ITBW21 VISUAL ANALYTICS PROJECT

Project Guide

AY2021 Semester 2

Table of Contents

1 Introduction

1.1 WIU synopsis

Visual analytics is an approach that uses data visualisation tools and techniques to visualise data insights, trends, patterns, and relationships in business data.

Through this WIU, learners will demonstrate their competencies in developing a visual analytics project in teams by

a. gathering, identifying, analysing business requirements from key stakeholders with diverse needs to establish business problems,
b. discussing and analysing business problems using statistical modelling techniques to support strategic decision-making,
c. preparing the data using ETL techniques,
d. developing visualisations to communicate business data insights effectively to the key stakeholders with diverse cultural backgrounds.

1.2 WIU learning outcomes

Upon completion of this WIU, learners will be able to:

1. Gather user requirements from key stakeholders with different cultural backgrounds and diverse needs using effective communication and interpersonal skills.
2. Use user story approach to capture user requirements and functionalities of the required system using online collaboration tools to establish acceptance criteria and business problems.
3. Perform data exploratory analysis and prepare data for visualisation presentation using ETL techniques.
4. Analyse business problems using statistical modelling techniques to support decision-making.
5. Work collaboratively in teams to develop real-time visualisations for effective communication on business insights to the key stakeholders.

2 Project Scope & Scenario

2.1 Project Background & Scope

According to a popular website on the topic of living and working in Singapore[1], it reported that the quality of life is often used as a shorthand for measuring how good one feels about one's life. There are formal procedures for calculating this measure that includes factors such as economic, social, physical, political, and spiritual well-being. Singapore may be the smallest country in Southeast Asia, but it has emerged as one of the best places to live in Asia with a very high quality of life measurement.

Singapore has been ranked as the top city in Asia in terms of quality of living according to global human resource consultancy, Mercer. Singapore is also regarded as the 'Happiest country in Southeast Asia' according to the 2018 World Happiness Report[2].

The common factors considered for determining the quality of life in each country are:

- Political and social environment
- Economic environment
- Socio-cultural environment
- Health and sanitation
- Schools and education
- Public services and transportation
- Recreation
- Natural environment
- Consumer goods
- Housing

Based on the report, it seems that Singapore is a good place to live / work in. Is this true?

In this group project, you and your teammates are tasked to provide a data visualisation report to verify or disprove the above hypothesis (in bold).

a. The team is to gather requirements from the key stakeholder(s) of your choice (who is your potential target user of your solution) to understand the user needs and data visualisation report objectives through a requirements elicitation interview session. The team is also required to document the requirements using the user story approach.
b. The team is to provide a data-driven solution for the key stakeholder(s) using data visualisation tool (Microsoft Power BI) by applying ETL techniques, visualisation techniques and statistical modelling techniques.

[1] Quality of Life in Singapore | Immigration | GuideMeSingapore - by Hawksford
[2] World Happiness Report 2018 | The World Happiness Report

2.2 Project Requirements

Key Task 1: User Requirements Gathering

1. Develop critical questions to elicit information from key stakeholder(s) using a mixture of open and closed questions to understand the business needs and visualisation objectives.
    a. Relevant interview questions should be developed with consideration of users' perspectives.
2. Conduct interviews with the stakeholders to gather the business requirements using effective listening and questioning techniques.
3. Describe user experiences from the user's perspective using user story approach to establish acceptance criteria and business problems.
    a. Document captured business requirements using user story approach e.g. As a [customer], I want [shopping cart feature] so that [I can easily purchase items online].
4. Based on user requirements gathered, select appropriate datasets for analysis to achieve visualisation report objectives.

(refer to Annex B for interview template and Annex C for user story approach template)

Key Task 2: Perform ETL for Data Visualisation

1. Plan a project schedule by considering resources and support needed.
2. Organise data with consideration of the source, its validity and its relevancy and load chosen datasets based on user requirements into Microsoft Power BI using Microsoft SQL server.
3. Perform data cleaning using Power Query from Microsoft SQL Server.
4. Create suitable data visuals to illustrate and represent information of the datasets by applying fundamental concepts of data visualisation.
5. Analyse and evaluate the use of data visuals and charts to represent the dataset to answer business problems and meet user needs.

Key Task 3: Data Visualisation and Statistical Modelling Analysis

1. Employ regression analysis on suitable dataset in appropriate context to provide basic prediction for businesses to support decision-making that answer to the hypothesis.
    a. Utilise advanced DAX calculation or forecast or add-ons in Power BI for modelling.
2. Evaluate the use of various visualisation & modelling techniques and co-create ideas with others by using collaboration techniques and tools for action-driven analysis

Datasets

Datasets in the area of economic, education, healthcare, housing & facilities, safety and transport are provided for you to aid your analysis. You may use other datasets from reliable sources to support your analysis such as comparative index of other countries. Do note that irrelevant use of other datasets may impact the performance of your report.

These are some links you may refer for government sector and general information of Singapore:

http://www.data.gov.sg

http://www.singstat.gov.sg/

Statista global customer survey and dataset accessible via NYP Library Database. To access: Login to library > under Resources > select S > you will find Statista. Global Consumer Survey | Statista (remotexs.co)

Visualisation Report

Your visualisation report will need to convey a conclusion of the analysis and should be highly interactive, attractive, and adhere to the principles of good data visualisation. Each member should own at least 2 visualisation report pages addressing the hypothesis, with minimum 2 visualisations in each page and 1 statistical modelling technique for each member.

The statistical modelling technique to be applied is regression. You may consider other modelling technique as you deem fit for your model objective. Do consult your tutor.

The visualisation report should be entirely presented using Microsoft Power BI. The use of other tools such as Java or Python within Microsoft Power BI is possible.

2.3 Roles & Responsibilities

Each project group should consist of **3-4 students**. Each group must elect a group leader.

Project Supervisor / Module Tutor

- Provide feedback to project teams' proposals and designs.
- Advise the project group during project development, including the task allocation, development plan, tools used, etc.
- Provide inputs from the user perspective to the project team.
- Act as technical advisors (supervisors are NOT expected to debug programs or solve problems for students).

Group Leader

- Maintain the project schedule and documentation, and record attendance at meetings.
- Coordinate and assign work among members.
- Arrange meetings with the project supervisor. Leader is required to book the meeting rooms if meeting is held outside of the lab/tutorial hours.
- Communicate with the supervisor on behalf of the team to discuss any project-related matters.

Group Members

- Carry out allocated tasks.
- Be punctual and attend all lessons and project meetings.
- Cooperate with the rest of the group during project development.

2.4 Project Schedule & Submission

This project will be completed over 8 weeks and will adopt the Cross Industry Standard Process for Data Mining Initiative (CRISP-DM) methodology. Please refer to the following six key phases from CRISP-DM and the corresponding schedule. The detailed lesson plan can be found in Blackboard.

CRISP-DM	Weekly Schedule & Submissions
1. Business Understanding a. Determine user requirements b. Determine the business objectives c. Determine project goals	**Week 9**: Team founding & user stakeholder(s) identification **Week 10-12**: Business Understanding (User requirements gathering with key stakeholder(s)) **Week 12**: Data Understanding (Identify data sets & data sources) **Week 13**: Prepare Project Proposal ***Project Proposal Submission (20%)*** *(refer to Annex E)* *[due on 16th Jan 2022, Sunday, 2359]*
2. Data Understanding a. Describe data b. Explore data c. Verify data quality	
3. Data Preparation a. Clean data b. Construct data c. Integrate data d. Format data	**Week13-14**: Data Preparation (Data cleansing, consolidation etc.) **Week 14-15**: Visualisation & Statistical Modelling (Design the visualisation components, models, dashboards, stories, etc.) ***Data Preparation & Modelling Report (20%)*** *(refer to Annex F)* *[due on 6th Feb 2022, Sunday, 2359]*
4. Modelling a. Select modelling technique b. Generate test design c. Build model d. Assess model	
5. Evaluation a. Evaluate visualisations b. Review process	**Week 16-17**: Dashboard Integration, Modelling Evaluation & Prepare Final Presentation ***Final Presentation and Report (20% + 20%)*** - *Submit **Integrated Visualisation Report & Final Report** (refer to Annex G)* - *Submit **Digital Portfolio & Online Brand** (refer to Annex H)* *[due on 20th Feb 2022, Sunday, 2359]* ***I&E Quiz (10%)***
6. Presentation and Final Report a. Prepare final report b. Prepare final presentation	

All submissions are to be submitted via Blackboard. Late submissions will be penalised.

3 WIU Assessment Components

Assessment Component	Group	Individual	Total
Project Proposal	20%	-	20%
Data Preparation & Modelling	-	20%	20%
Final Presentation			
- **Integration**	10%	-	10%
- **Demo**	-	15%	15%
- **Report**	5%	-	5%
Digital Portfolio & Online Brand	-	20%	20%
I&E Quiz	-	10%	10%
		Total	100%

The assessment will be done through:

- Continuous assessment by Supervisors throughout the duration of the project.
- Assessment by independent markers during the presentations.

Annex A: Project Assessment Rubrics

Project Proposal (20%)

Criteria	Proficient	Competent	Functional	Developing	Not Competent
Questions, Interview & Product Backlog (4%)	• Excellent mix of relevant open-ended and closed-ended questions to elicit relevant information and confirm/clarify information. • No leading question to influence opinions. • Every user story reflects a feature described in the case and presented in a systematic, clear way. • The product backlog covers extensively what is required to develop the solution.	• Good mix of relevant open-ended and closed-ended questions to elicit relevant information and confirm/clarify information. • None or only one leading question to influence opinions. • Most user stories reflect a feature described in the case and presented in a systematic, clear way. • The product backlog covers quite extensively what is required to develop the solution.	• Fairly good mix of relevant open-ended and closed-ended questions to elicit relevant information and confirm/clarify information. • Few leading questions to influence opinions. • Few user stories do not seem to reflect a feature described in the case, seem to be not important, or unnecessary. • The product backlog is not comprehensive but still covers what is required to develop the solution.	• Not very good mix of relevant open-ended and closed-ended questions to elicit relevant information and confirm/clarify information. • Some leading questions to influence opinions. • Some user stories do not seem to reflect a feature described in the case, seem to be not important, or unnecessary. • The product backlog is not comprehensive but fairly covers what is required to develop the solution.	• Poor mix of relevant open-ended and closed-ended questions to elicit relevant information and confirm/clarify information. • Many leading questions to influence opinions. • User stories do not have adequate structure. Many user stories seem to be redundant, not important, or unnecessary. • The product backlog lacks important information to complete the development of the solution.
Project Planning (4%)	• Determines resources (i.e. sources of funding, platforms/facilities, consultants/expertise) required for the project development	• Outlines the development process with milestones and timeline for the project development	• Prepares a project brief/outline to introduce the idea(s), describe the value of the project, and impact to users and stakeholders	• Identifies tasks to complete, considerations for each task, and person in-charge for the project development	• Follows an ad-hoc and unstructured project development process
Empathy (4%)	• Selects appropriate I&E tools for the empathy study, and examines the pain points experienced by users	• Uses suggested I&E tools in a proficient manner for an empathy study, and identifies pain points of users without needing additional guidance	• Follows instructions to use suggested I&E tools for an empathy study, and identifies pain points of users through a guided process	• Tries one or more I&E tools during a learning activity	• Examines pain points of users without I&E tools or process
Transdisciplinary Thinking (4%)	• Collaborates with people from other domains or disciplines to develop idea(s)	• Applies an approach used by another domain or discipline to develop idea(s)	• Examines approaches used by another domain or discipline to develop a similar idea	• Compares the different approaches used in the parent or own domain or discipline to develop a similar idea	• Focuses on a singular or own perspective to develop idea(s)
Pitching (4%)	• Establishes connections with professionals and/or experts in the field to consult and provide advices on the development and deployment of the product/solution	• Obtains inputs and advices from people outside the team who has experiences or insights on the product/solution	• Identifies partners or collaborators who the team can approach for help to develop the product/solution	• Lists open resources (i.e. coaches, staff with expertise, facilities, small project funding etc) that the team can readily access to develop the product/solution	• Relies on resources that is immediately available or accessible to the team

Data Preparation Report (20%)

Criteria	Proficient	Competent	Functional	Developing	Not Competent
Data Management (4%)	• Creates meaningful connections and correlations between different groups of data to solve problems	• Uses the data to interpret and identify issues during problem solving	• Prepares and organises gathered data into useful groups or themes for problem solving	• Gathers appropriate and sufficient data for problem solving	• Gathers data for problem solving without a plan or process
Data Preparation (4%)	• Thorough rationale on inclusion or exclusion of selected data • Comprehensive data cleaning and transformations	• Clear rationale on inclusion or exclusion of selected data • Complete all necessary data cleaning and transformations	• Simple rationale on inclusion or exclusion of selected data • Complete most of the necessary data cleaning and transformation	• Irrational inclusion or exclusion of selected data • Incorrect data cleaning and transformations	• No evidence of data preparation
Testing (4%)	• Evaluates the functionality of idea(s) with users in a simulated or controlled environment	• Verifies the usefulness of the idea(s) with existing and potential users	• Discusses the idea(s) with coaches, mentors or others who can provide useful or helpful suggestions or opinions	• Describes the idea(s) to people who may not have knowledge or experiences for inputs or comments	• Leaves idea(s) untested or relies on inputs from people who are unfamiliar or have limited relevant knowledge or experiences
Iteration (4%)	• Develops more effective version of idea(s), or pivot to better idea(s), using feedback gathered	• Refines the design concept for improved usability of idea(s) using feedback gathered	• Improves the functional movements or mechanics of idea(s) using feedback gathered	• Enhances the aesthetics or appeal of the idea(s) using feedback gathered	• Keeps to an early design and/or does not use feedback to identify gaps or improve idea(s)
Dashboarding & Prototyping (4%)	• Creates a simple prototype for users to try key functions or features of idea(s) • Multiple dashboards with visualisations and modelling used to clearly and effectively convey the message stated in the hypothesis • Visual representation is intuitive and interactive • The choice of visual representation provides the accuracy message	• Makes a mock-up or basic model of idea(s) using digital or non-digital aids • Multiple dashboards and visualisations / modelling used to effectively covey the message stated in the hypothesis • The choice of visual representation provides the accuracy message	• Puts together a rough form of idea(s) using craft materials (i.e. paper, moulding clay etc) for others to visualise • At least 1 dashboard with minimum 2 visualisations and 1 modelling used to convey the message stated in the hypothesis • The choice of visual representation is suitable but there are other better approaches	• Describes idea(s) using existing materials (i.e. online images, magazine cutouts etc) • At least 1 visualisation/ modelling/ dashboard • Visual representation is unable to convey the message stated in the hypothesis • The choice of visual representation is unsuitable for the data type	• Maintains idea(s) as a concept and does not make any model or sample to show the idea • No evidence of visualisation or modelling or dashboarding

Final Report (30%)

(a) Integration and Final Report (Group 15%)

Criteria	Proficient	Competent	Functional	Developing	Not Competent
Implementation (5%)	• Enlists the help or recruits people who can add to the team's capabilities to deploy the product/solution • All charts are properly integrated and functional.	• Assesses if the team has the necessary capabilities to deploy the product/solution • Majority of the charts are integrated and functional.	• Identifies the value proposition of the product/solution for a selected group of users • Some of the charts are integrated and functional.	• Evaluates the strengths and weaknesses of the product/solution • Some of the charts are integrated but not functional.	• Remains as a working idea and does not consider if the product/solution will work when deployed • None of the charts are integrated.
Co-creating (5%)	• Develops a design process that involves stakeholders in the project development	• Consults people who have similar projects or experiences to identify useful tips or blind spots for the design process	• Discusses incidents or issues with supporters or people outside the team to improve the design process	• Works with project facilitators to review the team's design process	• Limits learning to insights or experiences within the team during the design process
Final Report (5%)	• Concisely and clearly describes the business scenarios and the process of using analytics to solve the problems • Content is well organised with recommendations clearly conveyed	• Describe the business scenarios and the process of using analytics to solve the problems • Content is organised with recommendations clearly conveyed	• Describe the business scenarios and the process of using analytics to solve the problems • Content is somewhat organised with recommendations clearly conveyed	• Confusing description on the business scenarios and the process of using analytics to solve the problems • Content is not well organised and hard to follow	• No description on the business scenarios and the process of using analytics to solve the problems • Content is badly organised and hard to follow

(b) Dashboards Demo (Individual 15%)

Criteria	Proficient	Competent	Functional	Developing	Not Competent
Dashboard Demo (5%)	• Iteration: Analysed users' needs to improve user experiences with the selected idea • Modelling & Analysis: Comprehensive rationale on the selection of modelling techniques • Models were built with detailed test design and considerations • Able to relate model results to hypothesis and make novel recommendations	• Iteration: Reviewed users' needs to make changes according to expectations of the selected idea • Modelling & Analysis: Clear rationale on the selection of modelling techniques • Models were built with appropriate test design and considerations • Able to relate model results to hypothesis and make useful recommendations	• Iteration: Reviewed some users' needs to make changes according to expectations of the selected idea • Modelling & Analysis: Acceptable rationale on the selection of modelling techniques • Models were built with some appropriate test design and considerations • Able to somewhat relate model results to hypothesis and make useful recommendations	• Iteration: Used users' needs to improve the appearance of the selected idea • Modelling & Analysis: Irrational selection of modelling techniques • Models were built with inappropriate test design and considerations • Unable to relate model results to hypothesis and make recommendation	• Iteration: No evidence that user needs were used to modify the selected idea • Modelling & Analysis: No evidence of modelling techniques used, no models were built, and no recommendation made
Communicating (5%)	• Demonstrates the value and impact of the product/solution to users using visuals or storyboarding	• Explains how the product/solution will be used by users using an appropriate diagram, blueprint, or process flow	• Describes the product/solution to users and/or stakeholders using a simple sketch or mindmap	• Describes the product/solution to others without using visual aids	• Restricts discussions on the product/solution to within the team
Leading (5%)	• Leads the team at certain or several stages of the project development, and leverages on individual strengths to complement team members	• Provides the team with useful inputs and suggestions during project development, and cooperates with team members to tackle challenges	• Participates proactively in the project development, and works in a constructive manner with team members	• Shows respect and consideration to the opinions and ideas of team members	• Little or no contribution to the team during project development, and/or little or no collaboration with team members

Digital Portfolio and Online Brand (20%)

Criteria	Proficient	Competent	Functional	Developing	Not Competent
Content & Organisation (10%)	• Project samples showcase an excellent range of skills and abilities • Information provided on project samples is very clear and well supported with explanation • Digital portfolio includes and highlights links to learner's professional/social networking profiles	• Project samples showcase a good range of skills and abilities • Information provided on project samples is clear with some explanation • Digital portfolio includes clear links to learner's professional/social networking profiles	• Project samples showcase an acceptable range of skills and abilities • Information provided on project samples has relatively little explanation • Digital portfolio includes links to learner's professional/social networking profiles	• Project samples showcase a limited range of skills and abilities • Information provided on project samples is somewhat unclear and/or lack proper explanation • Digital portfolio includes some non-working/broken links to learner's professional/social networking profiles	• Project samples showcase are a poor representation of skills and abilities • Information provided on project samples are unclear and/or lack any form of explanation • Digital portfolio does not include links to learner' professional/social networking profiles
Use of Multimedia & Language (10%)	• Excellent use of visuals, graphics and videos • No grammatical and spelling errors	• Good use of visuals, graphics and videos • A few grammatical and spelling errors	• Some use of visuals, graphics and videos • Some grammatical and spelling errors	• Very little use of visuals, graphics and videos • Multiple grammatical and spelling errors	• No use of visuals, graphics and videos • Full of grammatical and spelling errors

Annex B – Form for Submitting Team Organisation

(To be completed by the Team)

Module Group: _____

Team Name (optional): _____

S/n	Name	Admin No.
1.*		
2.		
3.		
4.		

*denotes the Team Leader

Annex C – Interview Questions

(To be completed by the Team)

Module Group:	ITBW21-0x
Team Name:	
Team Members: **(*denotes the Team Leader)**	1. <Student Name> (<Admin No>)* 2. 3. 4.

List of Interview Questions			
S/N	**Question**	**User**	**Type of Question**

Annex D – Product Backlog

(To be completed by the Team)

Module Group:	ITBW21-0*
Team Name:	
Team Members: **(*denotes the Team Leader)**	1. <Student Name> (<Admin No>)* 2. 3. 4.

S/N	Use Case	User Story
		As a *<type of user>* **I want to** *<perform some task>* **so that I can** *<achieve some goal>*
E.g.	Forgot Password	**As a** user, **I want to** be able to recover the password to my account, **so that I can** access my account in case I forgot the password.

Annex E – Project Proposal (20%)

(To be completed by the Team)

Module Group:	ITBW21-0*
Team Name:	
Team Members: **(*denotes the Team Leader)**	1. <Student Name> (<Admin No>)* 2. 3. 4.

Project Research & Proposed Workplan

- User Requirements
  (key stakeholder(s) profile, interview questions, user requirements using user story approach relating to business hypothesis, video/audio evidence of the interview)
  Refer to Annex C & D

- Target Users
  (who will be using your analysis/solution, what are the restrictions, platforms, etc.)

- Features (indicate which member in-charge of each feature)
  (give a complete description of the features you plan to provide in your analysis/solution. Describe the possible insights for datasets provided or any other datasets (with URLs and justification for using the additional datasets).)

- Benefits (indicate which member in-charge of each benefit)
  (describe how your analysis/solution will help the target users with the business question)

Miscellaneous
(anything else you wish to add about your project can be included here)

Annex F – Data Preparation & Modelling Report (20%)

(To be completed individually)

Module Group:	ITBW21-0*
Name:	

Data Preparation & Modelling Processes

1. Scope of datasets
   - List down all possible data sources with description, including those that *have been studied* and explain why a dataset is included for further analysis or excluded

     *(List down the names and URLs of **ALL** the possible data sources that you have **found** – and for each URL, give reasons why you have decided to include OR exclude them)*
   - Is the dataset shared or common?

     (Is this dataset shared/common? If not, list which team member(s) are using it.)
   - How is the dataset being used? e.g., selected fields or all fields?

     (Will the entire dataset be used? If not, list out the names of the column that you will be using.)

2. Data Preparation
   - Describe the data cleaning and transformation done

     (Explain briefly the steps required to clean your data source. For instance, you can state points like (1) Striped symbols and empty spacings from ALL columns, (2) Wrote Excel formulas to transform abbreviations into actual description, etc.)
   - How is the dataset related to problem / hypothesis?

     (Justify how your dataset is relevant to your team's hypothesis, for example, this dataset contains environmental data collected by NEA which helps us gather insights on…….etc.)

3. Data Visualisation
   - Describe all visual charts created

     (Include screenshots of visual charts and indicate interactive functions for each chart. Analyse and evaluate the use of data visuals and charts to represent the dataset to answer business problems.)

4. Statistical Modelling
   - Describe the statistical modelling undertaken
     (Explain the modelling objective, dataset & variables used for modelling and the steps taken to reach the final model results (including iterations).)

Miscellaneous
(anything else you wish to add about your project can be included here)

Annex G – Final Project Report (30%)

(To be completed by the Team)

This report should follow the guidelines stated below. As a rule, your report (excluding the cover page, contents page and the appendixes) **should not exceed 30 pages**. The report should be prepared using **one and a half line spacing**.

Header and/or footer should be included to show at least the project name, the chapter name, the file name of the document and the page number. Each section/chapter should begin on a new page with an appropriate heading. **Name of student** who has documented the section **should appear at the header of the section**.

You may include additional sections such as preface, acknowledgement, glossary of terms and symbols used, etc.

Recommended content outline:

i) **Cover Page**, this should reflect:

- WIU Name, Document Title and Supervisor's Name
- The Project Team Number, Team Member's Name and Admin No. (stating roles played, e.g., Team Leader etc.)
- The Latest Report Amendment Date

ii) **Contents Page**, this should list all the chapters/sections found in your report with their respective page number.

iii) **Executive Summary**

- Summary of business objectives & hypothesis, and user requirements gathered
- Describe the business scenarios, recommendation and insights discovered

iv) **Project Plan**

- Project team organization
- Project schedule and task allocation (Gantt chart)
- Software tools used for development

v) **Data Understanding, Visualisation and Modelling**

- Datasets chosen and visual charts used
- Describe the statistical models used and how the model results are linked to your hypothesis for decision-making.
- Screenshots of Dashboards *(with descriptions - and highlight any special features)*

vi) **Problems Encountered**

vii) **Future Enhancements**

viii) **Conclusion**

- Summarise the works, provide results interpretation, and conclude whether the outcome of the analysis fit the project expectation.

Annex H – Digital Portfolio and Online Brand (20%)

(To be completed individually)

Module Group:	ITBW21-0*
Name:	

Project Brief

Prepare a digital portfolio to showcase a total of three projects consisting of:

- **Current ITBW21 Visual Analytics Project**
- **Two completed projects from any of the following CmUs**

Acad Year & Semester	CmU Code	CmU
AY2021 S1	ITB111	UX Design
	ITB211	Statistical Research Methods
	ITB511	Programming
	ITB611	Network Administration
	ITB811	Business Needs Analysis
	ITB411	Data Modelling
AY2021 S2	ITB221	Decision Analysis
	ITB521	Data Structures & Algorithms
	ITB621	Operating Systems Administration
	ITB131	Data Visualisation
	ITB911	Applied Cryptography
	ITB421	Data Storage Administration

Each of your three featured portfolio projects should be properly narrated with detailed information that covers these four key areas:

1. **Project Scope/Client's Problem**
2. **Your Role & Solution**
3. **Your Work Process**
4. **Outcome & Results Achieved**

You should include relevant visuals and/or videos to support your narration of each project. Do also include and highlight links to your LinkedIn profile as well as other relevant professional/social networking profiles in your digital portfolio.

You are encouraged to create your digital portfolio using a website-builder (Wix or Weebly) or portfolio hosting site recommended in your e-learning unit "Setting Up Your Digital Portfolio". Consult your tutor If you wish to explore other platforms for your portfolio.

Upon initial creation of your digital portfolio, please submit the **URL (live online link)** in the ITBW21 module page on Blackboard so that your tutor can access your works. The same URLs will also be used by your tutor to view and assess your digital portfolio after the project deadline.