Unit 5

Justifying engineering choices, improving clarity and cohesion in writing, enhancing delivery and signposting in oral presentations

Overview

In effective technical writing, the writer explains the rationale behind engineering solutions in a concise and cohesive fashion. This session helps you identify the main elements in the justification of technical designs, related language use and evaluative expressions. The learning activities in this session will also help you improve the clarity and cohesion of your writing using appropriate sentence structures and cohesive devices. You also learn how to enhance your delivery and use of paralinguistic (non-verbal) features in oral presentations. Finally, you will learn effective signposting and transitions in oral presentations.

Learning outcomes

By the end of this unit, you will be able to

- identify the main components in justifying engineering choices
- justify engineering choices with appropriate language and evaluative expressions
- improve the clarity and cohesion of your writing
- enhance your delivery and use of paralinguistic features in oral presentations
- enhance your signposting and transition techniques in oral presentations

5.1 Identifying the main components in the justification of engineering choices

Everyone has an opinion about something, Aand this is probably the MOST important element in technical writing – addressing the 'why's: "why do you want to use Java instead of C++", "why do you want to use a client-side plug-in rather than server-side programs to execute a user function", etc. Similar to using technical illustrations discussed in the previous unit, there are also three main components in the justification of engineering choices.

Three main components in the justification of engineering choices

1. introducing the choice (can include reference to a visual or be a heading)
2. describing the choice (details about the choice made)
3. commenting on the choice (justifying why the choice was made)

In this section, you will learn how to identify these three components.

TASK 5.1 Identify the three components of justification

Below is an abridged description of a system architecture used in conducting image-based exploration of massive online environments.

Step 1

Read the text fairly quickly. Does the writer convey a sense that they are putting in-depth considerations into the architecture design? Why? / Why not?

Text 1 [1]

Our system has a distributed client-server architecture (Figure 2), in which client renders its view of the world using geometry for nearby objects and a set of depth images for more distant ones. Our system has the following properties, which are not altogether present in any previous work.

- It is appropriate for worlds with fine detail at large scales.
- It can accommodate any environment, not just special classes such as urban models and terrains.

[text removed]

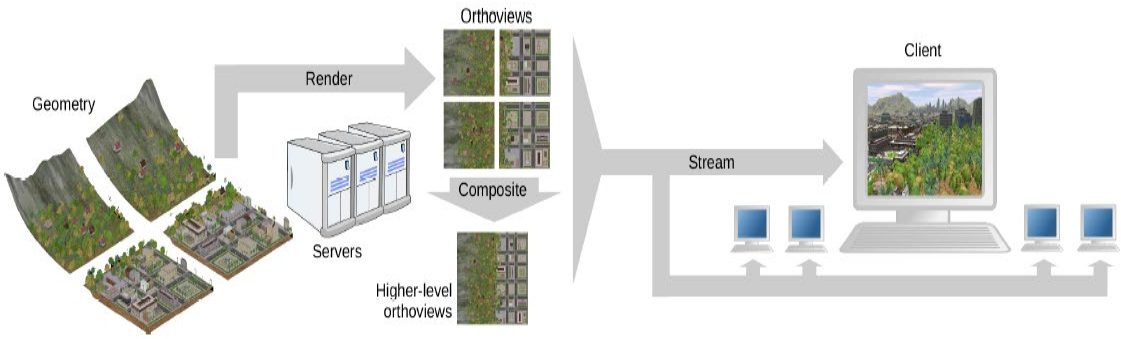


Figure 2: *An overview of the system.*

Server

The server-side preprocessing partitions the world geometry into a regular grid of cells. These cells form the leaves of an octree. The subdivision can have different levels along different axes if the environment has different extent along them.

[text removed]

For each cell of the octree, the preprocessing creates orthographic depth images, or orthoviews, of the cell's content from a number of canonical directions. Computation and storage costs increase linearly with the number of directions, hence we strive to keep this number small. We use a subset of the principal directions of a cube, namely $\{-1,0,+1\}^3 \backslash \{0,0,0\}$. For our test scenes this provides good visual quality (Figure 5). This

choice would not be suitable for some environments, like a regular grid of objects where the axes of maximum occlusion are precisely these principal directions: for such scenes a different set of canonical directions would be chosen.

[text removed]

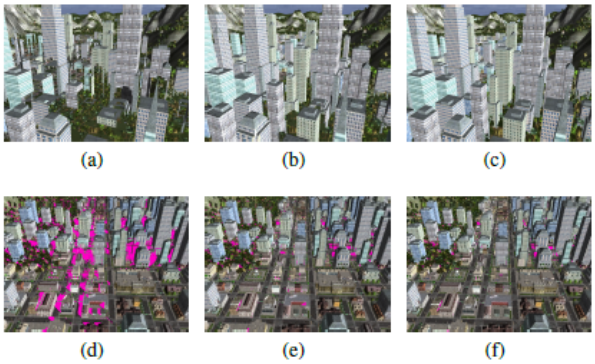


Figure 5: *Varying the number of orthoviews. (a) A view rendered with 5 available canonical projections per cell, showing severe disocclusion artifacts. (b) 9 canonical projections perform considerably better. (c) A reference image rendered from geometry. Note that this is a particularly challenging scene with many long, narrow spaces between buildings. (d) 2, (e) 3, and (f) 5 orthoviews selected per cell by the client, from a maximum of 9 canonical projections. Disocclusion errors from the use of just 2 orthoviews (highlighted in pink) are largely solved by adding a third view. Additional views yield small improvements.*

Step 2

Identify the three components of choice justification – some examples have been marked up for you.

Text 1 [1]

Examples given in paragraph below:

1. introducing the choice (can include reference to a visual or be a heading)
2. describing the choice (details about the choice made)
3. commenting on the choice (justifying why the choice was made)

[1] Our system has [2] a distributed client-server architecture [1] (Figure 2), [2] in which client renders its view of the world using geometry for nearby objects and a set of depth images for more distant ones. [3] Our system has the following properties, which are not altogether present in any previous work.

- It is appropriate for worlds with fine detail at large scales.
- It can accommodate any environment, not just special classes such as urban models and terrains.

[text removed]

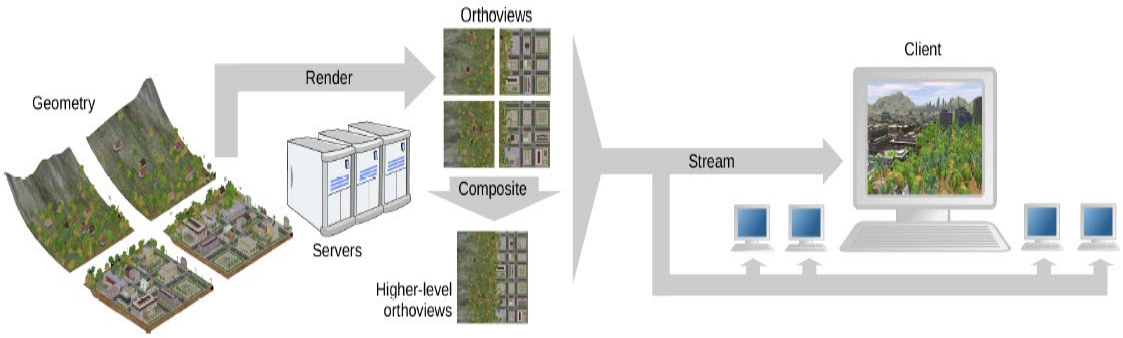


Figure 2: *An overview of the system.*

Server

The server-side preprocessing partitions the world geometry into a regular grid of cells. These cells form the leaves of an octree. The subdivision can have different levels along different axes if the environment has different extent along them.

[text removed]

For each cell of the octree, the preprocessing creates orthographic depth images, or orthoviews, of the cell's content from a number of canonical directions. Computation and storage costs increase linearly with the number of directions; hence we strive to keep this number small. We use a subset of the principal directions of a cube, namely $\{-1,0,+1\}^3 \setminus \{0,0,0\}$. For our test scenes this provides good visual quality (Figure 5). This choice would not be suitable for some environments, like a regular grid of objects where the axes of maximum occlusion are precisely these principal directions: for such scenes a different set of canonical directions would be chosen.

[text removed]

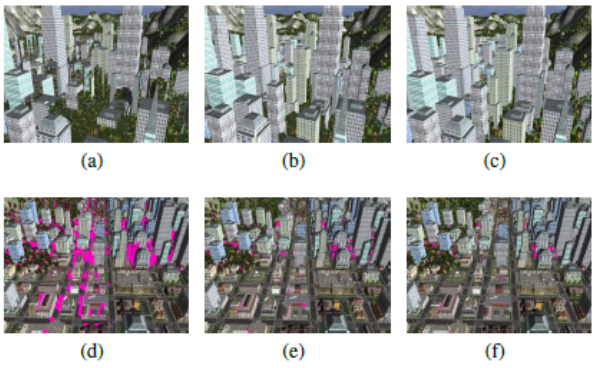


Figure 5: *Varying the number of orthoviews. (a) A view rendered with 5 available canonical projections per cell, showing severe disocclusion artifacts. (b) 9 canonical projections perform considerably better. (c) A reference image rendered from geometry. Note that this is a particularly challenging scene with many long, narrow spaces between buildings. (d) 2, (e) 3, and (f) 5 orthoviews selected per cell by the client, from a maximum of 9 canonical projections. Disocclusion errors from the use of just 2 orthoviews (highlighted in pink) are largely solved by adding a third view. Additional views yield small improvements.*

TASK 5.2 Evaluate justification in a student report

Now read the justification by a previous student on a project titled "Ranking News Headlines by Crowdsourcing" on selecting Twitter as the data-mining resource for collecting responses on which news headline ranking is based.

Note: Twitter has recently been rebranded as X.

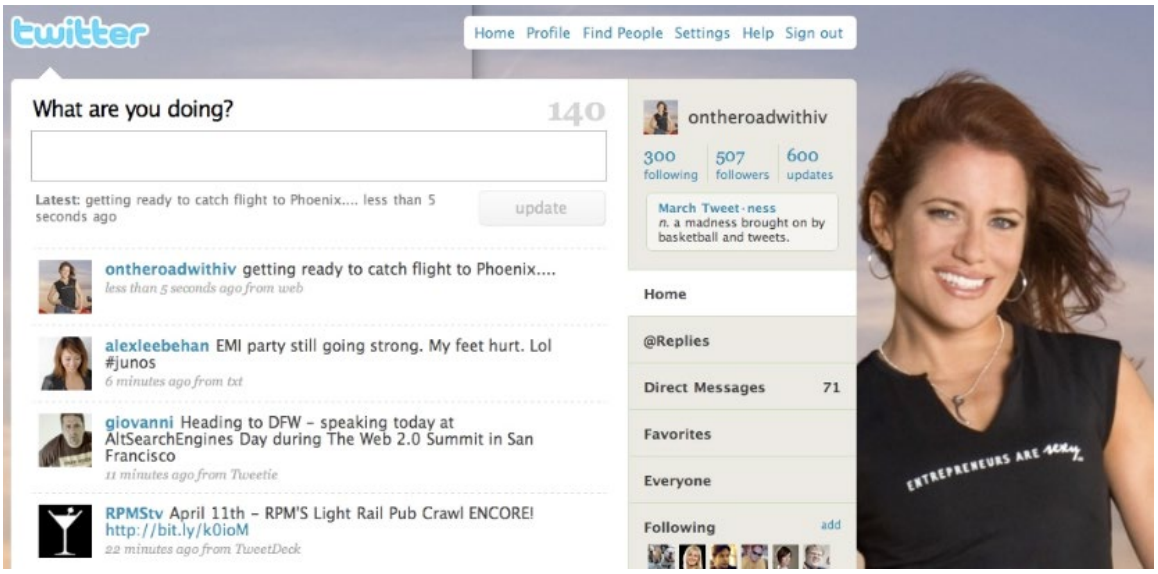
Step 1

1. Identify the three components of justification.

    1. introducing the choice (can include reference to a visual or be a heading)
    2. describing the choice (details about the choice made)
    3. commenting on the choice (justifying why the choice was made)

2. Mark the justifications. How many are there?

Text 2 [2]



Why Twitter?

Facebook (facebook.com) and Twitter (twitter.com) are currently the most popular social networks used every day by millions of people around the world, which people can share information within their virtual communities anytime anywhere. As of February 2012, Facebook had more than 845 million active users while Twitter had over 300 million users as of 2011. Both platforms allow users to post their own and read others' posts (or tweets). However, why was Twitter chosen as the resource for the project even though Facebook has twice as many users as Twitter?

The first reason is Twitter is used in several ways more than just for a social networking. Twitter set up the system to make better use of Twitter's trove of data, allowing it to be

mined for brand management, financial trends, or for social and political data as well as academic research to gauge public opinion. Therefore, it has become a powerful research tool, and many researchers prefer to use it as a tool to extract real-time content out of social media, and the information that is valuable to them.

In addition, according to Pew Research Center's Project for Excellence in Journalism, most media outlets from newspapers to magazines to TV stations and cable news view Twitter as an alternative to an RSS feed, and merely publish links to their stories and other information, which is available elsewhere, rather than attempting to engage with other Twitter users. At the same time, it seems that everyone is adopting Twitter as a tool to keep track of news and spread news. People use it as the alternative to RSS readers, to keep up with the news and up-to-date information. Based on a sample of 2,259 The adults, the study [3] reveals that three quarters of Americans (75%) who find news online receive it either forwarded through e-mail or posts on social networking sites, and half of them (52%) forward the news through those means. Based on the above reasons, all criteria match our project's nature which is about news, thus we decided to track data from Twitter.

Step 2

Are you convinced by the writer's justification of choosing Twitter over Facebook?

5.2 Identifying the evaluative language in the justification of engineering choices

While the underlying logic and objective data are the cornerstone of justification, its delivery through evaluative language is also crucial in signalling the stance of the writer. Raising your sensitivity towards such evaluative language vocabulary and expressions help you improve your justification.

TASK 5.3 Identify evaluative language through listening

Watch a video on robot demo and write down any vocabulary or expressions which signal the attitude of the speaker on the design presented.

http://www.youtube.com/watch?v=qsRsrMQy64k&feature=relmfu

A wide variety of evaluative language is available through nouns, adjectives, adverbs, verbs, etc. Learning from high quality report can help enhance your repertoire of language choices in justification.

TASK 5.4 Identify evaluative language in a high-quality report

Highlight the evaluative vocabulary and expressions in the following justification of a system architecture design in a report titled "Image-based Exploration of Massive Online Environments." Some examples have been highlighted for you.

Text 3 [1]

Our system has a distributed client-server architecture, in which the client renders its view of the world using geometry for nearby objects and a set of depth images for more distant ones. Our system has the following properties, which are not together present in any previous work.

- It is appropriate for worlds with fine detail at large scales.
- It can accommodate any environment, not just special classes such as urban models and terrains.
- It can handle an unstructured and unpredictable variety of geometric content. Virtually no human intervention is required to adapt the algorithm to the specific structure of the scene.
- The server-side storage overhead is comparable to or smaller than the original world data.
- Server-side preprocessing takes linear time. It is easily parallelizable on commodity clusters.
- Changes to the environment are quickly and efficiently processed and the update can be transmitted to clients within a short (though not real-time) period of time.
- The required bandwidth is bounded as a function of maximal user velocity and is independent of the size of the world. In practice, the consumed bandwidth is only fractionally larger than the bandwidth required to maintain nearby geometry.
- The lighting can be customized in real time on any individual client (Figure 3).

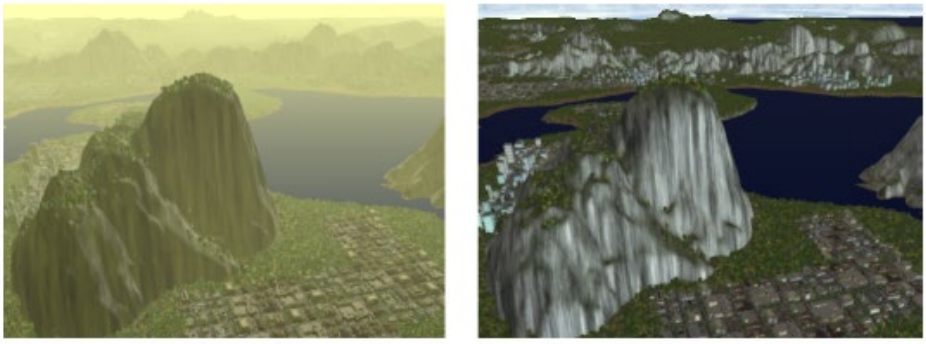


Figure 3: *Different client-side lighting for the same environment.*

Follow-up

1. Evaluative language can only be meaningful when supported by evidence. What kind of evidence?
2. Which section of a report should the above extract be placed in? Why?

TASK 5.5 Apply your knowledge in justifying your engineering choices

Read a section of your Progress Report 1 and identify some examples of the following:

1. The three components of justification
2. Evaluative vocabulary and expressions

In your writing, have you explicitly justified or just neutrally describe your engineering choices and assume the choice speak for themselves? Is there enough evaluative language?

5.3 Improving the clarity and cohesion of your writing

In addition to using appropriate evaluative language, the quality of your justification also depends on how clearly and cohesively you write. There is a common belief that technical information must be phrased in long and complex sentence structures. This is not exactly true because overly complex sentences and convoluted ideas will unduly confuse readers.

TASK 5.6 Evaluate the readability of a short technical description

Read an adapted version of a short paragraph on extracting example code and examples by an online tool *Blueprint* (*Blueprint* is a tool that integrates Web search into a development environment). Is it easy to understand?

Rewrite the paragraph to improve its clarity.

Hints:

- Avoid using "which"
- Think of how many steps Blueprint uses to complete the locating and extracting the source code. What linking words can you use to list these?
- Divide the paragraph into 2 or three sentences.

Text 4 [3]

Blueprint locates and extracts source code from web pages by segmenting them and the segments of which are then classified based on their being source code or not, which represents an online process taking the current *Blueprint* prototype about 10 seconds per page.

Put your rewrite here:

Additional pointers are provided below for improving clarity.

Make your sentence straightforward and concise:

- Simplify your sentence to focus on one idea with a clear subject and succinct verb
- Avoid sentences with this topical structure **"For xxx, it is…"** e.g., For the **Code of Practice for Fire Resisting Construction**, **it** requires that every building should be divided into compartments to inhabit the spread the fire. Simply say "The Code of Practice for Fire Resisting Construction requires that …"

In writing technical document, one thing that writers need to bear in mind is that readers of your text would not like to spend time on decoding every sentence. It is therefore important to take readability into serious consideration when explaining technical information. Maintaining cohesion in a text can greatly enhance the readability of the text.

TASK 5.7 Identify cohesive devices

Look at the following comments on a longer section of extracting example code and examples by *Blueprint* and see how the cohesion is achieved through different cohesive devices.

Find examples in the text of the different types of cohesion listed below:

- Referencing device (referring back to previous concepts, ideas, processes)
- Sequential
- Cause and effect
- Conditional (something has to happen first before something else happens)

One example has been done for you.

Text 5 [3]

Text	Cohesive devices
To facilitate locating and extracting source code from Web pages, *Blueprint* first segments the page. Then, *Blueprint* classifies each segment as being source code or not. This offline processing takes the current *Blueprint* prototype about 10 seconds per page. Since HTML documents often contain errors (e.g., missing tags or extraneous quotes), *Blueprint* first transforms them into proper XHTML documents so that we can leverage their structure in the segmentation process. We pre-process the HTML file with the Beautiful Soup library, which generates valid XHTML output for any input. Next *Blueprint* divides the resulting hierarchical XHTML document into independent segments by examining block-level elements. *Blueprint* uses 31 tags to define blocks; the most common are: P, H1, DIV, and PRE. We also extract SCRIPT and OBJECT blocks as block-level elements, because running examples are usually contained within these tags. To find block-level elements, *Blueprint* traverses the document depth-first. When we reach a leaf element, we backtrack to the nearest containing block-level element and create a segment. If the root of the tree is reached before finding a block-level element, the element immediately before the root is extracted as a segment. This algorithm keeps segments ordered exactly as they were in the original document.	Sequential

TASK 5.8 Cohesion at the Section / Chapter level

The extract below is from a student FYP entitled *"Validation of the diagnostic accuracy of computational high-throughput autofluorescence microscopy by pattern illumination (CHAMP) for subtyping lung adenocarcinoma."*

There are two versions of the extract. Read Version A first and then Version B of the extract. As a reader which version do you prefer and why?

Text 6 [4]

Version A

2 Methodology

2.1 Collection of biological tissues

The lung tumour tissues used in this study were acquired from lung tumour removal surgical patients at the Hong Kong Queen Mary Hospital. The tissues were taken from the resected lung lobes using a scalpel and then fixed for a day at room temperature in 4% neutral-buffered formalin before being transferred to the HKUST TAB-Lab for imaging. All human-related experiments were conducted in compliance with the Institutional Review Board of the University of Hong Kong/ Hospital Authority Hong Kong West Cluster (HKU/HA HKW) with reference number UW 20–335. Consent for tissue usage was also secured from all lung cancer tissue donors.

2.2 CHAMP imaging of human lung tumour tissue slices

The tissues fixed in formalin were subjected to dehydration, before being cleared and impregnated using a tissue processor. This processing took approximately 12 hours before the samples were embedded into paraffin. As validation of CHAMP images was to be carried out on thin tissue slices for fair comparisons to histological stained images, the paraffin-embedded block specimens were sliced to a thickness of 7μm using a RM2235 Leica Inc. microtome and mounted on quartz slides. For CHAMP imaging, quartz slides were preferred due to their high UV transparency, as conventional glass slides would absorb the UV rays, resulting in low image contrast of the sample.

[Text removed]

2.3 Histological imaging of human lung tumour tissue slices

Once CHAMP imaging was completed, the tissues were subjected to standard histological procedures to acquire the H&E reference images. Firstly, the quartz coverslip was removed by placing the sample in the water and gently waving it. The sample was then stained with H&E and cover slipped after drying. The stained thin tissue slices were imaged by Hamamatsu Photonic K.K's NanoZoomer-SQ to produce histological images. Histological software, ImageJ, was subsequently used to view fine histological details of the sample.

2.4 Validation of elastic fibres as a diagnostic tool using image processing

Elastin van Gieson (EVG) staining is a common method used for distinguishing elastin fibres in connective tissue. CHAMP was validated for the visualization of elastin fibres in lung adenocarcinoma samples through visual comparison with previously archived EVG-stained lung adenocarcinoma samples.

In the image processing phase, pixels representing elastic fibres from CHAMP images were extracted using Python code. The code was implemented using the following Python packages: OpenCV, NumPy, and PIL. CHAMP images are first read into the code using the image path.

[Text removed]

Version B

2 Methodology

There were four main stages to performing imaging of human lung tumour tissue which involved collecting biological tissues (Section 2.1), CHAMP imaging of human lung tumour tissue slices (Section 2.2), imaging of the tissue slices using a microscope (Section 2.3), and validation of elastin fibres in the lung as a diagnostic tool using image processing (Section 2.4). These are described in more detail below.

2.1 Collection of biological tissues

The lung tumour tissues used in this study were acquired from lung tumour removal surgical patients at the Hong Kong Queen Mary Hospital. The tissues were taken from the resected lung lobes using a scalpel and then fixed for a day at room temperature in 4% neutral-buffered formalin before being transferred to the HKUST TAB-Lab for imaging. All human-related experiments were conducted in compliance with the Institutional Review Board of the University of Hong Kong/ Hospital Authority Hong Kong West Cluster (HKU/HA HKW) with reference number UW 20–335. Consent for tissue usage was also secured from all lung cancer tissue donors.

2.2 CHAMP imaging of human lung tumour tissue slices

The tissues fixed in formalin were subjected to dehydration, before being cleared and impregnated using a tissue processor. This processing took approximately 12 hours before the samples were embedded into paraffin. As validation of CHAMP images was to be carried out on thin tissue slices for fair comparisons to histological stained images, the paraffin-embedded block specimens were sliced to a thickness of 7μm using a RM2235 Leica Inc. microtome and mounted on quartz slides. For CHAMP imaging, quartz slides were preferred due to their high UV transparency, as conventional glass slides would absorb the UV rays, resulting in low image contrast of the sample.

[Text removed]

2.3 Histological imaging of human lung tumour tissue slices

Once CHAMP imaging was completed, the tissues were subjected to standard histological procedures to acquire the H&E reference images. Firstly, the quartz coverslip was removed by placing the sample in the water and gently waving it. The sample was then stained with H&E and cover slipped after drying. The stained thin tissue slices were imaged by Hamamatsu Photonic K.K's NanoZoomer-SQ to produce histological images. Histological software, ImageJ, was subsequently used to view fine histological details of the sample.

2.4 Validation of elastic fibres as a diagnostic tool using image processing

Elastin van Gieson (EVG) staining is a common method used for distinguishing elastin fibres in connective tissue. CHAMP was validated for the visualization of elastin fibres in lung adenocarcinoma samples through visual comparison with previously archived EVG-stained lung adenocarcinoma samples.

In the image processing phase, pixels representing elastic fibres from CHAMP images were extracted using Python code. The code was implemented using the following Python packages: OpenCV, NumPy, and PIL. CHAMP images are first read into the code using the image path.

[Text removed]

Section overviews are helpful to the reader, particularly for longer documents such as FYP reports. They give an overview of content, tell the reader what to expect, and allow the reader to skip to subsections if they want.

- For CAES9542 we want you to give a short overview only for the main sections / chapters e.g., Introduction, Methodology / Design, Results and Discussion, Conclusion.
- If these main sections do not have subsections (e.g., Introduction, Conclusion) there is no need to have a section overview.
- If you have subsections within subsections e.g., 3.1.1, 3.1.2 there is no need to have a section overview.

When submitting your FYP report to your supervisor you can ask them whether they want you to give a section overview for all sections and subsections.

5.4 Delivery and paralinguistic features in oral presentations

Your class teacher will carry out an interactive presentation on delivery and paralinguistic features (non-verbal features) in oral presentations.

5.5 Signposting in oral presentations

An unbroken stream of information is difficult to follow whether you are reading it or listening to it. Visual clues such as punctuation, highlighting and formatting help the reader to follow the text and understand it more easily. In an oral presentation, you need to do the same thing, but you need to do it orally to maintain the structure and coherence of what you are talking about. You need to insert signposts throughout your presentation to help the listening audience follow the organization of ideas and how they are linked together in the structural framework of your topic.

Do not simply use terms like NEXT or AND. They are insufficient to help the audience remember what you are listing, describing or explaining. Use full phrases which contain helpful references, so the audience is reminded of where you are in the structure of your presentation and what subtopic you are currently talking about or turning to next.

A list of signposting expressions

- What I plan to cover is…
- There are (3/4/5) main sections to my presentation which are…
- To begin with…
- To start with…
- I'd like to start by explaining / telling / describing / listing…
- I'd like to conclude this section /point by saying…
- Now I'll move on to explain / describe/ discuss...
- Having just outlined X, I'd like now to look at/ turn to/ discuss/ explain

- There are three main findings in this section which I will discuss in turn…
- The last part/ example is….
- Let's just recap…
- This brings me to the next part/ ideas/ section/ reason/ idea…which is….
- That brings me to the end of my presentation

TASK 5.9 Signposting expressions for different purposes

Choose one of the 'signpost' expressions from the box below for the following situations:

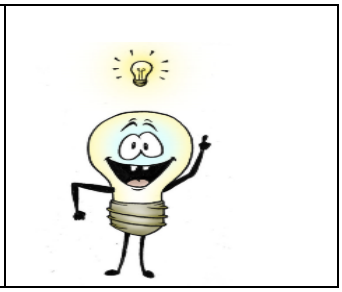
To move on	***To go back***	***To summarize***
To expand on (something)	***To recap***	***To turn to***
To disagree	***To conclude***	***To elaborate on (something)***

1. When you want to make your next point
2. When you want to change direction
3. When you want to refer to an earlier point
4. When you want to repeat the main points
5. When you want to give a wider perspective
6. When you want to do a deeper analysis
7. When you just want to give the basics
8. When you want to depart from your plan
9. When you want to finish your talk

5.6 Over to you

Justification is perhaps the most important function in technical communication. While there are many means to help you gain weight in justifying your engineering choices, it is crucial that you have a stance and 'speak' for the data. Do not only reply on data and statistics. Language-wise, there are also many techniques introduced in this chapter to help you be succinct.

TASK 5.10 Reflect on this unit



Key points to remember

- In justifying your choices, introduce, describe, and comment on your justification
- DO NOT be afraid to use evaluative expressions such as adjectives
- Improve the clarity of your writing by putting the focus of your sentence in the subject position and use illustrative verbs.
- Reduce excessive use of relative clauses (which and that clauses)
- Identify the relationship between ideas before using a particular connective e.g., cause-and-effect, conditional, sequential

Homework and Preparation for the next session

- Start preparing Progress Report 1
- Complete one area of SAR

References

[1] Chaudhuri S, Horn D, Hanrahan P, Koltun V. Image-Based Exploration of Massive Online Environments. *Stanford Computer Science Technical Report*. Stanford University; 2009.

[2] Adapted from a student text.

[3] Brandt J, Dontcheva M, Weskamp M, Klemmer SR. Example-Centric Programming: Integrating Web Search into the Development Environment. *Stanford Computer Science Technical Report.* Stanford University; 2009.

[4] Adapted from a student text.