular development. This would contribute to enhancing the responsiveness of PATA's user interface.

Visual Studio Code stands out as a lightweight and feature-rich IDE, providing an intuitive development environment for the project team. Its support for various programming languages and extensions contributes to a seamless development experience.

The choice of Git and GitHub aligns with collaborative development practices. Git's distributed version control system enables effective code versioning, while GitHub enhances collaboration, code review, and issue tracking.

These choices streamline the deployment process, mitigating potential compatibility issues and enhancing the overall reliability of the PATA system.

## 3.5.5 Project Management

Effective project management is crucial for the success of the PATA system development (ProjectManager, 2013). It involves the planning, organization, and coordination of resources, tasks, and timelines to ensure the timely and successful delivery of the project. In the context of PATA, project management will follow an incremental model, emphasizing iterative development and continuous improvement.

The project management process for PATA will begin with a comprehensive planning phase, identifying the core functionalities and features to be included in the initial version. Each subsequent iteration will build upon the previous one, incorporating additional elements and refinements. This incremental approach allows for flexibility, adaptability, and the incorporation of stakeholder feedback throughout the development process.

Tools like Gantt Charts (ProjectManager, 2013) will be utilized for issue tracking and project management, enabling transparent communication and collaboration among the development team. Regular progress reviews and feedback sessions will ensure that the project stays aligned with its goals and responds to evolving requirements.

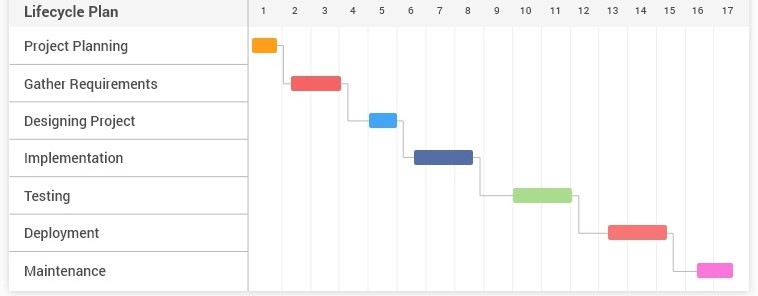
The overall aim of project management in the PATA development process is to deliver a robust, user-friendly, and feature-rich system that effectively addresses the challenges of reporting and responding to missing persons cases.

### 3.5.5.1 Project Scheduling

The initial phase of scheduling involves defining the scope of each iteration in the project, identifying key features to be developed or refined. This phase is crucial for setting clear objectives and expectations for the development team. The iterative nature allows for adjustments to the schedule based on feedback and changing priorities.

Tools such as Gantt charts (ProjectManager, 2013) will be employed to visualize and manage the project schedule effectively. This provides a clear overview of tasks, dependencies, and timelines, facilitating coordination and communication within the development team.

Regular checkpoints and reviews are integrated into the schedule to assess progress, address challenges, and ensure that each iteration aligns with the overall project goals as shown in the Gantt chart example below:



This approach to project scheduling ensures transparency, adaptability, and a structured progression toward the successful completion of the PATA system.

### 3.5.5.2 Resource allocation

Resource allocation for the PATA (ProjectManager, 2013) project is a strategic process aimed at optimizing human and technological resources to meet development goals efficiently. In line with the incremental model, resources are allocated iteratively, with each phase focusing on specific features or enhancements.

Human resources, including developers, designers, and project managers, are allocated based on their expertise and the requirements of each iteration. This approach allows for flexibility, enabling the team to scale up or down depending on the complexity and scope of the features being developed.

Technological resources, (ProjectManager, 2013) encompassing hardware and software tools, are allocated to ensure compatibility, reliability, and scalability. The choice of programming languages, development tools, and the technology stack aligns with the project's objectives and contributes to effective resource utilization.

Regular assessments of resource allocation are conducted during project checkpoints, allowing for adjustments based on evolving requirements or unforeseen challenges. This adaptive approach ensures that resources are strategically deployed to maximize efficiency and contribute to the successful development of the PATA system.

### 3.5.5.3 Risk Management

Risk management (IBM, 2007) is a crucial component of the PATA project's development strategy, aiming to identify, assess, and mitigate potential challenges that may impact project success.

Risks may include technological constraints, changes in project scope, or external factors such as data security concerns.

Following risk identification, the team conducts a comprehensive risk assessment, prioritizing risks based on their potential impact and likelihood. This process informs decision-making, allowing the team to allocate resources effectively and implement mitigation strategies.

Mitigation strategies may involve adjusting project timelines, enhancing security measures, or incorporating fail-safes within the system. Continuous monitoring throughout the development process ensures that emerging risks are promptly addressed, maintaining the project's resilience and adaptability.

The iterative nature of the incremental model provides inherent opportunities for risk reassessment and adjustment, aligning risk management with the dynamic nature of the PATA project.

This proactive approach aims to minimize the impact of potential challenges and contribute to the overall success of the development process.

# APPENDICES

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