TECHNOLOGY CONSULTING
IN THE GLOBAL COMMUNITY

Final Consulting Report
Agahozo-Shalom Youth Village

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August 2023

Carnegie Mellon University

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Agahozo-Shalom Youth Village (ASYV)
Executive Summary

Student Consultant, Zhijie Gao, Mujie Zhang
Global Community Partner, Stella Wayianzuvuko, Joseph Ngendahimana

I. About the Organization

As a non-profit organization, Agahozo-Shalom Youth Village (ASYV) stands as a sanctuary of nourishing underrepresented Rwandan youth. By incorporating parental wholeness, formal education, wellness, and life enrichment applied programs, ASYV has successfully empowered its community of 1300 alumni. The core of ASYV's value lies in its mission:

> *Through healing, education, and love, the Agahozo-Shalom Youth Village empowers orphaned and vulnerable Rwandan youth to build lives of dignity and contribute to a better world.*

The Village's physical and educational infrastructure includes school facilities, residential houses, and various educational programs, driven by a committed executive team and staff. The IT department strives to enhance the Village's technological capabilities, aiming for an integrated platform to manage all affairs. Communication and information management practices remain pivotal to operations, despite challenges in database consistency. ASYV is continuing its relentless journey towards empowering the youth to shape a better world.

II. Goal 1 - Implement the Alumni Management System

The first goal in the scope of work for ASYV is to implement an Alumni Management System (AMS). This necessity arises due to current difficulties in tracking alumni information with the manual, spreadsheet-based process. The inability to properly manage and engage with alumni, analyze their performance, and establish a vibrant, beneficial network is a major drawback. Therefore, ASYV has undertaken the task of developing an AMS with features such as a web-based platform for engagement, centralized database for information tracking, profile management, and reporting capabilities.

Outcomes:

- Enhanced alumni management efficiency - decrease in alumni calls for query and CRC staff's time cost for alumni information management
- Increased alumni engagement
- Improved tracking and analysis of alumni performance through the system's analytic capabilities

Outputs:

- User-friendly web-based AMS
- Centralized database for alumni information

- Reporting and analytics capabilities
- Data visualization capabilities
- Data migration and training services

Major sustainability risks can include technical issues during the implementation phase, potential resistance to the new system from alumni, and challenges in comprehensive data migration from existing spreadsheets. To mitigate these risks, an extra one-month remote support from the consultants will be provided. ASYV may also implement thorough training sessions for the related staff and provide guidance for the alumni. Moreover, it is recommended for ASYV to keep the connections with CMU-Africa, seeking further collaboration opportunities and support.

III. Goal 2 - Establish Industry Level Software Engineering Processes in ASYV

The second goal is to establish industry-level software engineering processes within ASYV, mainly by introducing GitHub Repository and Postgres Database, so as to ensure that all future application development benefits from sound practices. Specially, the reasons are: (1) AMS is the first system developed by ASYV, so there was no software engineering experience and procedure in ASYV; (2) ASYV plan to have more systems implemented in the future, so a unified and professional process can be a model and guidance for future reference, as well as ensure the consistency; (3) alleviate potential risks for software development, such as version conflicts, scope creep, and security threats.

Outcomes:

- Establishment of an established GitHub repository where all development projects can be stored and issues can be tracked
- Active use of GitHub features: includes branches and pull requests for all updates and changes
- Implementation of an organization-level Postgres database: replace data currently stored in Google spreadsheets, allowing for more comprehensive data visualization and analysis

Outputs:

- A GitHub repository which already contained AMS, and useful for future ASYV projects
- An organization-level Postgres database for information management
- Established model for setting up, using, and maintaining GitHub projects

In terms of the risk management for sustainability, disruptions to ongoing business processes can be a potential challenge. Accordingly, it is suggested to conduct training sessions and periodic process reviews for future developers, as well as ensure the continued leadership support. These measures can promote the established processes to remain relevant, efficient, and are used effectively by ASYV.

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I. About the Organization

Organization

Agahozo-Shalom Youth Village (ASYV) is a non-profit organization focused on providing vulnerable and orphaned youth in Rwanda the necessary healing, education, and love. Founded by Anne Heyman in response to the orphan crisis caused by the 1994 Genocide Against the Tutsi in Rwanda, Agahozo-Shalom is a place where "tears are dried" (from the Kinyarwanda word "agahozo") and where vulnerable youth can “live in peace” (from the Hebrew word "shalom"). The mission of ASYV formally defined what they do:

> *Through healing, education, and love, the Agahozo-Shalom Youth Village empowers orphaned and vulnerable Rwandan youth to build lives of dignity and contribute to a better world.*

With the priority to heal hearts, ASYV adopts four models to restore hope and opportunity to kids: Parental Wholeness, Formal Education, Health and Wellness, Life Enrichment Applied Programs. Moreover, the following core values depicted how the community dedicated to building empowered and self-reliant lives for children.

Commitment
Embrace the mission and go the extra mile.

Respect
Be considerate and mindful of others and the environment.

Role Model
Live and lead by example in a positive way.

Interest of Child
Base every decision on how it impacts the child.

Support
Help and encourage one another.

Integrity
Always be honest with yourself and others and act accordingly.

Learning Community
Seek and maximize opportunity for growth and development.

Currently, there are 4 grades, 24 families, and approximately 500 students in the school. Additionally, ASYV has 1,300 graduates and has served more than 1,600 young people since opening our doors in 2008. In terms of the staff, there are executives, teachers, family mothers, financial workers, IT technicians, administrative staff, logistics staff, nurses, social workers contributing to ASYV.

Facilities

Spanning over 150 acres with a view of far-off lakes, farmland, and endless rolling hills, ASYV is located about 40 kilometers East of Kigali, Rwanda's capital city. The grounds are fenced and monitored 24 hours a day by the security personnel. And it is in a rural location and surrounded by family farms on the rolling hills of the Eastern Province.

In ASYV, there is a school (with 22 classrooms and computer labs inside), staff offices (used by accounting and human resource departments, the principal, teaching staff and interns), student residential houses (where 20 to 24 students live together with a family mother), a dining hall, a canteen, a sports field (for soccer and basketball), two club houses, a farm, a solar field, several guest houses, a visitor center, and a Health & Wellness Clinic. Computer labs are equipped with HP desktop computers and Dell laptops running Windows.

Besides, the village has access to wireless internet, though connectivity is slow due to lack of bandwidth (16 bps). As for the electricity: the electrical current used in Rwanda is 220V; plugs take 2 round prongs (same as most of Europe, except the UK); most electrical devices have a built-in transformer that can accommodate a range of 110V to 220V. It is worth noticing that the power supply can fluctuate at times.

Programs

ASYV's academic calendar consists of three terms, separated by two-week breaks. There are two main programs: formal education and informal education. The formal education track encompasses an enrichment year as well as Senior 4, 5, and 6. Classes are conducted in English. In the enrichment year, students go through the comprehensive curriculums in Intensive English, Digital Literacy, Mathematics, and Science. During the following years, in addition to English, Entrepreneurship, and IT courses, students also have the opportunity to select the following subject combinations to study.

- Physics, Computer science, Math
- Math, Economics, Computers
- Math, Economics, Geography
- History, Economics, Geography
- History, Geography, Literature
- Physics, Biology, Chemistry

Informal education at ASYV encompasses various activities including sports, art education, and community service. The art component covers a wide range of mediums such as digital media, recording, photography, and filmmaking. The service aspect, known as "Tikkun Olam," meaning "repairing the world," involves students engaging in activities like teaching English in nearby schools, constructing houses for underprivileged villages, assisting in clinics, or receiving training related to the One Laptop Per Child initiative. Additionally, students have the opportunity to participate in clubs such as Dance, Drums, or Information Technology. For students demonstrating particular potential, there are dedicated classes for TOEFL and SAT preparation. Each evening, there is designated family time that includes debates, discussions, and engaging activities. On Friday evenings, the entire village gathers at the amphitheater to watch the news together and

showcase their diverse talents. Saturdays are often spent volunteering on the farm or enjoying movies, while Sundays involve attending church services and carrying out household cleaning tasks.

There is also a program called Educational Resilience Program (ERP) aiming to train teachers from across Rwanda in education technology, student-centered teaching, and life skills concepts like sexual and reproductive health and mental health. In August 2021, the inaugural class of 177 teachers from 60 secondary schools participated in the ERP. The second class of 132 teachers from 44 schools completed the program on August 30, 2022. Between the summer of 2021 and the end of 2023, the ERP will train more than 500 teachers and 167 school administrators and give approximately 75,000 students access to critical-thinking education, digital skills, and life skills.

To carry out its daily operations such as attendance tracking, report generation, and material sharing with students, ASYV adopts Teachmint (LMS), Google Drive, and Academic Bridge. Teachers utilize email to distribute homework assignments and assessments. Students regularly utilize Office 365, Excel, Word, and PowerPoint. Information technology plays a role in various activities, including computer science classes, extracurricular digital art pursuits, and within the health department, though there is considerable potential for further development and expansion in this area.

Staff

- **Executive Leadership**

Jean-Claude Nkulikiyimfura *(Executive Director)*: JC has over 17 years of experience in education, marketing, government, and corporate communication. At ASYV, JC manages a diverse team of educators and care providers while building successful local and international partnerships.

Shiri Sandler *(Managing Director)*: Shiri has a deep background in education, programming, and fundraising, in post-genocide communities. Shiri is the granddaughter of Holocaust survivors.

- **ASYV Staff Leadership**

Christine Icyitegetse *(Director of Finance)*: Joining ASYV in 2018, Christine is a professional accountant with a Certified Public Accountant (CPA).

Richard Niyibigira *(Country Director)*: Richard has been working in the education sector in Rwanda for over 12 years.

Aloys Kagimbura (*Special Projects Manager*): Aloys began his work with the ASYV in 2009 as a Math and Instructional Enrichment teacher, before becoming Deputy Principal of the Liquidnet Family High School in 2011.

Stella Wayianzuvuko (*Principal, Liquidnet Family High School*): Stella joins ASYV with vast experience in faculty professional development and curriculum development and implementation.

- **Staff Directly Impacting the Project**

Joseph Ngendahimana (*School Learning management system administrator*): Joseph joined ASYV in 2019 and is the IT technician and teacher here. Before that, Joseph was the computer science

teacher at CMS APADEM. He has experience in full-stack development, skills including Python, Django, html, CSS, etc.

Julius Kaboyo *(Dean of Students)*: Julius joined ASYV in 2012. He is skilled in data analysis, curriculum development, teacher training and coaching, education strategic planning, program evaluation, and public speaking.

Joseph is the developer that the consulting team mostly corporate with. Julius and Stella are the leaders in charge of the AMS project and the team should report to.

- **IT Department in ASYV**

  IT department: the IT department in the village involves 5 staff, with 2 permanent staff (Deo and Justin) and three interns (Kellen, Danny, Divin). The IT department in the village is in charge of running the programming classes for students, providing IT support for village life, and supporting network connection in the village.

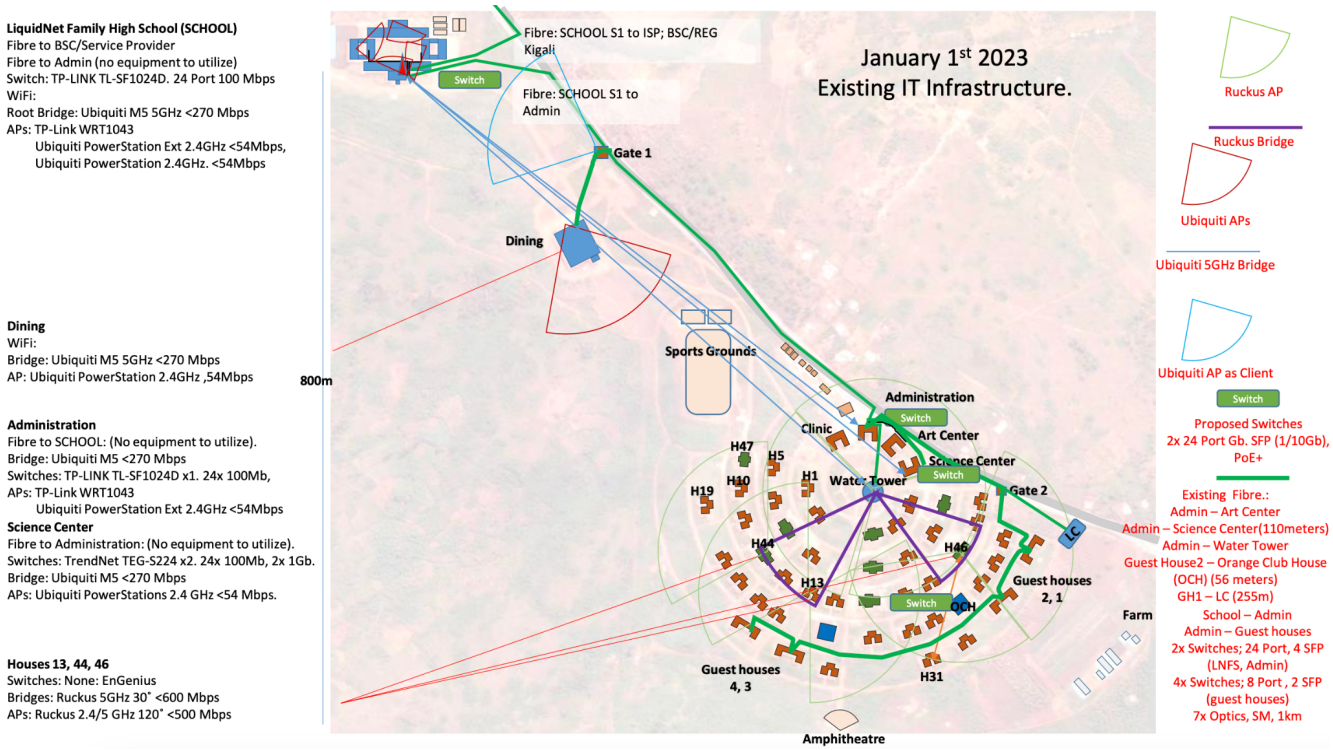
  SubIT department in school: in the high school, there is a separate sub-IT department with 4 IT teachers, including Joseph. The school's IT department is primarily responsible for running IT classes in school, and providing technical support for teachers in school.

Technology Infrastructure

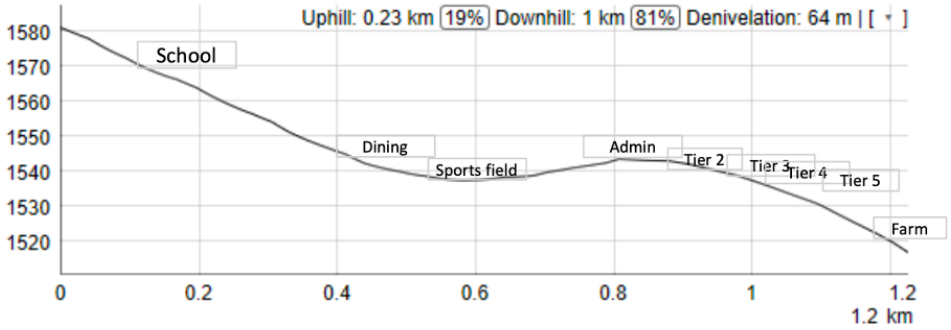
Technology	Description
Servers	The village has 3 servers with a capacity of 6TB (main controllers). There are also 2 servers (N computing servers - MX hundred) and Vcloud servers (stand alone servers that won't break together).
Internet	The Village is equipped with wireless Internet, though connectivity in Rwanda is slow due to lack of bandwidth. The networks are open. The strongest Wi-Fi networks can be accessed from the Administration Building and the guest houses. Detailed network diagram is shown below.
Computers	The computers' operating system used is Windows. There are 5 computer labs in the school with a total amount of 146 computers. In the village, there is a science center equipped with 12 computers.
Laptops (students)	Students use laptops made in 2014, which have been heavily used since then. The laptops are running into more technical issues faster.

Laptops (teachers and administrators)	There are 30 village laptops for teachers. They are provided by the village for easier management and data protection. For family mothers, there are village tablets for them to obtain information.
Laptops (LEAP)	Media center for LEAP has 10 desktops, but most of these desktops are too old and out of use.

The network diagram is shown as follows.

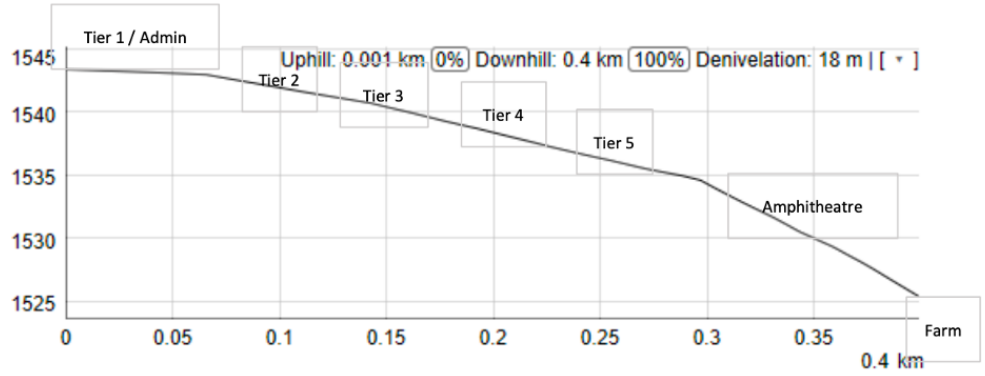


Village



Site	Elevation (M/Ft)
School	1569 / 5147
Dining	1543 / 5064
Admin Tier 1	1543 / 5062
Tier 2	1540 / 5053
Tier 3	1538 / 5047
Tier 4	1537 / 5042
Tier 5	1535 / 5037
Amphitheatre	1530 / 5020
Farm Buildings	1520 / 4988

Admin, Residences, Amphitheatre, Farm.



The electricity supply is generally good, though the power goes out on occasion. There are outlets to charge phones, iPods, and computers, but electricity is expensive. Additionally, the power supply can fluctuate at times, which may be damaging to electronic devices, particularly computers — so people should not leave anything plugged in if the power goes out (when it comes back on is typically when there can be a power surge).

Technology Management

There is an IT office in the school, where Joseph and another three teachers or alumni cooperate to deliver IT solutions and computer courses. Joseph is in charge of the school's learning management system administrator technology infrastructure: from software to hardware. He is also responsible for the development and maintenance of the Alumni Management System. When teachers and students are facing technical issues, Joseph is usually the person to go to. Justin is the IT specialist in ASYV capable of troubleshooting and operational task management.

Besides, there is also an IT office in the village, where Deo, the IT coordinator in ASYV, works to fix issues in the village. If problems escalate, they may go to Kigali to find external support.

Technology Planning

ASYV has long hoped to develop its own learning management system that would handle teaching materials, assignments, attendance, etc. There are many existing options, yet due to how unique ASYV is, most of these options could not fully realize the needs of the organization. In 2021 and 2022, ASYV began the national Educational Resilience Program to train teachers in student-centered education and digital teaching technologies. Joseph, the developer, had developed a small management system in PHP in the past few years.

Deo was in charge of planning and budgeting for technology infrastructure. Usually, there is also a five-year technical plan in place, though each year the plan is revised to meet the specific need of the organization. In terms of hardware, ASYV is planning to build more cable-based wifi connections in the village, given how the grown up trees had blocked the signals of the old point-to-point connections.

The long-term goal of the organization is to create one integrated platform to manage all affairs in village lives and school, the current Alumni Management System (AMS) could be regarded as a first step towards this long term goal. ASYV hopes that the development of the AMS could introduce necessary digital infrastructure for future development.

If the AMS is successfully implemented, ASYV plans to create an organizational database next year, after collecting all the relevant information from all departments in the village and in school. The end goal is to create one database that manages all data in the village. The IT department believes that once the organization database has been implemented, it would also make future application development smoother. The student consultant also advised that while the one integrated platform could take years to develop, ASYV could begin with introducing SingleSignOn to existing platforms.

Communication

For general information relating to communication, the main language in Rwanda is Kinyarwanda, however, most Rwandans speak a little of at least one international language. English is now the primary language taught in the school system. As for the time zone, Rwanda operates on Central African Time, and does not have daylight savings time.

ASYV employs various internal communication methods for sharing information. Face-to-face interaction is the most prevalent form. Email is frequently used for both communication and sharing documents, typically in Excel or Word format. While many documents are still paper based, which can be slow and sometimes cause errors. Phone calls, text messages, and WhatsApp are also utilized for communication purposes. Another challenge they face in communication is the delayed response time to emails and the limitations of their server, which hampers the effectiveness of their intranet.

Regarding external communication, email, video calls, phone calls, and text messages are utilized. Communication with families and other stakeholders within Rwanda primarily occurs through phone calls. The New York office handles most of the external communication with donors, visitors, and volunteers. ASYV maintains a website, asyv.org, which serves as a platform for engaging potential donors and visitors. Social media platforms, including YouTube, Facebook, and Instagram, are actively used by ASYV to raise awareness about the school and gather funds. They can be located on these social media platforms through the following means:

Facebook: @agahozoshalom
Twitter: @asyv
Instagram**:** @agahozoshalom
Blog: www.asyv.org/blog
YouTube**:** www.youtube.com/theasyv

News updates are student performed, edited, and produced in collaboration with Enock Mutabazi, ASYV Class of 2022 and current Media Intern.

For this project specifically, the development team (Mujie, Zhijie, Joseph) have decided to make use of a GitHub issue to communicate technical issues. Most problems and inquiries are tracked via Github issues and comments.

Information Management

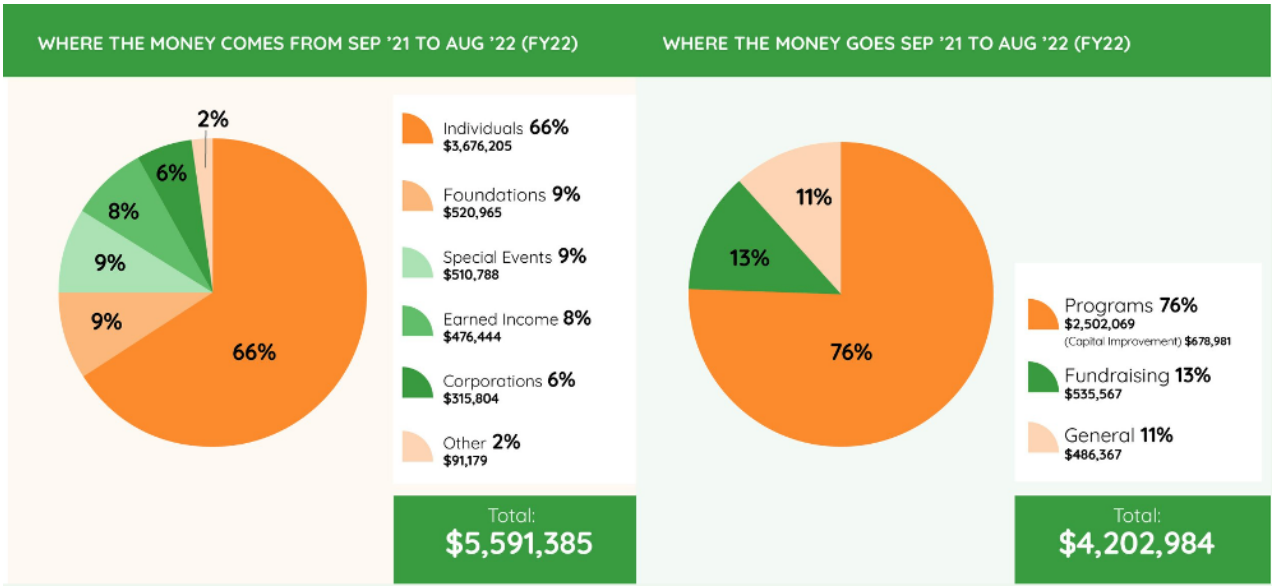
Data is collected through various means at ASYV, including paper-based forms, Google Forms, and Microsoft Access, among others. This data is often compiled and transferred to different formats, for example, alumni information is stored via Excel, to facilitate analysis and management by the administrative team. However, the transferring process is time-consuming and requires significant labor resources. ASYV deals with a substantial volume of critical data as they gather essential information about each student multiple times throughout the year. Therefore, enhancing their information management methods is a crucial objective for ASYV.

Currently, there are several databases in place, developed by the Monitoring and Evaluation Officer, the health and wellness department, and the school staff, serving different purposes. However, the main challenge lies in achieving efficiency and consistency across these databases. Improving information management practices will enable ASYV to closely monitor students' progress and update whenever necessary.

Business Systems

The development of most ASYV business systems occurs in both New York and Rwanda. ASYV boasts an efficiently operating finance department, headed by Director of Finance Christine Icyigetse. The department also consists of several accountants responsible for handling payroll, salaries, and employee information. Employees can be reimbursed for their expenses. As to receive payment such as visitor fees, both online at paypal.me/asyv and in-site payment by Rwandan Francs are acceptable. In general, operations could be automated more so as to increase efficiency and accuracy.

Where the money comes from and where it goes in ASYV can be seen in the figure below.



II. Implement the Alumni Management System

Motivation

Since the first cohort of Alumni in 2012, the administration and management of ASYV have struggled to find a solution to track the alumni. For all these years, data collection has been done using a very detailed spreadsheet which makes data analysis and interpretation cumbersome.

This leaves the organization unable to:

- holistically analyze how their alumni are performing and form decisions based on data
- maintain consistent and up-to-date communication with their alumni
- establish vibrant alumni network as resources for the school's alumnus' future success

The organization then decided to shift its focus to developing an Alumni Management System itself, and has finished the early designs (wireframes) and basic code project as the consultants came in this year. The new Alumni Management System would be focused on four primary user groups:

1. General visitors: the website would have a well designed home page to introduce ASYV and its alumni network to visitors. Visitors can only view the home page information.
2. ASYV alumni: all alumni of ASYV would be registered by the school's CRC (career resource center) staff with their student information. They should be able to log in, view opportunities posted by other alumni, post opportunities to other alumni, and connect with other ASYV alumni via social media.
3. CRC staff: the school's CRC staff would have the privilege to perform most operations in the AMS. They would be able to log in with their personal account, view data analysis reports generated from the database, approve opportunities posted by alumni, track alumni networking, post events and opportunities.
4. Administrators: the administrators of the AMS would be in charge of the technical maintenance with all privileges. It is likely that only the developer, the head of CRC, and probably the school principal, would be the administrators.

In sum, this software will help with alumni database management, analytics, reporting, interaction, sharing opportunities, scheduling events and hosting virtual sessions. It will help ASYV to easily measure the impact by analyzing the journey each student has taken and planning how to better improve programs and support the Alumni using data-based decision-making approaches.

Outcomes

- ### Activities and Deliverables

The following indicates the involved activities and deliverables in terms of the timeline:

1. Discuss thoroughly with clients about user requirements (Week 1)
   - OUTPUT: Consulting proposal

2. Design a user-friendly web-based Alumni Management System interface (Week 1)
   - OUTPUT: Figma designed Interface

3. Create the Entity Relational Diagram (ERD) and use cases (Week 2)
   - OUTPUT: ERD

4. Establish the collaborative coding environment and practices via GitHub (Week 2)
   - OUTPUT: Established GitHub repository
5. Create a centralized database structure to store and manage alumni information (Week 3-4)
   - OUTPUT: Established database via PostgreSQL
6. Implement User profile management features (Week 3-4)
   - OUTPUT: User Page and Profile with subpage with alumni and staff
7. Implement alumni information management features, including stories, families, eps, employment, education, etc. (Week 4-8)
   - OUTPUT: Alumni Page with the above functionalities
8. Implement Event adding, showing, editing features (Week 4-8)
   - OUTPUT: Event Page with the above functionalities
9. Implement features to automatically show events in calendar by months, weeks and days (Week 4-8)
   - OUTPUT: Schedule Page with the above functionalities
10. Implement Opportunities adding, showing, editing, approving features (Week 4-8)
    - OUTPUT: Opportunity with the above functionalities
11. Implement features to store and update ASYV memorable photos (Week 4-8)
    - OUTPUT: Gallery Page with the above functionalities
12. Implement features to add, read, edit, delete, and pin News (Week 4-8)
    - OUTPUT: News Page with the above functionalities
13. Offer online guidance to users (Week 4-8)
    - OUTPUT: Help Center Page with the above functionality
14. Implement Front Page with features including contact, video play, login, alumni stories display, news display, etc. (Week 4-8)
    - OUTPUT: Front Page with the above functionalities
15. Implement reporting and analytics capabilities to track alumni status (Week 6-8)
    - OUTPUT: Visualized graphs and maps in dashboard
16. Unify page presentation styles via html, css, jsx (Week 7-8)
    - OUTPUT: Consistent and user-friendly system styles
17. Conduct test data migration from existing spreadsheets to the new Alumni Management System, ensuring the accuracy and completeness of the transferred information (Week 8)
    - OUTPUT: Data transfer
18. Conduct user testing and gather further feedback from ASYV to make necessary refinements and improvements to the system (Week 9)
    - OUTPUT: Demo presentation

19. Support deployment, facilitate connections with experts from CMU-Africa, and generate necessary documentations for future reference (Week 10)
    - OUTPUT: Deployment in progress; CMU-Africa already involved in the project and further cooperation ensured

- **Outcomes and Indicators**

Outcome	**Indicator**
Alumni Management System in place	ASYV's first self-developed system is born
Enhanced alumni management efficiency	Eliminate reliance on spreadsheets Decrease the number of phone calls received for alumni queries Decrease CRC staff's time cost
Increased alumni engagement and participation in the network	Alumni actively using the platform
Improved tracking and analysis of alumni performance	Can be used for analytics by generating needed data, visualized graphs, etc.
Generate ways to share job opportunities with alumni	Alumni are able to access wider job options
Post events to alumni with easy-tracking ways	Increased event engagement rates

Recommendations

The following strategies are recommended to ensure the sustainability of the project:

- **Training:** Provide training sessions to ASYV staff members responsible for managing the Alumni Management System. This will enable them to continue using and maintaining the system effectively. ASYV, then, should actively introduce and train alumni to use the AMS.
- **Documentation and Guidelines:** Detailed documentation and user guidelines should be offered and continually refined, including step-by-step instructions, best practices, and

troubleshooting tips. As for developers, wireframes, ERD, etc. should be carefully kept as valuable resources for future reference.

- **Ongoing Support:** With a GitHub repo implemented for the project, it is fairly easy for the client to submit problems related to the AMS for the consultants to review. This support can be provided by the consultants at least for one month to ensure a smooth transition and sustainable system maintenance. For future maintenance, the local developer (Joseph) who is proficient with react-django framework should be able to provide continued support as long as he remains in ASYV.
- **Collaboration with Alumni:** ASYV should actively involve alumni in the evolution and improvement of the Alumni Management System. Collecting feedback, conducting surveys, and organizing alumni focus groups can help gather insights and make necessary updates to meet their evolving needs.
- **Collaboration with CMU-Africa:** It is suggested that ASYV should keep in touch with Professor Umuhoza and Research Assistant Aime from CMU-Africa for potential future collaboration, especially regarding deployment issues.

III. Establish Industry Level Software Engineering Processes in ASYV

Motivation

ASYV is actively trying to develop various applications by itself, yet the organization lacks any formal software engineering procedures or practices. All development is handled by one individual developer (Joseph), and the code projects exist on his personal laptop. ASYV is aware of some design practices of application development (use cases, wireframes, ERD, design docs), but lacks solid procedures when it comes to the development itself. This leaves the organization vulnerable to many typical software engineering problems caused by lack of procedures: version conflicts, lack of documentation, scope creep, dependency conflicts, security threats, etc. The team hopes that by collaborating with the local developer on the AMS, the team would be able to introduce basic software engineering procedures and processes to ASYV that would benefit all future application development in the organization. Specifically, the team would focus on GitHub Repository and Postgres Database.

Outcomes

- ### Activities and Deliverables

1. Develop the AMS collaboratively on GitHub
   - OUTPUT: An established GitHub repository for all ASYV developed projects
2. Implement Postgres database with react-django framework
   - OUTPUT: An organization level Postgres database for storing information

3. Generate common Github practices for future onboarding developers
   - OUTPUT: Documentation regarding how to setup, use and maintain Github projects
4. Deploy the application with AOS according to the national policy of Rwanda
   - OUTPUT: One production version of the application deployed on the server, with git properly set up for future updates.

- **Outcomes and Indicators**

Outcome	**Indicator**
Established GitHub repository	All development projects are in the GitHub Repository of ASYV Development specific issues can be tracked via GitHub issues
Active use of github features including branches, pull requests	All updates and changes are finished in local branches, and merged to the main branch with pull requests
Application deployed with AOS	A production version of the AMS has been deployed on the Ubuntu server offered by AOS. Remote git has been setup to make future updates easier
Postgres database implemented at an organization level	All data stored in google spreadsheets is being imported to the Postgres database, which also provides functionalities for visualization and basic analysis

Recommendations

Potential risks and challenges associated with implementing the industry-level software engineering processes include resistance to change from staff, potential disruptions to ongoing projects, and the need to overcome cultural barriers within the organization. To ensure the sustainability in ASYV, the following strategies can be employed:

- **Documentation and Knowledge Transfer:** Documenting guidelines, newly established processes, procedures, and best practices can serve as a valuable resource for future reference, training, and onboarding of new team members.
- **Training and Capacity Building:** Offering regular training sessions, workshops, and seminars can help keep the staff updated on evolving industry standards and practices. This will empower them to apply and adapt the processes effectively and independently.
- **Process Reviews and Continuous Improvement:** Establish a culture of continuous improvement by conducting periodic reviews and assessments of the implemented software engineering processes. Encourage feedback from the staff to identify bottlenecks, areas for

improvement, and emerging trends in the software engineering field. This iterative approach will ensure that the processes remain relevant, efficient, and aligned with industry standards.

- **Leadership and Management Support:** Obtain ongoing leadership and management support to sustain the industry-level software engineering processes. Senior management should actively participate in the process improvement initiatives, provide necessary resources, and communicate the importance of adhering to the established processes. Their continued support will foster a culture of excellence and accountability.

- **Additional Staff in IT:** Assuming that future ASYV applications will be developed and deployed in the same way, Joseph would take the responsibility of a database administrator, application developer and server administrator. This is a lot of responsibilities for one individual, especially considering that Joseph has other responsibilities in the school. ASYV should consider employing full time or part time developers to join the IT team if the village really hopes to achieve the long term goal: building one application that manages everything about ASYV. Given that Joseph is familiar with git, the new developers could even be remote.

IV. About the Consultant

Mujie Zhang is a master student majoring in Information System Management at Carnegie Mellon University. She has various experience in consulting, system development and data analyst. Mujie will further develop her expertise in the technical field and cultivate a deeper appreciation of the art and science of information technology.

Zhijie Gao is an undergraduate student majoring in Information Systems at Carnegie Mellon University. He has previous experience in application development, and is also interested in exploring the intersection between technology and society.

V. Acknowledgement

The TCinGC consultants want to express their deepest gratitude towards Professor Eric Umuhoza and Aime Jean Akimana. They offered extensive support in the deployment of the application. From negotiating with AOS (the local service provider) to a step to step deployment session, their experience and expertise were invaluable for the consultants and ASYV.