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Week 6 Workshop

COS10025 – Technology in an Indigenous context project

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Acknowledgement of Country

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.

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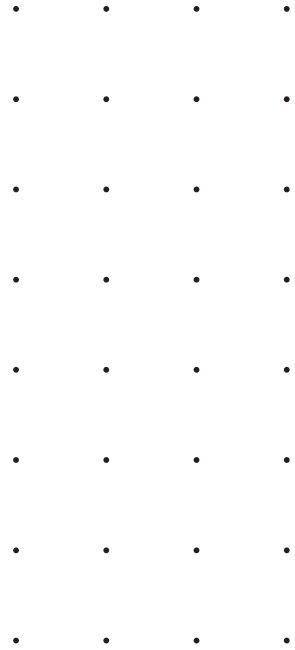
Workshop 6

The aim of today's class is to focus on development of design ideas and receive feedback from the facilitator.

Weekly workshop plan: week 7 to week 12

Assessment 2: Innovation concept

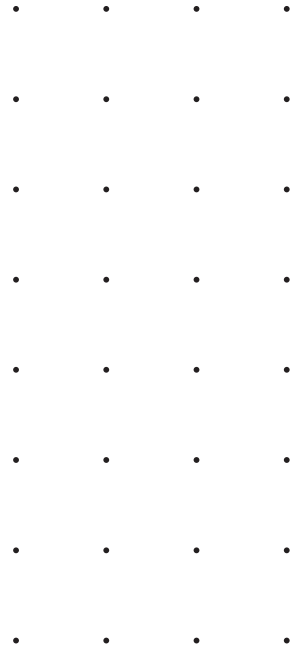
Activity 1: Finalise design ideas for your team learning issues and receive facilitator feedback



Week 7 Workshop

Teams working on finding **hardware and software** required for each design idea.

- Sensors
- IoT devices
- Network devices
- Telecommunication devices
- Network connecting components



A 10x4 grid of dots. There are 10 rows and 4 columns of dots. Each row contains 4 dots, and each column contains 10 dots. The dots are arranged in a regular grid pattern.

An illustration depicting financial management tools for project budgeting. It includes a green and white calendar, a blue and white calculator showing '320', a blue clipboard with a document and a green clip, and a brown wallet containing blue and green banknotes and a gold coin. A hand in a blue suit sleeve points at the calculator, and another hand in a blue suit sleeve holds a blue pen over the clipboard. The text 'PROJECT BUDGETING' is written in large, bold, blue and green letters above the tools.

Week 9 & 10 Workshops

The team focuses on finalising the design ideas with the following

- Design outline
- Design specifications
- Design benefits
- Design Constraints
- Project budgeting for all required components (Hardware and software), labour cost and other installation, maintenance costs

Start working on preparing **team presentation** in week 11 and **Business case analysis** report (final report - individual) in week 12

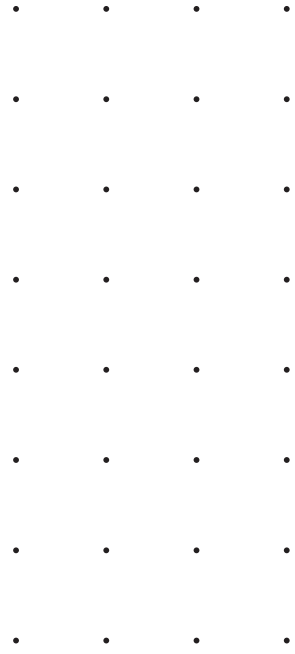
Week 11 Workshop

The final presentation is held during the week 11 workshop sessions please make sure your team should be present on the day

- Present your design ideas (as a Team)
- Gain feedback on the design solutions

Your group will have about 15-20 minutes (depending on the number of team members) to present your recommended solution to the Academic Panel

A template is available for team use.



Week 12 Workshop

Business Case Report (individual)

Your project outcome is to do a Business Case analysis with different design ideas/solutions.

A business case is a document that is common for many projects. The main point of a business case is to **justify** the **costs** of a project by explaining the **benefits** that the project will bring.

Another important part of the report includes

Reflection(s)

- A reflective write-up of how you contributed to the project and met the learning outcomes of the unit
- At least two examples for each learning outcome and if the examples serve two to three learning outcomes

Assessment #2: Innovation Concept

- Second phase of the project
 - Team-based assessment
 - Due date: 26th Sep 2022, 23:59 pm
 - Marks allocated: 25% of your final mark
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- Recommended word-count range: 1200 words for each team member (4800 for 4 team members or 6000 words for 5 team members or 7200 words for 6 team members)
 - Aim of this task:
 - Expects the team to explain your team design idea/concept based on your defined learning issues/problems
 - Each team should explain 3-4 design ideas for 4 to 5 team members or 4-5 design ideas for 5 to 6 team members



Assessment #2 – Part A

Assignment 2 – Innovation concept (team-based)

The Part A of Assignment 1

- Project Overview

A detailed description of the project topic, project goals and objectives. The team should explain the steps to achieve those goals and their expected outcomes.

- Project requirements

It refers to the actions, processes and conditions/criteria to achieve the outcome of the project



Assessment #2 – Part B

You will briefly write about the following

Design idea/concept - Explain your team's design concepts/ideas based on identified learning issues/problems.

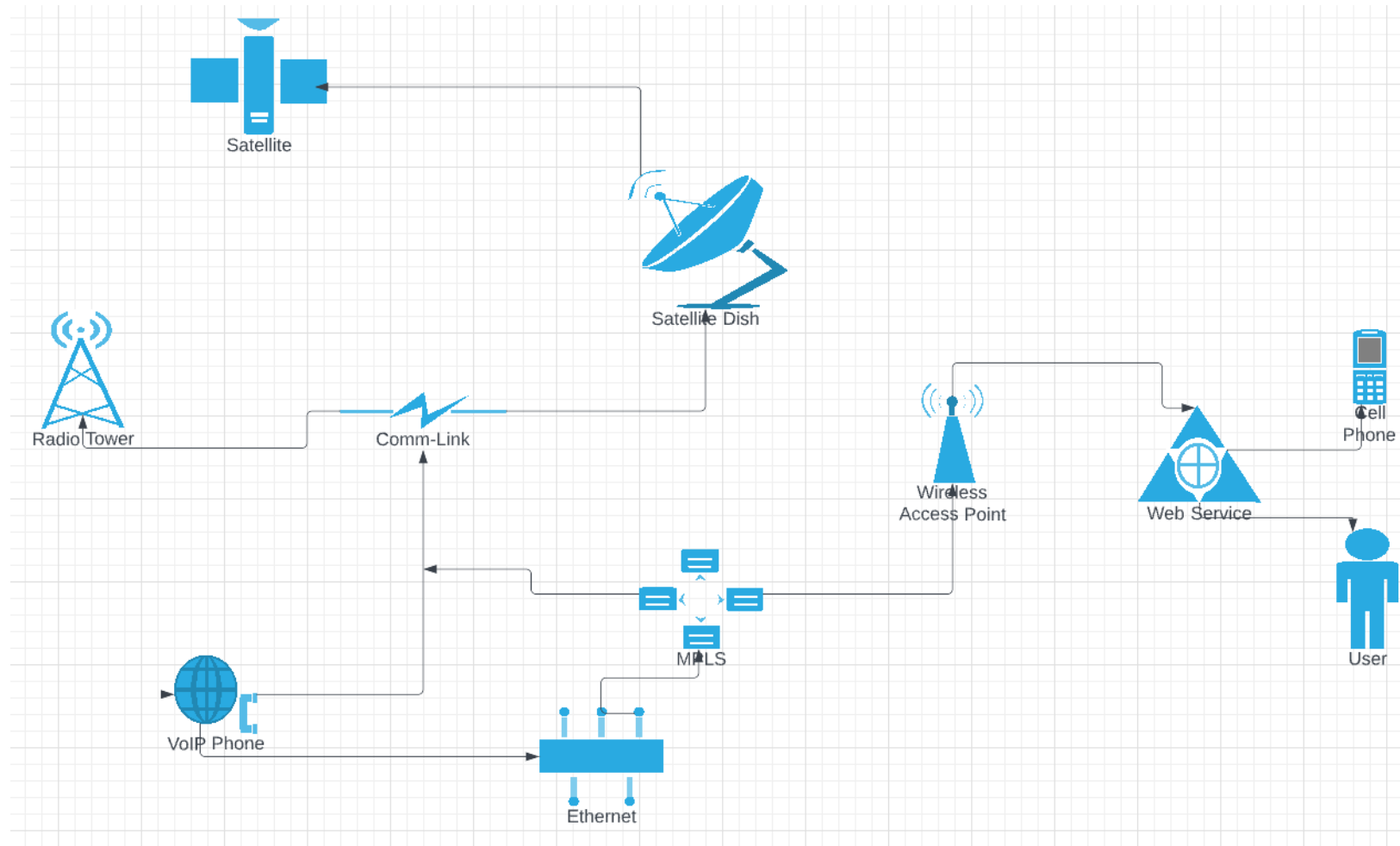
Each **team** should explain 3-4 design ideas for 4 to 5 team members or 4-5 design ideas for 5 to 6 team members

Design idea/concept

- A brief introduction to the learning issue/problem identified
- A description of the design idea/concept
 - Design outline (design idea) - A layout of the design idea with a detailed explanation of the concept
 - Design Specifications - List of hardware and software requirements - Explain in detail each hardware/software required
 - Design benefits - How does the design idea benefit the township in accordance with the telecommunication guidelines such as access & equity, health & safety, appropriateness, affordability, environmental health, and sustainable livelihoods
 - Design Constraints - What are some of the potential challenges identified during the implementation & maintenance phase of the design idea/concept

Design outline (design idea)

A layout of the design idea with a detailed explanation of the concept (below using Lucidchart as an example)



Using lucidchart app for free

- Lucidchart App – Sing up free lucidchart.com
- Look for basic network shapes and detailed network diagrams
- Start designing your idea

Design Specifications

List of hardware and software requirements - Explain in detail each hardware/software required based on the following

- Different types of network components
- Appropriate network technologies
- Classifying network technologies
- Access and core networks



Design Specifications

Appropriate Network Technologies

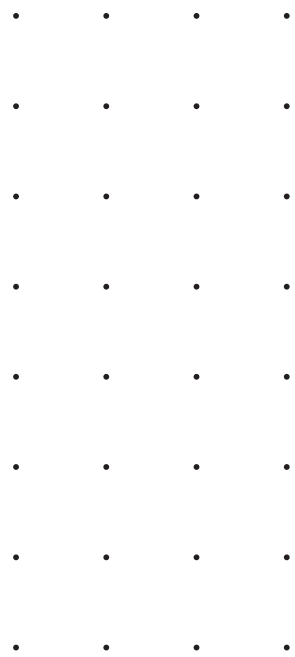
- The appropriate network technology for a particular client or clients will depend on many things
 - Cost, number of users, distribution of users, available infrastructure, purpose of the network...
- It may be appropriate to implement a mix of technologies
 - Fixed wireless or ADSL for distances of up to two or three km and a satellite uplink for example
- There will usually be many possible mixes of technologies for any particular situation....



Design Specifications

Appropriate Network Technologies

- For this project many network technologies may be suitable
- Access network technologies
 - WiFi, Cellular, Satellite, IoT technologies, ADSL, Ethernet, Fiber
- Backhaul
 - Microwave, Satellite (again), Cellular (again), Fiber
- You will need to consider what is available for your region and what is appropriate for your application
- Different network technologies have different availability, capacity, cost, delay...



Design Specifications

Appropriate Network Technologies – Access

- Generally, wired network technologies are more expensive to implement and maintain but have much higher bit rates than wireless technologies
- Wired
 - ADSL:
 - Runs over existing voice telephony wire (twisted pair)
 - Range of a few kms
 - Fiber
 - Very high capacity and low delay but expensive
 - Ethernet
 - High capacity but limited range of a few hundred metres
- Wireless
 - WiFi
 - Cellular
 - Satellite
 - Internet of Things Technologies



Design Specifications

Appropriate Network Technologies – Access

- Many more wireless options
- Wireless
 - Fixed wireless
 - Similar range to LTE (uses same technologies)
 - WiFi
 - Range of a few hundred metres
 - High bit rates
 - Low cost
 - Cellular
 - A few options here: LTE, 5G NR plus several IoT options
 - Range of 20 to 30 kms but expensive, particularly LTE
 - 5G NR has a distributed base station architecture that makes implementation a lot lower in cost than LTE but the technology is still to be widely deployed
 - LTE and 5G NR have very high bit rates and low delay



Design Specifications

Appropriate Network Technologies – Access

- Wireless (continued)
- Satellite
 - Two options here: Geostationary and CubeSats
 - Geostationary expensive and moderately high delay but available everywhere
 - CubeSats low bitrate and big delay but cheap and available everywhere
- Internet of Things Technologies
 - IoT technologies are intended to be low power and low cost but are usually low bit rate
 - Suitable for sensor networks
 - Cellular technologies (may not be available everywhere)
 - LTE-M, NB-IoT, SigFox similar range to other cellular
 - Short range such as ZigBee (100 metres) and Bluetooth (10 metres)
 - Long range such as LoRa and LoRaWAN (several km)
 - 6LoWPAN uses ZigBee physical layer but provides connectivity to the Internet



Design Specifications

Appropriate Network Technologies – Backhaul

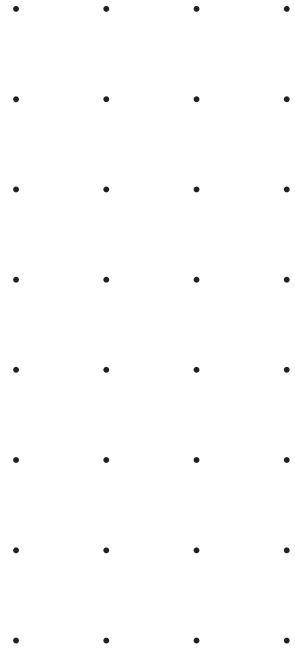
- All these technologies will require some form of connectivity to the wider telecommunications network
- This is the “backhaul” network
- Some network technologies will have specific requirements as to backhaul
 - Cellular will require either fiber or microwave
 - ADSL will connect to the nearest exchange which will have its own backhaul such as microwave, fiber or (less commonly) coaxial cable
- Others will be more flexible
 - WiFi, Ethernet, LoRa, ZigBee, Bluetooth will be connected to one of cellular, ADSL, Satellite



Design Specifications

Appropriate Network Technologies – Backhaul

- Backhaul technologies will provide connectivity to nearest major centre
 - Microwave
 - Satellite (geostationary)
 - Fiber



Design benefits

How does the design idea benefit the township in accordance with the telecommunication guidelines such as

- Access & equity,
- Health & safety,
- Appropriateness,
- Affordability,
- Environmental health, and
- sustainable livelihoods

Also, Most cultural appropriate solution



Design Constraints

What are some of the potential challenges identified during the implementation & maintenance phase of the design idea/concept?

- Resources – people, equipment or materials, facilities
- Risk – high costs, low performance, operational failure
- Cost – equipment, facilities, material costs
- Time – project timeline, planning and strategy

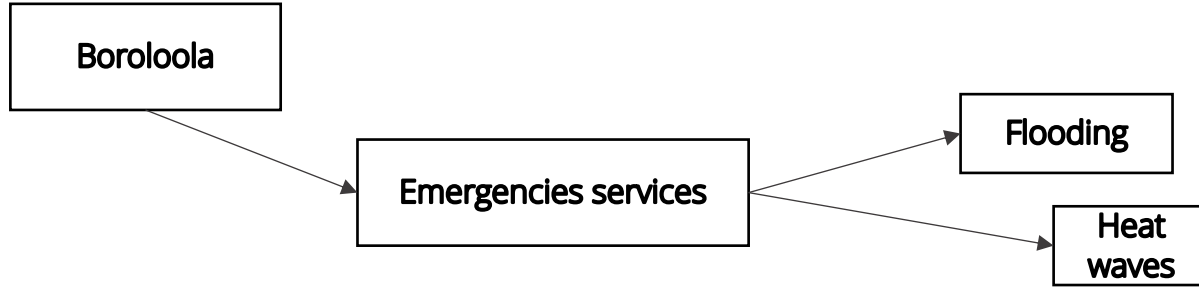


Digital Connectivity Infrastructure for Remote Indigenous Communications

- Analyse current challenges and needs of communication technologies and services for remote Indigenous communications in particular regions
 - Analysing Indigenous communities for remote communication coverage against the population of communities (major cities, regional, remote, very remote).
 - Estimating total communications infrastructure expenditure
- Explore user access, affordability, digital literacy, and Indigenous education rates in relation to the communication infrastructure
 - Analyse user access based on the Indigenous communities' need for day-to-day activities in remote areas
 - Ensure the affordability, digital literacy of typical applications used in an indigenous remote communities
- **Telecommunication guiding principles** - Access and equity, health and safety, environmental health, appropriateness, affordability, sustainable livelihoods

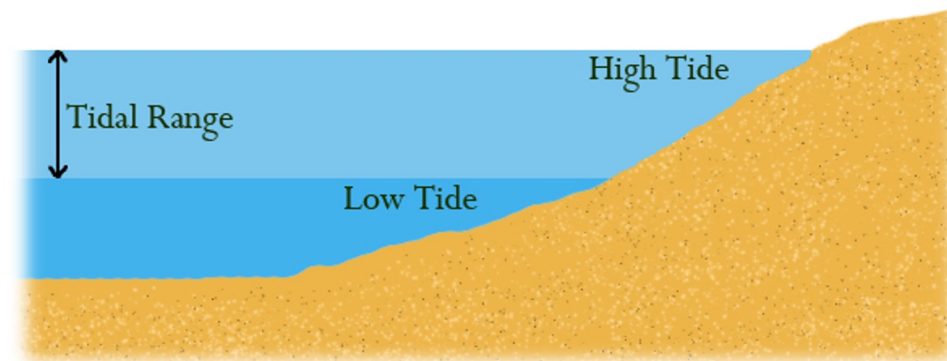


So returning to our example...



Problem: Water level (flooding)

Riverine flooding can affect thousands of square kilometres for weeks or even months at a time



Returning to our example...

- Since flooding can affect vast areas, we are probably looking at a large number of sensors scattered over a similar range of distances
- A wireless solution would be most appropriate
 - If there is LTE coverage, then LTE-M or NB-IoT might be appropriate
 - If there is no coverage, then LoRaWAN might be appropriate with a satellite backhaul
 - If delay is not an issue, then CubeSat might be appropriate
- Many options..

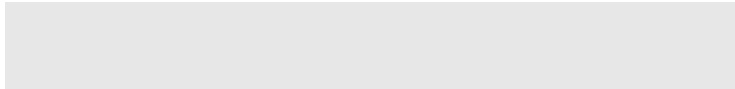
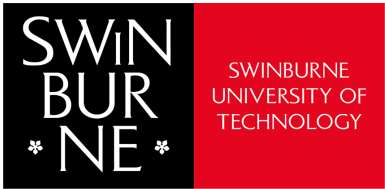


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Activity 1

Finalise design idea for your team learning issues

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1st Activity

Aim : Finalise design idea for your team learning issues

- Instructions :
1. Revisit case studies from week 5
 2. Finalise your team design ideas based on the defined problems.
 3. Use Lucidchart App to create, visualise and design your team design ideas.
 4. Consider the telecommunications guidelines when you develop a design ideas.
 5. Lastly, consider the cultural appropriateness of your design ideas



Teamwork: 20-25 minutes

Next week

- Continue working on analysing the hardware and software requirements for each design ideas (design concepts)
- Finalise Assessment 2 Innovation concept before the submission due week 8