COS10025

Technology in an Indigenous Context Project

Business Case and Project reflection report

Project Title: Digital Connectivity Infrastructure for Remote Indigenous Communication

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We respectfully acknowledge the Wurundjeri People of the Kulin Nation, who are the Traditional Owners of the land on which Swinburne's Australian campuses are located in Melbourne's east and outer-east, and pay our respect to their Elders past, present and emerging.

We are honoured to recognise our connection to Wurundjeri Country, history, culture, and spirituality through these locations, and strive to ensure that we operate in a manner that respects and honours the Elders and Ancestors of these lands.

We also respectfully acknowledge Swinburne's Aboriginal and Torres Strait Islander staff, students, alumni, partners and visitors.

We also acknowledge and respect the Traditional Owners of lands across Australia, their Elders, Ancestors, cultures, and heritage, and recognise the continuing sovereignties of all Aboriginal and Torres Strait Islander Nations..

Declaration

I declare that this report is my individual work. I have not copied from any other student's work or from any other source except where due acknowledgment is made explicitly in the text, nor has any part of this submission been written for me by another person.

Signature: Nguyen Nam Tung

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Part A: Business case

Executive Summary

Our team is tasked with analyzing the digital infrastructure of Umuwa, a rural town in South Australia, and identifying any existing issues. Then, we provided some viable solutions that can be utilized to address the mentioned problems. For each design solution, budgets were also estimated to ensure that they were of excellent quality and affordable for the town's inhabitants. Finally, we would outline the benefits and drawbacks of each solution to determine the most effective one for the township.

Introduction

Township Background

Umuwa is a town in South Australia's Anangu Pitjantjatjara Yankunytjatjara Lands (APY Lands). The population is approximately 100 people. The settlement is located roughly 250 kilometers northwest of Marla and 460 kilometers southwest of Alice Springs, making it an exceptionally remote position. The average annual precipitation for the Umuwa is 216.9 millimeters and the average temperature in January is 37.3 degree Celsius, making its weather very extreme in the summer. The nearest medical facility is in Kaltiji, which is a 30-minute drive away – a very long distance to travel in case of emergency.

Project Description

The research examines the existing digital infrastructure in Indigenous communities in Umuwa, Land of APY, South Australia. Even though each indigenous and remote community has unique characteristics, such as culture

and population, they still have a lot of similarities. For instance, many Indigenous Australians residing in remote and rural regions of Australia have specific needs and encounter particular barriers in many aspects. Therefore, this project will analyze the aforementioned obstacles and propose some suitable solutions for them utilizing advanced digital communications infrastructure.

Problem Statement

Many Australian rural areas, such as Umuwa (Land of APY, South Australia), face numerous difficulties due to the absence of digital communication infrastructure. They lack access to modern medical systems, which makes them more vulnerable to sickness, particularly throughout this Covid-19 pandemic (Government, 2022). In addition, their life expectancy is lower than that of people living in the city due to a lack of technological advancements that would facilitate access to healthcare services. In addition to healthcare, internet access is a significant issue that must be addressed. The speed and quality of the internet are insufficient for daily use, and in some areas of the city, inhabitants do not even have access to digital technology. Last but not least, there are no service facilities in Umuwa at all, such as a police station or a fire station, which can be a major issue in case of emergency.

Project Requirements

In order to develop solutions that can solve the concerns of the Umuwa community, each stage of the project must satisfy certain standards.

The initial stage of planning and research is, in my opinion, the most crucial because it establishes the foundation for the entire project. During this phase, our team focused on researching the problems and present requirements of the township's communication infrastructure. We also wanted to ensure that the obtained data is current and usable in the future.

Then, in the subsequent phase, we must build solutions that address the digital literacy and affordability issues of the township's citizens. In addition, a detailed expense strategy had been proposed.

We then reevaluated the designs to ensure that the solutions adhered to the Telecommunications guideline requirements. Besides that, every design concept should benefit Umuwa people in their daily lives, improving their living standards.

Project Scope

Although many aspects of Umuwa were covered in the project, there were still many things that we were unable to develop due to time and knowledge constraints. Some environmental adverse effects of the technology will not be investigated. In addition, additional budget items such as taxes and transportation charges were not included in our team's budget scope.

Project Motivation

Overall, the project focuses on identifying the difficulties facing Umuwa, South Australia, and developing solutions to the community's most critical problems. The project should be carried out in accordance with the Telecommunications guideline for sustainability, affordability, environmental health, and appropriateness, as well as health safety and user access equity. We hope that by doing so, we will be able to implement design solutions that do not only help people in Umuwa but also in other indigenous and rural communities in Australia, improving all of the inhabitant's living standards.

Summary of project budget (all design ideas)

Design idea 1: Accessibility to digital technology

PROJECT BUDGET TABLE - Umuwa				
Category / Budget Item	Cost Calculation	Qty	Unit Cost	Total
Equipments				
Router		4	$ 60.15	$ 240.60
Wireless Access Point		2	$ 99.20	$ 198.40
Server		1	$ 819.65	$ 819.65
Server Racks		1	$ 1,704.10	$ 1,704.10
Optic Fiber cable	100 meters	1	$ 211.50	$ 211.50
UPS		1	$ 985.60	$ 985.60
TOTAL				$ 4,159.85
Labour Cost				
Salary for Technicians	200 hours @ $42/hour	2	$ 16,800.00	$ 16,800.00
Salary for field supervisor	$88,500 annual salary for 1 year	1	$ 88,500.00	$ 88,500.00
TOTAL				$ 105,300.00
Others				
Web Maintenance	$400 / year for web maintenance and domain name @ 15/year	1	$ 415.00	$ 415.00
Internet costs	Business NBN @ 219/month	1	$ 2,628.00	$ 2,628.00
TOTAL				$ 3,043.00
Total				$ 112,502.85
Grand Total (+20%)				$ 135,003.42

Table 1: Budget of the design idea 1

The overall budget for the initial design concept is $112,502.85. It costs $105,300 for labor, $4,159.85 for hardware equipment, and $3,043,00 for other expenses such as internet and website maintenance. The entire amount is $135,003.42. This solution intends to expand Umuwa's population's access to technological innovation and increase their work opportunities.

Design idea 2: Emergency smartwatches

Hardware	Units	Cost per Unit (in AUD)	Total Cost (in AUD)
ADAFRUIT INDUSTRIES 746 GPS Module	700	$64.80	$45360
eSim	700	$2	$1400
ADXL345 Triple Axis Accelerometer	700	$6.90	$4830
Labour Cost	Total Hours	Hourly Rate (in AUD)	Total Cost (in AUD)
Software Engineer	80	$100	$8000
Hardware Engineer	80	$100	$8000
Total:			$67590
Grand Total after factoring in 10% contingency:			$74349

Table 2: Budget of the design idea 2

This second design is anticipated to cost a total of $67,500, with the ADAFRUIT INDUSTRIES 746 GPS Module ($45,360) accounting for the majority of the expense. This design will enhance the quality of emergency services in Umuwa by increasing the number of connections between the community and vital agencies such as the police and hospital.

Design idea 3: DSL Network

	UNIT COST	QUANTITY	PRICE
Outsiden Phone Box	80	15	1200AUD
Phone Cable	80	10	800AUD
DSL Modem	80	300	24000AUD
Telephone	80	100	800AUD
Ethernet Cable	80	20	16000AUD
Computer	80	1000	80000AUD
Labour			
Workers	14 people- 10 days	2100AUD per day	21000AUD
Engineers	15 people- 10 days	3300AUD per day	33000AUD
Testing	5 days	1000AUD per day	5000AUD
Installation	5 days	1000AUD per day	5000AUD
			TOTAL: 186800AUD

Table 3: Budget of the design idea 3

The entire cost for this design is $186,800, which includes $122,800 for hardware components, $54,000 for labor including workers and engineers, and $10,000 for testing and installation. This solution will increase the speed and quality of internet transmission in Umuwa.

Design Idea 4: Digital healthcare system

Software	Software	Unit Cost	Quantity	Total Cost
	Creating the application	15000	1	18000
	Creating and managing the database	5000	3	15000

Hardware	Hardware	Unit Cost	Quantity	Total Cost
	Phone	600	100	60000
	Watch	700	100	70000

Process		Cost per hour	Hour required	Total Cost
	Workforce Training	200	8	1600
	Testing	300	10	3000
	Connecting (1 time)	2000	1	2000

Table 4: Budget of the design idea 4

The budget for the final design is divided into three categories: the software, which entails developing an online health application and managing the database, costs $33,000. The most expensive element is the hardware ($130000 for the purchase of smartphones and smartwatches alone). Finally, there are a few processes that must be paid for in this project, including workforce training, testing, and database connection, which cost a total of $6,600. This design concept will enhance the entire health service and the health status of Umuwa residents, improving their life expectancy.

Recommended option to proceed

All of the aforementioned ideas contribute to solving specific problems in Umuwa; however, the fourth design concept is the most viable option for proceeding. Without a functional healthcare system, the hospitalization rate of the population will increase, and since the town lacks a modern hospital with advanced equipment, this can be a challenging issue to tackle in the long run. The alternative project designs can be implemented later in the later stages of the project.

Shared value

This solution can add significant values to Umuwa by satisfying the town's health and safety requirements and resolving a lot of people's health issues. This method lowers the number of inhabitants in the city who suffer from a

variety of diseases and illnesses. Additionally, this design's technology can be greatly expanded in the future, making its potential limitless.

Benefits

1. Accessible

This technology is applicable to all circumstances, including children, the elderly, and the disabled, as it only requires a single phone to monitor the health status and the watches for data to be collected. This technology's coverage area is also expansive, providing all Umuwa people access to it.

2. Health and safety

Several sources indicate that the radiation released by smartwatches can be hazardous to people's health. However, the censor's operating system is employing spectroscopy to detect reflected light and analyze the heartbeat, allowing it to measure health statistics without negatively affecting the users

3. Environmental health

This technology does not emit any potentially dangerous chemicals or electromagnetic radiation, so it is friendly to the environment.

4. Affordability

No equipment such as an antenna or a satelline is required as Bluetooth connection is the only mode of connecting. In addition, the longevity of this system reduces the need for frequent technological checks and maintenance, hence saving a lot of expenditures. Hardware items such as phones and watches are also not unique in the market, so there will be many options for choosing the most cost-effective suppliers.

5. Sustainable livelihood

The system can be simply maintained by the community. Device update and installation are simple tasks for citizens with basic technical skills.

6. Appropriateness

The fact that the design's durability is better than that of the other technology and the technology's extensive coverage area makes it an appropriate option for Umuwa to implement.

Opportunities

Implementing the design concept well can result in numerous future opportunities for the city. The improvement of Umuwa's tourism and economic aspects would be facilitated by the enhancement of the town's digital network and health service. More hotels with fast internet transmission speeds can be constructed to attract more tourists to the city, boosting the local economy. Modern hospitals and health centers can be built to increase the living standard of inhabitants. In addition, with a larger network coverage area, the

solutions may be extended to include a unique sensor that monitors the amount of Carbon Dioxide in the air, thereby aiding in the management of the town's pollution level.

Part B: Project reflection

Group Work Reflection

Describe the group work strategies/processes that worked for your team.

One of the strategies that our team applied successfully is using Google Docx to share related articles and references that could be useful for our tasks. This greatly simplified the research process, as many of those materials were subsequently utilized in our work. In addition, after every online meeting on Discord, Julia, the team leader, wrote a meeting report that documented what we had previously discussed. Then, all members of the team were required to sign the reports to ensure that everyone had attended the sessions and understood the next steps in the project, assisting our team in keeping track of our progress and allowing us to make better decisions in the later stages of the project.

Describe the group work strategies/processes that did not work for your team.

Having offline meetings besides workshops was one of the strategies we were unable to implement. We were never able to find a time that worked for everyone on our team due to our extremely diverse schedules and heavy workloads as well as part-time jobs. However, at the workshop, everyone still paid close attention to the shared project, and I believe that we should have held more offline sessions to strengthen the relationships between team members.

Describe what could be improved on next time you work in a group. This should be from your individual perspective, e.g., "not working with person X" is not something you can change.

Despite our team's best efforts, we were not able to deliver high-quality products. Our team performs exceptionally well on the first group assignment, which involves innovative concepts. However, the outcome of the presentation fell short of our expectations. Therefore, I have evaluated many aspects that have contributed to our group's declining performance. First, it involves the fact that our team members focused more on individual tasks than the group assignment as a whole. When completing their assigned individual tasks, the majority of team members pay little attention to those of their teammates. This was a serious mistake, as the group's overall performance will be affected as a result. Another vivid example of this error is one of our team members, Phat. A week before the presentation's due date,

he was still uncertain about what to do. This caused a delay in the report's finalization process because he submitted his work late (only a few hours before the deadline) and we did not have time to review it. Consequently, his presentation lacked his design diagram, and he also performed poorly during the project presentation. These challenges were primarily caused by our inability to communicate clearly. If we had spent more time examining the progress of team members and providing feedback, this issue may not have developed. In my next group project, I will try to organize more weekly meetings before and after group work to ensure that everyone understands the goal, is on track with the assignment's scope, and that the final product is of the highest quality. In addition, I believe that our team should have more team-building activities and weekend meals together in order to strengthen the bonds between team members. When we work with people we truly understand, our work productivity will increase. We can determine what our teammates excel at most and assign them jobs that are suitable to their strengths. This seems to be the type of activity that we have not engaged in throughout this project, and I believe that my team should employ this technique during the next group project.

Team organisation

Team organization is regarded as one of the most crucial factors in group work, and I believe we do a good job with this section. Tasks and responsibilities are distributed evenly among team members. As the team leader, Julia scheduled weekly meetings with the facilitator. Alvis was responsible for submitting the project files, including innovative concepts and the project presentation. I was the project's timekeeper, making sure that all team members attended the meeting online and submitted their tasks on time. Meanwhile, each member developed a design concept that corresponded to their learning issue in assignment 1. Since just only four design concepts were utilized, Julia prepared the summary and the description of the project.

Meetings

We utilized both workshop meetings and online webinars. For online meetings, Discord served as the primary method of team communication. In addition, we used Google Drive to store and share our work. Despite the fact that all team members were extremely busy during the week due to a large number of assignments in other units and the majority of our team members having part-time jobs, we were still able to schedule twice-weekly online meetings to discuss the working progress and some unresolved problems related to the tasks. Every member of the team showed up on time, and nobody has ever missed a meeting. In addition, we utilized Microsoft Teams online meetings to discuss the team project with the tutor. Since this meeting was held on a Monday and the most of team members have school or part-time jobs, only one or two individuals were able to attend. However, all of the

meeting's content was documented and presented to everyone in an efficient manner. Last but not least, the offline workshop was used to conclude our work with the facilitator. Many challenging questions were answered by the tutor, which greatly assisted us in enhancing the content of our project.

Delivery of the project design ideas/budget

The design concepts were assigned to four members of our team. Alvis, Scott, and I generated high-quality items, but Phat's research was quite misdirected, so I had to assist him in changing his work in the right direction. Due to my time, effort, and his hard work, we were able to complete his individual project on time, giving Phat plenty of time to prepare for the final presentation.

Delivery of the Innovation concept

At that time, each member of the team had a different duty in the group, and despite having numerous assignments at once, everyone performed admirably in their tasks. Alvis, Scott, Phat, and I worked on the concepts, while Julia managed the project's overview. Since every member of the team was experienced in academic reading and writing, our innovation concept submission was of satisfactory quality.

Delivery of the final presentation

Although the project presentation was not presented to a satisfactory level due to the lack of material and insufficient depth of the content, I believed that our teammates had tried our best. The presentation's preparation phase was quite successful because slides were sent almost one week before the presentation's deadline. As a result, we had ample amount of time to analyze the PowerPoint presentation and provide suggestions on areas that might be enhanced.

Individual Work Reflection

Project Task

Phase 1 – Problem identification and identifying learning issue

In my opinion, the first phase is the most difficult phase of the project. As a foreign student, I had a limited understanding of the Indigenous people in Australia, and I found the project's approach to be really confusing. Then, after my teammates explained what to do, I selected health and hygiene as my learning issue, which I used for my research report and the design idea assignment.

Phase 2 – Develop design ideas using diagrammatic tools

Next, I was required to propose a design concept that would improve the health and healthcare system of Umuwa residents. Initially, I decided to record the health conditions using solely smartwatches and a mobile health

application. However, I also decided to utilize SQL Database to manage all of the health records. Canvas and draw.io are two tools that I used to create the design diagram for my product.

Phase 3 – Estimation of cost (budgeting)

During this phase, I determined the total cost of the services required for my design concept. This work involved me to research the value of the hardware, software component and the required process of my design. Based on the population of Umuwa, South Australia, I then evaluated the most suitable quantity for each budget category to compute the total price.

Phase 4 – Analysing the benefits of each solution in accordance with the telecommunication guidelines

Finally, I analyzed the benefits of my design idea in term of the telecommunication standards. This focused on six criteria, including access and equity, health and safety, appropriateness, affordability, environmental health, and sustainable livelihood.

Contribution

I believe I made a significant contribution to the team. As the team's timekeeper, I was responsible for setting a project schedule and ensuring that everyone submitted their assignments on time. Besides that, I also supported Phat, one of the team members who has recently arrived in Australia, with preparing the project budget and academic writing skills. At the beginning of the unit, he struggled considerably because of its difficulty, but with my assistance and encouragement, he became better and produced satisfactory work. Last but not least, throughout the teamwork process, I have always been an active member of our Discord server and acknowledged all team members' significant announcements quickly.

Conclusion and recommendation

In conclusion, despite the complexity of this unit in the beginning, I have now gained a better understanding of the challenges facing isolated indigenous communities in Australia and the solutions we may employ to assist them. This unit has helped me improve in several aspects, including teamwork, communication, and presentation skills. This has provided me with a great deal of valuable learning experience.

Despite the fact that my design concept has a number of appealing characteristics, there are things that may be improved. For instance, other expenditures, such as transportation, taxes, etc., can be included in the budget for my design concept, making it more specific and accurate. This detail can considerably improve the quality of our project presentation.

Part C: Unit Learning Outcomes (ULOs)

Apply relevant knowledge of emerging technologies to a project within an Indigenous context taking into consideration and acknowledging Indigenous histories, worldviews, standpoints, and cultures.

Situation:

We were required to address the town's learning issues and difficulties.

Task

Our team had to spend a considerable amount of time studying and evaluating learning issues. The facilitator also provided us with numerous insightful comments and facts on the culture and history of Indigenous people, which helped us a lot in the assignments.

Action

We identified the town's learning issues as well as how the residents might adopt technology into their daily lives.

Response

Everyone on the team now has a greater understanding of the Indigenous communities and their difficulties. Additionally, the group had a stronger understanding of how advanced technologies can be applied to an Indigenous context, which has facilitated the group's work considerably.

Function as an effective team member using project management tools and demonstrating professionalism and ethical behaviour.

Situation:

In the workshop session, each team member was assigned an issue, and I was confident that everyone could successfully submit their tasks. However, a few days before the deadline, I took a short check at the group project and noticed that Phat was still unclear on what to do as his work up to that point was not on the right track with the project scope.

Task:

If this situation continued, I knew our team assignment would be in serious trouble. Due to the fact that I was the project's timekeeper and a person with experience in technology projects, I strongly believed it was my responsibility to assist him in identifying what he did not grasp in order to finish his work.

Action:

As a result, I had to speed up my work in order to assist Phat with his tasks. I had to contact Phat and arrange an offline meeting with him to clarify everything he didn't understand. Fortunately, Phat and I share the same mother tongue, which made our communication much easy. Therefore, it only

took him two hours to fully understand what to do. I also supported him in finalizing his work by reviewing grammar and formatting. On the other hand, after this incident, I also needed to design a better timeframe for checking progress and submitting tasks. Moreover, after everyone had completed their work, our team sat together and reviewed the submission file to ensure that it was correct.

Response:

We believed that our team's performance had significantly improved following this incident. The assessment result was also relatively high. This can be explained by the fact that our teamwork skills increased significantly and we were more familiar with the working styles, strengths, and limitations of the other team members. This

Communicate within teams, stakeholders using appropriate verbal, written, and technological approaches.

Situation:

Monday's weekly meeting with the facilitator was missed by a number of team members. As a result, many individuals were unable to obtain feedback on their work.

Task:

I was also among those who were unable to attend the Monday meeting. Therefore, I needed to propose a solution that would allow us to receive the tutor's feedback on all sections of the project.

Action:

I told everyone to send a draft outline of their work to Scott, the only person who could join the online tutor meeting so that he could present our work to the tutor. He also recorded the comments and demonstrated them to the rest of the team to ensure that everyone understood what to adjust in their sections.

Response:

The facilitator provided a great deal of insightful feedback, and we were able to comprehend what the instructor wanted us to include in the assignment. This significantly improved our assignment grade. On the other hand, this also allowed me to have a better understanding of how we may strengthen the communication channel in professional working or studying environment, so that all team members can obtain their desired information.

Appreciate emerging technologies in a local, global and sustainable context.

Situation:

I was required to employ advanced technology to build a design solution for the town as part of the innovation idea assignment.

Task:

Bluetooth and database technology must be utilized to develop a digital health system for the residents of Umuwa.

Action:

I conducted numerous studies on the Umuwa health system and discovered that Umuwa residents can utilize a digital health system. This design must prioritize the cost and suitability of the users, especially the indigenous ones like the Umuwa community.

Response:

I have created a design solution that can aid people in Umuwa, and I understand how this technology can improve the community's living conditions.

Word Count: 4200

Reference

Government, A. (2022). Rural and remote health