

## Appendix C – Case Study

### **Business Case Background:**

Sally Lee is a 42 year old who came from Vietnam to Australia as a refugee 30 years ago. She didn't speak English when she arrived, but through mathematics and computing, she was able to quickly learn the new language, and also make lifelong friends in high school. She also attended University and completed a Bachelor's degree.

Sally is currently working as a Software Engineer and is a mum to 4 young daughters, one at high school and 3 at primary school and kindergarten. Sally's children are growing up and she wants to ensure that they are exposed to STEM (Science Technology Engineering Mathematics) subjects, and thereby have strong Technology, Mathematics, Physics and Computing knowledge. They live in Maryborough, a small town in regional Australia. When talking to the teachers and career counselors at her daughters' schools, Sally discovered that being in a regional area (2 hours away from Melbourne) has limited her children's exposure to STEM subjects. In addition, there are very few STEM projects being run by the school. Two of the main reasons provided are-

1. staff shortages in these areas, and
2. general lack of interest from children.

Sally has very fond memories of her high school visits to ScienceWorks<sup>[1]</sup> in Williamstown (a technology park with interactive displays for students to learn about how things work in areas such as electronics, mechanics, and physics). She tries to take her children there as often as possible. Children in regional areas have further seen their exposure to STEM reduced and complicated by COVID-19 restrictions, where regional schools now no longer plan STEM incursions or excursions to places like ScienceWorks.

Sally has a great idea on how she could help spark an interest in STEM subjects with young students in regional schools: ***A Travelling Technology Bus***. This would be a well-designed bus, and a project that would showcase the latest technologies. The bus would travel to regional schools and spend time, thereby allowing students to interact with the technology displays. This would reduce the need for regional schools to organize excursions and increase students' exposure to STEM across different year levels. The bus would be designed for groups of 10 students to visit at any one time. During the visit, students can interact with the displays, be shown how they work, or undertake activities to stimulate their interest. These sessions will ideally be 1 - 2 hours in duration. This duration is planned in order to maximize the number of students who can visit the bus, in addition to providing an appropriate amount of time for an exciting experience, that will hopefully spark further interest in the subjects.

The ***Travelling Technology Bus*** would be designed as follows:

1. The bus would feature a solar/wind hybrid system<sup>[5]</sup>, along with wind and kinetic energy set up to demonstrate how these technologies work. The solar panels would sit on the roof of the bus, and a retractable wind propeller would be used whilst driving to generate electricity.
2. It would also have Virtual Reality chairs, Kinetic Wheel Systems<sup>[2]</sup>, Robotics Interactive Displays and Mechatronics project kits that are built using LEGO<sup>[3]</sup>.
3. Additionally, the bus would have an underbody storage for a marquee<sup>[4]</sup> (a temporary shelter that can be setup and dismantled easily) that could be set up in the school car park. Inside this marquee, additional student groups could convene to run *Specialized Activities* like robot building and programming, gaming, VR (virtual reality), Immersion Display Design, or build AR (augmented Reality) displays. Participating in this activity will come with a cost of \$30 per student. The school would need to book this as an additional service. In addition, the school can also book a teacher skill augmentation session. During these sessions (conducted either in the school premises or in the marquee), teachers are up-skilled with the tools and templates to keep the kids engaged in STEM after the bus has departed.

It's estimated that the bus will require support staff of 2-3 people per day, and the plan is to augment the staff by hiring casual (technology skilled) staff at each location that the bus will visit. The casual staff will need to complete

an online course to train them on the session(s) they will run. They also need to have a valid Working With Children Checks and other required paperwork for employment. One idea is to try to attract substitute teachers from the local areas to fill these casual staff positions. Government imposed restrictions due to COVID has complicated some of the logistics, specifically in relation to travelling at certain times. Sally is keen to continue with the project and will resolve these issues later.

Sally has a friend Anna, who is also very keen on supporting the uptake of STEM subjects across all age groups and areas. Anna has her own small company with resources who specialize in different areas including full stack development, UI/UX and Databases. Sally and Anne have done some research and decided to set up a 'Not for Profit' organization that will design the business concept of the **Travelling Technology Bus**, apply for grants and funding from the government, and seek out business sponsors to make this project a reality. In order to demonstrate the proof of concept, Sally and Anne need to build an app and a web application that will manage the schedule of the travelling bus. Having this app as a prototype will help in their bids for grants, and also aid Sally and Anna to explain and visualize the project to the funding agencies.

Sally and Anna plan to develop the features of the 'Proof of Concept' as an App and Web Application in 2 phases. They want to enlist the help of Melbourne University students enrolled in the current semester of SWEN90016 to help them design and deliver Phase 1 requirements, before investing time and resources on Phase 2. Student teams will be tasked to work on either an App or a Web Application. Please note- only 1 choice to be made per team – implement the functionality, either as an App or a Web Application (not both).

### **Requirements for Phase 1 – Scheduling System:**

#### **Requirement 1 – Admin User**

The Moderator is a person who is tasked with the responsibility to schedule the visits of the Travelling Technology Bus to different schools, based on their expression of interest. The Moderator Account (also called the Super Admin User) is referred to as the **Admin User**. The Admin user shall have a default e-mail address and password to login. You do not have to create a separate User Interface for creating the Admin User.

#### **Requirement 2 - School Registration**

Schools wishing to have the Travelling Technology Bus visit their premises, shall register in the scheduling system by providing the following information. *This is the School Registration Web Page (User Interface)*

ID	User Interface Element (UI)	Description of UI Element
1	School Name	Text Field
2	School Contact Name	Text Field
3	School Contact Number	Text Field
4	e-mail address	Text Field
5	Password	Password Field (Masked Characters)

#### **Requirement 3 - School Expression of Interest**

After completing the School Registration, the school representative shall login into the system using the e-mail address and password. They shall be able to enter the following details to register the expression of interest (on behalf of the school) to request a bus visit. *This is the Expression of Interest Web Page (User Interface)*

ID	User Interface Element (UI)	Description of UI Element
1	School Name	Text Field
2	Address	Text Field (Address)
3	City	Text Field (Address)
4	State	Text Field (Address)

5	Postal Code	Numeric Field (Address)
6	School Type	Choose one of the following options <ul style="list-style-type: none"> <li>• Hosting School</li> <li>• Visiting School</li> </ul>
7	Is Secure Parking Present	Yes / No Option To be entered only if School Type -> Hosting School
8	Total Car Parking Spaces	Numeric Field To be entered only if School Type -> Hosting School
9	Total Open Areas	Numeric Field To be entered only if School Type -> Hosting School
10	Visiting School Name	Text Field To be entered only if School Type -> Visiting School
11	Nearest Host School Name	Text Field To be entered only if School Type -> Visiting School
12	Distance from Nearest Host School	Numeric Field To be entered only if School Type -> Visiting School
13	Message	Text Field

#### **Requirement 4 – Intimation to Moderator about a new Expression of Interest**

When the school representative completes Requirement 3, the system shall send an e-mail to the Admin User with the following details (to indicate a new expression of interest has come for scheduling)

1. School Name, Address, School Type, Message

#### **Requirement 5 – Viewing all the Expression of Interests Received**

Admin User (Moderator) after logging into the scheduling system shall be able to view the list of all expression of interests received from different schools in a tabular form. The table shall have two columns with following details. *This is the Expressions of Interest Listing Web Page (User Interface).*

1. Name of the School
2. School Type

The Name of the School is displayed as a Hyper Link for all the schools displayed in the table.

#### **Requirement 6 – Rostering a Schedule for a School**

When the Admin User clicks the hyperlink for any school in the Table for Requirement 5, a new web page shall be displayed to allow the Admin User, to schedule the time window for the school to choose the bus visit. *This is the Rostering a Schedule Web Page (User Interface).*

ID	User Interface Element (UI)	Description of UI Element
1	Expression of Interest Acceptance ID	Numeric Field – Auto Generated unique 3 digit number starting with 100, to track each successful expression of interest from each school
2	School Name	Text Field – Auto populated from Requirement 5
3	School Type	Text Field – Auto populated from Requirement 5
4	Start Date	Date Field
5	End Date	Date Field

Start Date and End Date that has been scheduled for a given school, shall not be available for selection when scheduling the dates for other schools. This is to prevent scheduling overlaps between different schools

The difference between the Start Date and End Date

- Shall be not more than 2 months

### Requirement 7 – Intimation to School to choose a Time from Schedule

When The Admin user completes Requirement 6 (for each school), the system shall send an e-mail to the corresponding school representative with the following details (to intimate them to choose a suitable time for the Travelling Bus to visit their school)

1. Expression of Interest Acceptance ID
2. School Name, Address, School Type
3. Start Date
4. End Date

### Requirement 8 – Choosing a time from the Schedule for a School

The school representative after logging in shall be able to choose and confirm the time for the bus visit as communicated in Requirement 7. *This is Confirming a Time from the Schedule Web Page (User Interface).*

ID	User Interface Element (UI)	Description of UI Element
1	Expression of Interest Acceptance ID	Numeric Field – Auto populated from Requirement 6
2	School Name	Text Field – Auto populated from Requirement 6
3	School Type	Text Field – Auto populated from Requirement 6
4	Start Date	Date Field – Auto populated from Requirement 6
5	End Date	Date Field – Auto populated from Requirement 6
6	Participate in Specialized Activities?	Yes / No Option
7	Total Students Participating	Numeric Field To be entered only if Participate in Specialized Activities? -> Yes
8	Cost Per Student	\$ 30 – Non Editable Field. Display Only
9	Total Cost	Numeric Field Non Editable Field. Display Only

Start Date is defaulted to the Start Date from Requirement 6

End Date is defaulted to the End Date from Requirement 6

School Representative shall be able to change the Start and End Date with the following conditions

The difference between Start Date and End Date

- Shall be at-least 1 week
- Shall be no more than 3 weeks

The Start Date shall not be lesser than the Default Start Date

The End Date shall not be greater than the Default End Date

The Total Cost shall be computed as – Total Students Participating X Cost Per Student

### Requirement 9 – Cancelling a Scheduled Visit for the Technology Bus

Only if the school has already scheduled a bus visit, the school representative after logging in shall be able to cancel a scheduled visit made in Requirement 8. *This is Cancelling a Scheduled Visit Web Page (User Interface).*

ID	User Interface Element (UI)	Description of UI Element
1	Expression of Interest Acceptance ID	Non Editable. Auto populated from Requirement 8
2	School Name	Non Editable. Auto populated from Requirement 8
3	School Type	Non Editable. Auto populated from Requirement 8
4	Start Date	Non Editable. Auto populated from Requirement 8
5	End Date	Non Editable. Auto populated from Requirement 8
6	Participate in Specialized Activities?	Non Editable. Auto populated from Requirement 8

7	Total Students Participating	Non Editable. Auto populated from Requirement 8
8	Cost Per Student	Non Editable. Auto populated from Requirement 8
9	Total Cost	Non Editable. Auto populated from Requirement 8
10	Reason for Cancellation	Text Field

#### **Requirement 10 – Intimation about a Cancellation for the Technology Bus**

When a school representative completes Requirement 9, the system shall send an e-mail to the Admin User with all the fields from Requirement 9 (to inform the moderator about a cancellation of the bus visit to a school).

#### **Requirement 11 – Database Persistence**

All the data entered for Requirements 1 – 10 shall be persisted in a database storage.

#### **A Note on Phase 2 – (NOT REQUIRED FOR CURRENT DEVELOPMENT)**

Your team is not expected to develop any requirements listed in this section for Assignment 02. This is only to give an insight into the future enhancements of the scheduling system whenever appropriate.

1. Allow for a shopping cart and payment system, where school pay for ‘Specialized Activities’ online
2. Facility to Allow for casual STEM staff to undertake online training and upload all required documentation for employment.
3. Allow for casual STEM staff (those that have completed the training) to sign in and apply for a roster system as demonstrators.
4. Allow for casual STEM staff to input hours worked and submit a timesheet for payment of casual rates.
5. Allow for a school mailing list where schools within 20km proximity of current Bus location can be sent information and a newsletter reminding them they can book in for a visit.
6. Allow for a payment gateway for donations to be made towards the project by business sponsors. The sponsoring business should also be able to upload promotional materials and artwork to be used to demonstrate sponsorship either in the app/web site or printed materials on the bus.
7. Develop a social media presence for the Bus, with a Facebook and Instagram page

#### **References:**

- [1] [Scienceworks \(museumsvictoria.com.au\)](http://scienceworks.museumsvictoria.com.au)
- [2] [Why did the flywheel hybrid system never catch on for road cars? | Ars Technica](#)
- [3] [Home | Official LEGO® Shop AU](#)
- [4] [Pole marquee - Wikipedia](#)
- [5] [What are solar wind hybrid systems? - Solar Panels and Solar Energy Systems | Energis Melbourne](#)