ES2631 Critique and Communication of Thinking and Design

Semester I AY 2025/26

WEEK 2 TUTORIAL WORKSHEET

1 ICE-BREAKER (20)

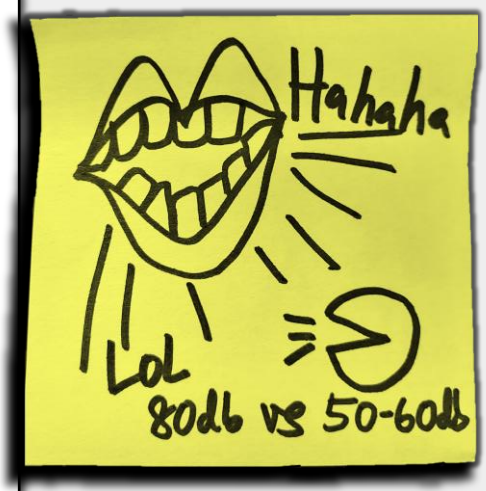
1) Get into 6 groups of 3
2) Introduce yourself to your groupmates
3) Set up Telegram group for A1 matters

Individual

4) On the given sticky note, draw a picture that represents a **fun fact** about yourself
5) Later, share with the class your (1) name, (2) major, and (3) sticky-note drawing

Group

6) What do you think this course is about?
7) What are your goals and expectations for this course?



2 HOUSEKEEPING (10)

Name:	Mr Wong Wei Li	
Email:	elcwwl@nus.edu.sg	
Classes:	**G01**: Mon, 9am-12pm @ EA-02-15	**G22**: Wed, 9am-12pm @ EA-02-14
	G06: Mon, 12pm-3pm @ EA-02-15	**G25**: Wed, 12pm-3pm @ EA-02-14
Google Drive:	https://drive.google.com/drive/folders/1ZVFI63Lo40lXKBcefKHfUZOS6F-iEUG0?usp=sharing	
Zoom:	https://nus-sg.zoom.us/j/81328841939?pwd=b2ovQ3BvR3REeXBRemtLK25PdlQvUT09	

Week	Tutorial activities	Deadline (Friday, 2359)
2	EoT and Int. traits | **A1 brainstorm**	**Quiz 1**: 22 Aug **Online activity 1 (int. traits reflection)**: 22 Aug
3	Int. standards | **A1 problem**	**Quiz 2**: 29 Aug
4	Sources, plagiarism, AI use | **A1 overall**	**Quiz 3**: 5 Sep
5a	OP | **A1 peer sharing & feedback**	**Quiz 4**: 12 Sep **Online activity 2 (source justification)**: 12 Sep
5b	**A1 Zoom consult**	
6	**A1 OP**	**Ppt deck and video**: by end of tutorial

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3 INTELLECTUAL TRAITS (10)

1) What are intellectual traits as a category? See "1a) ES2631 Engineering Reasoning Framework."
2) How are they linked to elements of thought and intellectual standards?

ONLINE ACTIVITY 1: REFLECTION (HOMEWORK)

3) As homework, write a paragraph of about **80-100 words** on ONE trait that you either exhibit OR wish to develop:

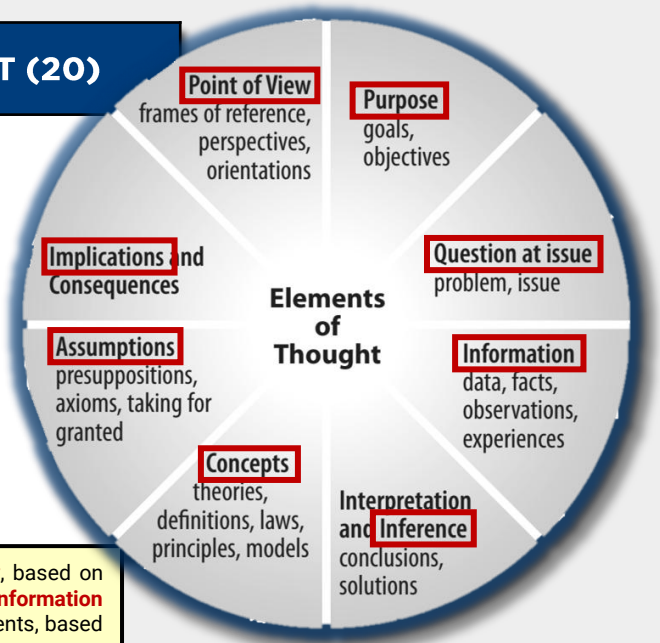
   For a trait that you exhibit, explain how you developed this trait and provide examples of how you exhibit this trait in your thinking.

   For a trait you wish to develop, explain why and provide examples of how this trait could be developed (i.e., your action plan) and/or how it would be exhibited in your thinking in future

4) Type your reflection in one of the slides in the Google Slides created. Find your respective tutorial group's Google Slides here: Google Drive > respective X) GXX > **Week 2 intellectual traits reflection (GXX)**
5) Deadline: **22 Aug'25, 2359**

4 RECAP: 8 ELEMENTS OF THOUGHT (20)

1) What is purpose?
2) What is question at issue?
3) What is information?
4) What is inference?
5) What is concept?
6) What is assumption?
7) What is implication?
8) What is point of view?



Adapted from p.4 of Paul & Elder's "The Miniature Guide to Critical Thinking Concepts and Tools" (2008)

"Whenever we think, we think for a **purpose** within a **point of view**, based on **assumptions**, leading to **implications** or consequences. We use **information** such as data, facts and experiences to make **inferences** and judgments, based on **concepts** and theories, to answer a **question** or solve a problem"

(Niewoehner, 2006; Paul et al., 2019).

Prepared by Wong Wei Li

WEEK 2 TUTORIAL WORKSHEET

5

ACTIVITY 1: EOT IN NON-ENGINEERING EXAMPLE (15)

Before diving into engineering cases, let us explore how the elements of thought operate in a situation most of us have faced—whether or not to exercise the S/U option (National University of Singapore Office of the University Registrar, n.d.).

Analysing everyday scenarios helps you realise that critical thinking frameworks such as the ERF are not just academic tools but also useful in everyday life. This warm-up activity will help you recognise and apply the eight elements more easily when you tackle engineering problems next.

Should we exercise the S/U option?

Elements of thought	Notes
Purpose *What are we trying to accomplish?*	
Question at Issue *What key issues are we trying to address?*	
Information *What data do we have and/or need?*	
Inference *What conclusions are we drawing from the info?*	
Concept *What theories, models, or principles apply?*	
Assumption *What are we taking for granted?*	
Implication *What are the possible outcomes or results of this policy and/or decision?*	
Point of View *Whose perspective are we considering or ignoring?*	

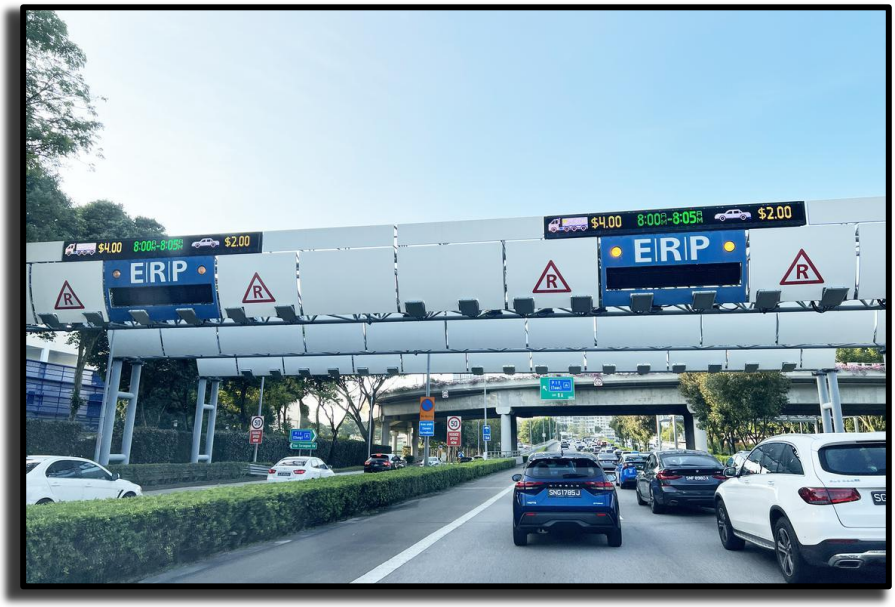
Adapted from p.2 of "AY25-26_S1_ES2631_Week 2 Tutorial Handout (Student)"

WEEK 2 TUTORIAL WORKSHEET

6

ACTIVITY 2: EOT IN ENGINEERING EXAMPLE

In this activity, we will discuss and identify the elements of thought based on the thinking and design of the Electronic Road Pricing (ERP) system in Singapore. Some background information on the system is provided below but you may refer to Goh (2002) for a fuller understanding.



Source: *The Straits Times*

Background: The ERP system was introduced as a response to the growing problem of road congestion in the city-state. Building on earlier congestion management efforts, the ERP was implemented in 1998 as a technologically advanced, pay-as-you-use road pricing mechanism designed to regulate traffic volumes in real time. The system automatically charges motorists for using specific roads during peak hours, with the main objective of encouraging drivers to modify their travel behaviour—such as changing routes, shifting travel times, or using public transport—in order to reduce congestion on busy roads (Goh, 2002).

The rationale behind the ERP is both practical and economic. Rather than expanding road infrastructure endlessly, Singapore's approach uses pricing as a tool to manage limited road space efficiently, ensuring smoother traffic flow and minimising the negative externalities of urban congestion. This system has positioned Singapore as a global leader in urban transport management, serving as a model for other cities facing similar challenges (Goh, 2002).

Adapted from pp.3-4 of "AY25-26_S1_ES2631_Week 2 Tutorial Handout (Student)"

WEEK 2 TUTORIAL WORKSHEET

6

ACTIVITY 2: EOT IN ENGINEERING EXAMPLE (20)

Now, let us put ourselves in the shoes of the **Singapore Government**. As policymakers, our task is to analyse the **thinking and reasoning behind the design and implementation of the ERP system**.

Elements of thought	Notes
Purpose *What are we trying to accomplish?*	
Question at Issue *What key issues are we trying to address?*	
Information *What data do we have and/or need?*	
Inference *What conclusions are we drawing from the info?*	
Concept *What theories, models, or principles apply?*	
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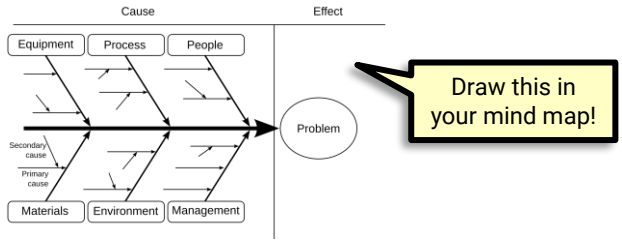
7

ACTIVITY 3: A1 BRAINSTORMING (10)

1) Read the A1 Team OP brief **carefully**. See "2b) AY25_26 S1 ES2631 Assignment 1 Team Oral Presentation_STUDENT".
2) Topic: "This semester, your focus must be **Singapore specific**. Your topic could relate to a **specific demographic** or **community** in Singapore"
3) Any questions?
4) Over the next few weeks, update your group's tentative A1 topic in this "A1 tentative topic (G01, G06, G22, G25)" Google Sheets where you can see what the rest are doing.

WHITEBOARD MIND-MAPPING (50)

1) Create a **mind-map** on the whiteboard to guide your thought and research processes, using (1) **arrows**, (2) **drawings**, (3) **sticky notes,** and the (4) **key words** below.
2) Focus your research on the **problem first**. Here are some questions to investigate:
    - What is the broader **topic**?
    - What is the **problem**? Articulate this in one statement.
    - Who is the **target user** (specific demographic or community)?
    - How do you prove that this problem **exists** and is **worth solving**?
    - What are the **causes** and/or **constraints** of this problem?



The *Ishikawa* diagram, or fishbone diagram, is a useful tool for brainstorming *thoroughly* the different causes to a problem.

    - What are the **current measures** (e.g, engineering solutions, policies, campaigns, etc.) **already implemented in Singapore** to try and address this problem?
    - What are the **gaps** of these current measures?
3) Take photo of the mind-map at the end of tutorial and upload to your respective group's Google Drive folder, following this path: Google Drive > respective X) GXX > 0) Tutorial activities > **GXX_X (X, X, X)**

Prepared by Wong Wei Li