

CHAPTER 1

Engineering Life

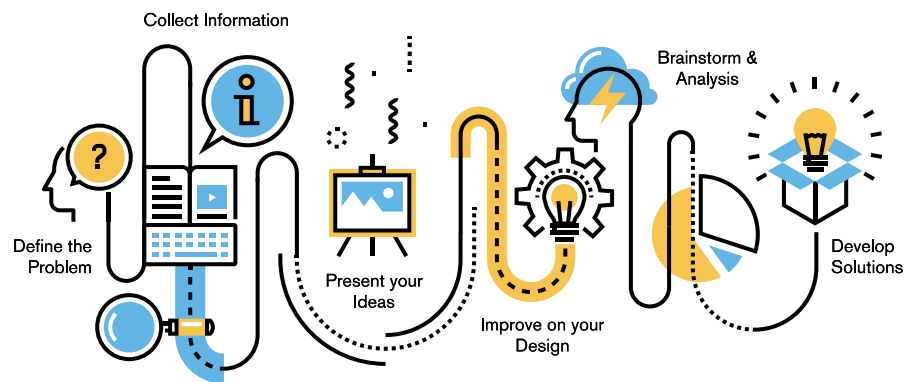
If you were asked to gather a team to go to Mars, what professionals would you call on to help get you there? Your answer would likely include an engineer. Many people think of engineers as people who work with big machines and, until recently, the profession was narrowly divided into *chemical*, *civil*, *electrical* and *mechanical* engineers. But today, there are about 200 engineering degrees as society demands educated workers with specialized skills in many fields. All engineers typically have an interest in analyzing processes and solving problems. **How are process analysis and problem solving part of your education and career interests?**

In this chapter, you will

- learn vocabulary related to analysis and problem solving;
- listen to infer attitudes, emotions, and intentions;
- think about hypothetical situations;
- learn about note-taking;
- talk about possibilities with conditional tenses;
- learn how to give presentations;
- present and discuss a hypothetical situation about the automation of a career.

GEARING UP

A. Designing products, ideas, and solutions is a common process. Look at the flow chart and answer the questions.



- 1 Why is it important to define the problem at the beginning of a process?

- 2 What are three ways you might collect information about a large real-world problem?

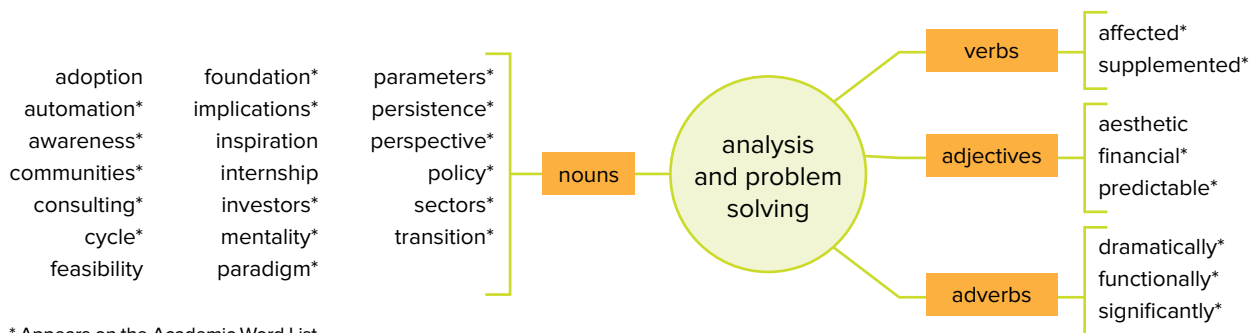
- 3 After presenting your ideas, why is a common next step “improve on your design”?

- 4 Is brainstorming and analysis best left to the end of the process, or should it occur at different times? Why?

B. Work in groups. Compare your answers with those of other students.

VOCABULARY BUILD OVERVIEW

Below are the key words you will practise in this chapter. Check the words you understand, then underline the words you use. Highlight the words you need to learn.



* Appears on the Academic Word List.



Inferring Attitudes, Emotions, and Intentions

"What did he mean when he said *no*?" It seems like the answer to such a question should be obvious, but people do not always say exactly what they mean. It is necessary to listen beyond the words to infer—or understand the true meaning—based on clues about their attitudes, emotions, and intentions. Understanding each clue means paying attention to word choice and sentence structure.



A. A speaker's attitudes are seen as *positive*, *negative*, or *neutral*. You can identify attitudes from the choice of words, particularly emotional verbs, adjectives, and adverbs. Read the sentences and decide if the word in **bold** in each one is positive, negative, or neutral.

ADJECTIVES AND ADVERBS	POSITIVE	NEGATIVE	NEUTRAL
① The new electric motorcycle is amazingly fast.	✓		
② He presented a long argument why we all supposedly need new headphones.			
③ He puts a lot of hard work into developing robotic friends for autistic children.			
④ She explained that buildings are similar to human bodies.			
⑤ It's questionable whether she'll discover anything in the Antarctic.			
⑥ The software is always based on the current needs of customers.			

One way speakers convey their intentions while they speak is by introducing new topics with rhetorical questions. Rhetorical questions are questions for which the answer is obvious; they help develop the speaker's argument.

B. Read the following rhetorical questions. Explain what the speaker's intention is in using each question. For example, is the speaker sharing an attitude or trying to make you think something in particular?

- ① No one really wants to work on a construction site for an hourly rate, do they?

SPEAKER'S INTENTION: to make you feel that working for an hourly rate is not a good idea

- ② You don't believe in ghosts or that people have equal opportunities, do you?

SPEAKER'S INTENTION: _____

- ③ Who doesn't think that taller buildings are the way of the future?

SPEAKER'S INTENTION: _____

- ④ Would any of us be successful if we hadn't learned how to study properly?

SPEAKER'S INTENTION: _____

- ⑤ Can you be a famous architect without studying engineering? Of course not!

SPEAKER'S INTENTION: _____

C. With a partner, look at task B's questions and your ideas about the speakers' intentions. Think of opposing arguments for each one.

① _____

② _____

③ _____

④ _____

⑤ _____

D. A speaker's attitudes, emotions, and intentions are often expressed in several ways. Read the questions below. Listen to the paragraph two or three times to answer the questions.

- ① What is the speaker's attitude toward students taking a gap year?

- ② What is an example of a rhetorical question she uses to make her point?

- 3 What is an emotional expression the speaker uses to indicate her personal preference?

- 4 What are three words or expressions the speaker uses to show her attitude?



Thinking about Hypothetical Situations

Are you a dreamer? Dreamers are people who think hypothetically, imagining what might happen in the future and what the consequences would be. Listening 1 is about a hypothetical situation, imagining a world without bridges. Hypothetical situations help us to explore ideas through *if* questions. How would the world be different if there were no bridges? What would be the consequences? Exploring hypothetical scenarios leads to insights about underlying ideas and principles.



- A. You can recognize a hypothetical situation when someone uses the word *hypothetical* or *imagine*. Other common expressions are *it's time*, *perhaps*, *wishes*, and *would rather*. Match the following hypothetical situations to their possible consequences.

HYPOTHETICAL SITUATIONS		CONSEQUENCES
1 Perhaps it's time to consider offering free university education to medical students.	<u>d</u>	a) There would be more social support in communities.
2 Imagine if every student had to take a year out to volunteer.	<u> </u>	b) They would bring real-world expertise to the classroom.
3 I wish that everyone would wear school uniforms, even at university.	<u> </u>	c) Classes would be less crowded.
4 Hypothetically, what if all teachers also had to work in their field?	<u> </u>	d) The number of doctors would increase.
5 I'd rather see universities offer courses in the evening and seven days a week.	<u> </u>	e) Less paper would be used.
6 Could you see a way that we might replace all textbooks with computer tablets?	<u> </u>	f) Students would save money on clothing.

B. Consider the following hypothetical situations and imagine what the positive and negative consequences might be. These consequences should be based on realistic ideas, even if the hypothetical situation is not realistic. Write brief points, then discuss your answers in a group to choose the best ones.

- ① Everyone could afford a personal robot to do jobs around the home.

POSITIVE CONSEQUENCE: _____

NEGATIVE CONSEQUENCE: _____

- ② The cost of fossil fuels suddenly rises, making gasoline (for cars) too expensive for most people.

POSITIVE CONSEQUENCE: _____

NEGATIVE CONSEQUENCE: _____

- ③ Laws were passed making four years of university a requirement for all young adults.

POSITIVE CONSEQUENCE: _____

NEGATIVE CONSEQUENCE: _____

LISTENING ①

Choosing the Right Path

Listening 1 sets out a hypothetical situation of a world without bridges. The point is not to stop building bridges, but rather to reflect on a hypothetical situation and ways you should prepare yourself to think about the future.

VOCABULARY BUILD

In the following exercises, explore key words from Listening 1. Look up any words you don't know.

A. Collocations are words that are commonly found in combination, such as *salt and pepper*. Complete the sentences by using the words in the box to fill in the blanks. Then highlight the other term of the collocation for each of the key words.

awareness financial foundation **paradigm** perspective significantly

- ① A **changing** _____ *paradigm* _____ in work is the idea of the home office.
- ② The number of jobs in computing is _____ higher.
- ③ We're facing a _____ crisis because of the loss of jobs.

- ④ Looking for jobs after university gives you a new _____.
- ⑤ We are hoping to raise _____ of the key issues.
- ⑥ We need a strong _____ to make a company work.

B. Use the words in the box to complete the paragraph. Then highlight the other term of the collocation for each of the key words.

communities inspiration investors paradigm perspectives

Traditionally, wise _____ have been the ones who have spent money in new construction that leads to the growth of cities. But now, local _____ are creating this new _____ and putting control back into the hands of people who live and work in neighbourhoods. These shifting _____ have happened because people are becoming more vocal about engaging in political processes. Many draw _____ from various human rights protests where people have stood up for themselves and the interests of those around them.

C. Write sentences using the pairs of words in parentheses. Share your sentences with a partner and practise saying them to check if they make sense and for speaking practice.

- ① (paradigm / perspective) _____

- ② (financial / investors) _____

- ③ (awareness / communities) _____

Before You Listen

A. Whenever you look at a problem and a hypothetical solution, you need to consider what happens next, or the positive and negative *effects* of any solution. What would be the effects of *not* repairing or replacing old bridges and *not* building new ones? Compare your answers with a partner's to check that your ideas are realistic.

- ① If we didn't *repair* bridges, the positive effects might be ...

- ② If we didn't *repair* bridges, the negative effects might be ...



3 If we didn't *build* bridges, the positive effects might be ...

4 If we didn't *build* bridges, the negative effects might be ...

B. In Listening 1, lecturer Dr. Quinn puts forward the hypothetical idea of no longer building bridges and getting rid of old ones. This is a hypothetical situation that is highly unlikely to happen. Choose the point that is most likely Quinn's intention for discussing the idea with her students.

- a) She would like to propose destroying all the bridges in a city where she lives, and she is looking for support.
- b) She wants them to explore consequences of a hypothetical situation and develop their thinking.
- c) She wants to use the ideas to develop ways to build new bridges in the place where she lives.

While You Listen

C. The first time you listen, consider what Dr. Quinn and Max are saying. Listen a second time to complete your notes and add details.

DR. QUINN AND MAX	NOTES
1 Welcome to this week's lecture. Throughout your different fields you study, ...	You are not prepared <i>for the future</i> .
2 When you talk about the future, you cannot know exactly what will happen, so ...	Going to Mars is hypothetical and won't happen unless
3 For inspiration, let's start with a topic that's familiar to you: bridges.	Bridges is a topic that
4 Can someone give me the opposite argument?	There is more than one
5 I'd say that bridges are necessary because ...	There are multiple reasons for building bridges.
6 Great answer, Max. If I can summarize your ideas, you're mostly concerned about ...	Max's points are all about
7 Okay, it's important to have an awareness of the opposite point of view.	Knowing another point of view helps you
8 I don't think that anyone would disagree that bridges are expensive to build, but ...	Quinn thinks cost
9 For the second premise from the planning perspective, ...	Words like <i>likely</i> and <i>often</i> mean
10 The third premise is the most serious one. From the engineering perspective, ...	Even if you don't agree with the other points,
11 Okay, so that's the foundation of my argument, but let's take it to the next level.	If you agree with the first points,
12 Can anyone tell me what is meant by paradigm shift?	Computer usage today can be compared to

DR. QUINN AND MAX	NOTES
13 What are some hypothetical paradigm shifts you might consider? What if ... in thirty years,	One change would lead to
14 As you can probably guess, I am not telling you all this because ...	Bridges are just an example
15 Besides exploring hypothetical situations, what else can you do?	Study outside
16 Really? Why biology? Max: Well, I've always been interested in ...	Growing up on a farm made Max
17 Let me push you a little further on this. Can you relate ...	Quinn sees a relationship between
18 Yes, bees live together but when a hive gets too big, some [bees] leave and ...	Bees and humans are similar
19 Wow! If only we could think like bees! So let's build a hypothetical situation ...	Money not spent on bridges might be spent on
20 Of course all of this is hypothetical, but at least it is a first step in ...	Hypothetical situations help improve

After You Listen

D. Review your notes from task C and use what you learned in Focus on Listening (page 4) to answer the following two questions.

- 1 What can you infer about Dr. Quinn's attitudes toward her students?

- 2 What can you infer about Max's attitudes from his time growing up on a farm?

E. Read the following statements and indicate whether you think each one is true or false. For each false statement, write the true statement.

STATEMENTS	TRUE	FALSE
1 Quinn suggests that the idea of humans going to Mars is hypothetical. 		
2 The topic of bridges was suggested because it mainly interests engineers. 		
3 Quinn's point about convenience is a summary of what Max said about bridges. 		



STATEMENTS	TRUE	FALSE
4 Quinn talks about point of view to suggest that you only need to understand one side of an argument. 		
5 A paradigm shift is the idea that your view of the world should never change. 		
6 One paradigm shift can result in multiple side effects, some of which are unexpected. 		
7 The example of bees is meant to model how groups organize their society based on resources. 		
8 The importance of hypothetical situations is that they help us think about the past. 		

F. Max's study of biology will probably impact on his work as an engineer. Think of a career you are interested in. Then choose another subject area from the list below. How might you use the combination for a new job?

Psychology Robotics Engineering Business
 Geography Literature Education
 Languages Music History Theater
 Law Medicine Mathematics Astronomy



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 Choosing the Right Path

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Talking about *If*

What would you do if you were given a million dollars? Questions that begin with “What would you do if ...” and “What will you do if ...” are two common ways to start hypothetical questions. To answer, you need to think about whether or not something is or was possible and then what you would do about it.

These are the three conditional tenses. Compare these tenses.

SITUATION	IF CLAUSE	RESULT CLAUSE	EXAMPLE SENTENCE
First conditional: true in the present or future	simple present	<i>will</i> + base form	If I have time, I will study.
Second conditional: untrue in the present or future	simple past	<i>would</i> + base form	If I had time, I would study.
Third conditional: untrue in the past	past perfect	<i>would have</i> + past participle	If I had had time, I would have studied.

The example sentences are made of clauses. The *if* clause is the condition; the other clause is the result or consequence of the condition. However, the order of the clauses can be switched (for example, *I will study if I have time*). When the *if* clause comes second, a comma between the clauses is not necessary.

A. Read the conditional sentences and choose the correct meaning of each one.

- ① However, if your dreams begin with sound premises, you will be in a better position to achieve them.
 - a) Your dreams may sound good but they won't help your position.
 - b) Base your dreams on facts and you will likely act on them.
 - c) Position your dreams to get yourself into better premises.
- ② If we built communities that had everything they needed, we wouldn't need bridges.
 - a) Our communities don't have everything so we still need bridges.
 - b) The main thing we need in our communities are better bridges.
 - c) We can still build communities with the bridges that we all need.
- ③ I wouldn't have gotten a better job if I hadn't worked hard at school.
 - a) I got a job at school because I worked harder.
 - b) I didn't work hard so I don't have the job I want.
 - c) I worked hard and it led to getting the job I wanted.
- ④ If you had woken up earlier, you wouldn't have missed today's test.
 - a) Today's test was too late for you.
 - b) You overslept and missed the test.
 - c) Getting to sleep earlier affects your tests.
- ⑤ If she hadn't forgotten, she would have visited the exhibition.
 - a) She did forget and regrets missing the exhibition.
 - b) She forgot but did not intend on attending the exhibition.
 - c) Forgetting the time is a good reason to miss something.
- ⑥ If that had happened fifty years ago, what would our cities have looked like?
 - a) Cities will continue to change in future.
 - b) It didn't happen so we can only guess.
 - c) Cities fifty years ago were far different.



B. Use the words in parentheses to write sentences about hypothetical situations using the first, second, and third conditional forms. After, practise your sentences with a partner and make sure each of you has used the correct conditional form.

- ① first conditional (everyone / show respect / get along)

If everyone shows respect, we will get along.

- ② first conditional (you / learn from mistakes / make a better person)

- ③ second conditional (they / study / urban geography, engineering, or business / understand the urban landscape)

- ④ third conditional (we / complete / engineering degrees / opportunity to work on bridges)



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Focus on Accuracy

Academic Survival Skill

Note-Taking

When you listen and take notes, you need a method that helps you capture important information for later study. The widely used Cornell Note-taking System was developed in the 1950s at Cornell University. To begin, divide your page of notes into four sections.



List
information
that
identifies
the talk.

Fill in the
main ideas
and
questions
while you
listen and
after.

TOPIC *Vanishing Trades in the Digital Age*

COURSE/CLASS _____

DATE _____

• MAIN IDEAS

• KEY QUESTIONS

• KEY WORDS AND IDEAS

• IMPORTANT NUMBERS (INCLUDING DATES)

• REPEATED / STRESSED INFORMATION

• NOTES ON ANY VISUALS *no visuals in this talk*

Write
your
notes
about
the talk.

SUMMARY

Write a
short
summary.

- A. Read the following paragraph from Listening 2 with a partner. In the above table, first fill in the *key words and ideas* box (including important numbers and key/stressed information).

We have, first of all, defined automation pretty broadly, so we have included robotics, but also artificial intelligence and machine learning, and we've been looking at how those different technology areas will impact both the jobs that we all do, but also the tasks that are done within jobs. And what we are learning is that 50 percent of the activities that people currently get paid for can be automated by some of those technologies by 2055.

- B. Look at your notes in the key words and ideas box and write down the main idea; the longer a talk, the more main ideas you will have. Write one question about it. In a lecture, key questions are ones you would research on your own or ask the speaker about later. Then write a short summary of the talk.
- C. In the summary, *artificial intelligence* is abbreviated to *AI*. Use short forms like *AI* for *artificial intelligence* so you can write more quickly as you listen. Write five abbreviations for words or terms that are common in your field.

ABBREVIATIONS				
_____	_____	_____	_____	_____

- D. Write five symbols that can help you write faster notes. Compare your abbreviations and symbols in a group to get new ideas about how you can take notes more efficiently.

SYMBOLS				
_____	_____	_____	_____	_____

LISTENING 2

Vanishing Trades in the Digital Age

How many jobs have completely disappeared because of technology? In the past sixty years, perhaps only the job of elevator operator is completely gone. However, many other jobs are likely to vanish in the coming decades. In other cases, technology will make some jobs more efficient and effective so one person can do the work of many.

VOCABULARY BUILD

In the following exercises, explore key words from Listening 2.

- A. Choose the word that best completes each of the sentences adapted from Listening 2.

dramatically affected sectors supplemented transition

- ① The year 2055 is when we would see most of the activities we've projected that could be automated—when that _____ will be complete.

- 2 Are some areas of the world going to be _____ in greater ways than others?
- 3 But almost every job will change form quite _____.
- 4 So doctors, lawyers, all sorts of professions will have parts of their current jobs replaced by automation, and frankly _____ by automation.
- 5 We're not looking at a world where entire _____ of the workforce are going to vanish as jobs are completely automated.

B. It's often easier to understand new words if you understand the root words within them. First, write the root word for each of the following and then write a synonym or definition for the key word.



Learn root words to expand your vocabulary.

KEY WORD	ROOT WORD	DEFINITION
1 adoption	<i>adopt</i>	
2 automation		
3 feasibility		
4 implications		
5 predictable		

Before You Listen

A. Machine learning is part of artificial intelligence and refers to how a computer can look at large amounts of data and learn to recognize patterns. An example is looking at test results from millions of patients so it can identify problems more quickly and accurately than a human doctor. Read an excerpt from Listening 2. Then answer the questions and compare your ideas with a partner.

We have first of all defined automation pretty broadly, so we have included robotics, but also artificial intelligence and machine learning, and we've been looking at how those different technology areas will impact both the jobs that we all do, but also the tasks that are done within jobs. And what we are learning is that 50 percent of the activities that people currently get paid for can be automated by some of those technologies by 2055.



- 1 What human jobs might be replaced by robotics?

- 2 What human jobs might be replaced by machine learning and artificial intelligence?

- 3 What jobs are unlikely to be completely replaced by robotics, artificial intelligence, and machine learning?

B. An outcome of increased automation is likely to be higher unemployment, even if companies save money and make greater profits. High unemployment often leads to social unrest. Governments in Sweden and Canada are experimenting with guaranteed incomes—paying everyone in a community enough to live, whether or not they are working. If you lost your job to automation but didn't have to work to support yourself, would you still want to work? Why or why not? Discuss in a group.

While You Listen

C. The Cornell System encourages you to listen for significant numbers and dates. Listening 2 features many number and time expressions. The first time you listen, consider what interviewer Nora Young and think-tank researcher Katy George have to say about automation, and make notes on their number and time expressions. Listen again and add details to your notes.

NUMBER AND TIME EXPRESSIONS	NOTES
1 At least according to one source, in the past sixty years ,	<i>elevator operator is the only career that's been completely automated</i>
2 There are less than 5 percent of today's occupations ...	
3 And what we are learning is that 50 percent of the activities that people currently get paid for ... by 2055 .	
4 Almost 60 percent of the occupations that exist today have tasks like ...	
5 I read that about 60 percent of all jobs are ...	<i>something like 30% automatable</i>
6 So, think about a third of everybody's, almost everybody's, jobs will be ...	

NUMBER AND TIME EXPRESSIONS	NOTES
7 The top three are first of all ...	
8 Second , tasks that are ...	
9 and, third , tasks that are collecting data. The sectors that will be most affected are ...	
10 but we actually see that these tasks that can be automated cut across all industries and all different wage levels. So ...	<i>Doctors, lawyers, will have parts of their current jobs replaced and supplemented by automation.</i>
11 There are several different factors that are quite important in ...	
12 But at the macro level, we believe that it's gonna [going to] take decades to play out, and there are ...	
13 Every part of the world as we evaluated this will be affected, so there's really no part of the world that ...	
14 But the Big Five in Europe, the United States, Japan ... all countries have very significant amounts of ...	
15 At one level, countries with lower wages have some roles that are ...	
16 Although, as I said, we also see the same kind of susceptibility to automation in very high- ...	
17 And so in that sense, you would expect faster -paced technology adoption in some of those industries. On the other hand, there's less of an economic imperative in place where ...	

NUMBER AND TIME EXPRESSIONS	NOTES
18 I think the two messages that I hope policy makers take away to the highest level would be, number one , that ...	• <i>automation and new technology are very important</i>
19 But the second takeaway is that, in order to manage this in a way that does not drive even greater income inequality and disruption to communities and to parts of our workforce, we really need to ...	
20 2055 is kind of our baseline projection as to when we would see most of the activities that we've projected ...	
21 But we think that that could happen twenty years earlier , or ...	
22 Well, two pieces of advice . One is to really become a confident and skilled user of ...	
23 But secondly , the kinds of tasks that are not susceptible to automation are things like ...	• <i>interfacing and facilitating relationships</i> • <i>applying expertise in decision making or planning</i>

After You Listen

D. Use your notes from task C and what you learned about the Cornell System (page 13) to write one main idea and one key question about Listening 2, and then write a summary.

1 **MAIN IDEA:** _____

2 **KEY QUESTION:** _____

3 **SUMMARY:** _____

E. Read questions and statements from Listening 2 and choose the best explanation for each one.

- 1 "Eventually, everything will be so automated that we'll just sit on our *Jetsons*' (a cartoon series about the future) couch and live a life of leisure."
- In the future, all work will be done by computers, robots, and other machines.
 - Most people in the future will work on their couches, not at desks.
 - We will have lives of leisure and sleep far more on couches than in beds.



- 2 “So doctors, lawyers, all sorts of professions will have parts of their current jobs ... supplemented by automation, in a way that should make all of those occupations even more productive.”
 - a) Technology will train us to be both doctors and lawyers.
 - b) Doctors and lawyers will help others become more productive at work.
 - c) More professionals will use technological tools to help them do their jobs.
- 3 “And then there are a bunch of other factors, things like regulatory factors, as well as other social factors, that will determine the pace of adoption.”
 - a) Regulatory and social factors will slow the pace of automation.
 - b) We will only understand factors when they are being adopted.
 - c) Few regulatory factors will involve social factors as well.
- 4 “We actually have labour shortages in some of those same industries because we don’t have people who are in the right location or with the right skills.”
 - a) Labour shortages will likely change the ways we look for work.
 - b) We’ll all look for jobs online without worrying about skills.
 - c) People with the right skills will travel farther to find work.
- 5 “On the other hand, there’s less of an economic imperative in place—where labour costs are really low—to automate those roles.”
 - a) We will have to invest in automation in poorer areas.
 - b) There will be little investment in automation in poorer areas.
 - c) Richer areas will eventually invest in even the poorest areas.
- 6 “In the long run it will work out, but in the short run there could be some painful disruptions.”
 - a) Almost everyone will go for longer runs, not shorter runs.
 - b) Automation may lead to many people suffering if they can’t find work.
 - c) We will create disruptions that may or may not be painful to others.



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F. In a group, look at the key questions you and others wrote in task D. Share the questions and discuss your answers.



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Giving Presentations

Giving presentations is a long-term skill that you will use in many contexts. For example, you will likely give presentations in university as well as throughout your future career. Sometimes presentations will be to a single person; in other cases, to small groups or to large crowds. In each case, you need to organize your ideas so they are easy to follow and remember. The following tasks will help you prepare a hypothetical situation in the Warm-Up Assignment and to make a presentation in the Final Assignment.



- A.** Think about a speaker or presenter you have heard who impressed you. Why did the presentation stand out? Was it the content (what was said), the structure (how the ideas were organized and the visual aids were used), or the presentation (the speaker's style and delivery)? Make notes, then compare your ideas in a group.

1 THE SPEAKER: _____

2 THE TOPIC: _____

3 WHY THE PRESENTATION STOOD OUT: _____

- B.** On a separate page, use these phrases to help you structure your presentation. Where you see an ellipsis (...), insert information about the presentation you described in task A. After, practise the sentences with a partner.

STRUCTURE	SENTENCES
GREETING AND INTRODUCTION (introduce yourself and your topic)	"Hello, my name is ... and I'd like to give you a brief presentation on ..." Or, "In this presentation, I'd like to describe/analyze/discuss ..." Or, you might want to use a rhetorical question (a question for which the answer is already understood by the audience): "Have you ever thought about ...?"
OBJECTIVE (explain your problem)	"The purpose of this presentation is to ... It is important to you because ..."
ORGANIZATION (explain what you will talk about)	"First, I'll explain the causes of ... Then, I will talk about the effects ... Finally, I'll conclude with a suggestion ..."
MAIN POINTS (your examples and explanations)	Add transitions between points to let your audience know that you are finishing one idea and going on to the next one. "Next, I'd like to turn to ..." "I've discussed ... now I'd like to talk about ..." Add examples and explanations.
CONCLUSION (a summary, solution, or request for action)	End with a clear and final message. "I'd like to conclude by saying ..." "To sum up, I'd like to say ..." "Now, it's your turn to ..."
QUESTIONS	"If anyone has any questions, I'd be happy to answer them." "We have time for a few questions."
THANKS	"Thanks for listening, and if you have any more questions, you can always contact me later / after the presentation."





WARM-UP ASSIGNMENT

Develop a Hypothetical Situation

Now it's time to develop a hypothetical situation related to the automation of a career and to consider the consequences.

- A.** Working with a partner, choose one career that requires a university education. You might choose a career that one or both of you are interested in pursuing. In your hypothetical situation, imagine that your chosen career is replaced by automation.

The career: _____

- B.** Brainstorm (think of different ideas) by discussing the possible consequences of your career no longer being done by humans. For example, imagine if doctors were automated—replaced by robots. Perhaps a consequence would be that robot doctors would visit patients at home more often. List your three best ideas about what the consequences would be of the career being automated.

CONSEQUENCE 1: _____

CONSEQUENCE 2: _____

CONSEQUENCE 3: _____

- C.** Consider the follow-up consequences that might occur as a result of your initial consequences (task B). For example, if robot doctors visited people at their homes more often, the idea of the emergency room might disappear and instead, every neighbourhood would have a robot doctor who worked twenty-four hours a day, seven days a week. Or perhaps robot doctors would be in the form of drones that could travel to your home at a moment's notice.

FOLLOW-UP CONSEQUENCE 1: _____

FOLLOW-UP CONSEQUENCE 2: _____

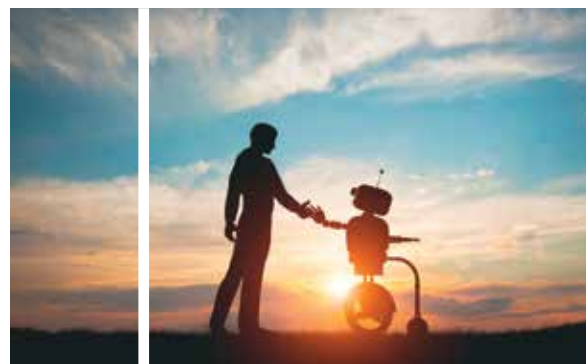
FOLLOW-UP CONSEQUENCE 3: _____

- D.** Make notes about your ideas. You will expand on your points and discuss them in your Final Assignment.



One Day in the Life: Six Jobs

What do these occupations have in common: architect, electric motorcycle engineer, mechanical engineer, planetary research scientist, roboticist, and software engineer? All of them are involved in solving problems in unusual ways. Which occupation might you be interested in doing?



VOCABULARY BUILD

In the following exercises, explore key words from Listening 3.

A. Reading words in context can help give an idea as to their meaning. Read the sentences adapted from Listening 3 and fill in the blanks.

functionally internships mentality parameters policy

- ① It requires the scientist; it requires the engineers, the people who come up with _____, the people who come up with the money.
- ② We've left instruments out in the field for years at a time so that we can really look at what the different environmental _____ are, how does the light vary?
- ③ As a start-up, our _____ really is to work fast and fail fast.
- ④ The experiences at my previous _____ taught me a lot about this career and just exposed me to a lot of things in the software universe.
- ⑤ You then start to test those concepts either by building them out and _____ using them and seeing if they perform the way you want them to, or by building them out virtually.

B. Complete each sentence with a phrase that helps to explain the key word in bold. After, practise your sentences with a partner to decide if each makes sense.

- ① Architecture is all about being **aesthetic**, which means that _____
- ② Often in the classroom, we were too focused on the very **specific** rules such as _____
- ③ At university and in your career, you have to show **persistence** by _____
- ④ One step in the **cycle** of project development is _____
- ⑤ As a **consulting** firm, most of our work involves _____



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Vocabulary Review



CEO = Chief
Executive Officer

Before You Listen

A. Marc Fenigstein is the CEO of an electric motorcycle company. Read about his company and his responsibilities, and then list three skills that might be important in his job.

Our first product is a race-level electric motocross bike. And because it's electric, there's also a street-legal version of it that is potentially the fastest urban vehicle on the planet. As CEO, ultimately I'm responsible for everything that happens under our roof, but my day-to-day [job] is primarily running the business side and keeping everything out of the way of our design and engineering team to let them do what they do best.

B. As you watch the video in Listening 3, you will focus on the main jobs, education, and advice or lessons of six professionals. Think about a career you would like to have some day and answer the questions. Share your answers with a partner to see if you both can find additional points to include.

① What is the main job or work of a person in this position?

② What education is required to work in this position?

③ What are the advantages and disadvantages of this position?

While You Listen

C. Use what you learned about the Cornell System (page 13) to take notes as you listen to six people talk about their jobs. For each one, take notes about what their main job is (beyond each one's job title), the education they received (both at university and informally), and the advice they have or lesson they have learned in their professions. Listen again and fill in details.



See what you can understand from the speakers' facial expressions, gestures, and body language.

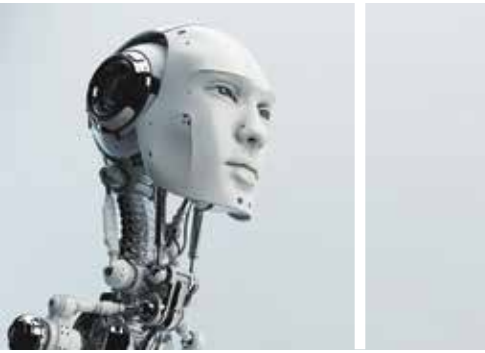
JOBS	DETAILS
ELECTRIC MOTORCYCLE ENGINEER: MARC FENIGSTEIN	MAIN JOBS: <i>running the business side so the design and engineering teams can work</i>
	EDUCATION:
	ADVICE/LESSONS: <i>Don't be afraid to ...</i>
SOFTWARE ENGINEER: VICTORIA SUN	MAIN JOBS:
	EDUCATION: <i>her engineer</i>
	ADVICE/LESSONS:
ROBOTICIST: MAREK MICHALOWSKI	MAIN JOBS:
	EDUCATION:
	ADVICE/LESSONS:

JOBS	DETAILS
PLANETARY RESEARCH SCIENTIST: MARGARITA MARINOVA	MAIN JOBS:
	EDUCATION: <i>engineering</i>
	ADVICE/LESSONS:
MECHANICAL ENGINEER: NIVAY ANANDA-RAJAH	MAIN JOBS:
	EDUCATION:
	ADVICE/LESSONS:
ARCHITECT: RACHELE LOUIS	MAIN JOBS:
	EDUCATION:
	ADVICE/LESSONS: <i>She loves how her career integrates so many different aspects of the human spirit.</i>

After You Listen

- D. Review your notes from task C. Continue with the format of the Cornell System and work with a partner to write a main idea, key question, and summary for each of the six professions.

JOBS	NOTES
ELECTRIC MOTORCYCLE ENGINEER	MAIN IDEA: <i>His job is about making it easy for others in his company to work.</i> KEY QUESTION: SUMMARY:
SOFTWARE ENGINEER	MAIN IDEA: KEY QUESTION: SUMMARY:
ROBOTICIST	MAIN IDEA: KEY QUESTION: SUMMARY:



JOBS	NOTES
PLANETARY RESEARCH SCIENTIST	MAIN IDEA: KEY QUESTION: SUMMARY:
MECHANICAL ENGINEER	MAIN IDEA: KEY QUESTION: SUMMARY:
ARCHITECT	MAIN IDEA: KEY QUESTION: SUMMARY:

E. Read the statements and choose the best inferences.

- 1 When the electric motorcycle engineer says, “Managing an operation like this is not easy and it requires a lot of multidisciplinary thinking,” you can infer:
 - a) Most jobs require many people to work with every possible tool.
 - b) No one is likely to have enough skills to do the jobs of the future.
 - c) Multidisciplinary thinking means that you have to have lots of skills.
- 2 When the software engineer says, “I really ... dreamed about being a games developer when I was in high school and I thought building video games was so much fun,” you can infer:
 - a) All video game players should dream about doing her same job.
 - b) She enjoys her job because it relates directly to her passions.
 - c) If you don’t start young, you will never learn about the job of your dreams.
- 3 When the roboticist says, “As an undergraduate, I studied computer science and psychology,” you can infer:
 - a) Creating robots for autistic children combined his interests.
 - b) Autism is a topic that is commonly considered in computer science.
 - c) Sometimes things you study have no relationship to your future job.
- 4 When the planetary research scientist says, “I think the biggest key to success is being passionate about something and allowing yourself to be passionate about something,” you can infer:
 - a) She is passionate about her job.
 - b) Success is the most important thing to her.
 - c) She works with passionate people.



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One Day in the Life: Six Jobs

- 5 When the mechanical engineer says, “With this headband alone, I’ve probably made thirty different prototypes (models),” you can infer:
 - a) If you don’t know what you’re doing, you waste a lot of time.
 - b) He only works on his own when he should work with others.
 - c) Much of his work involves getting things right through trial and error.
- 6 When the architect says, “The core and shell is the skin and bones of the building, the shell being the skin, the outside, and the core being the inside,” you can infer:
 - a) Her building designs will tend to have faces like people or animals.
 - b) She likely has a background in a medical field such as nursing.
 - c) She has a strong interest in relating biology to architecture.

F. Based on what you now understand about each of the six occupations, which would be most interesting to you? Why? Compare your choices in a group and explain your reasons.

FINAL ASSIGNMENT

Present, Discuss, and Take Notes on a Hypothetical Situation

Now it’s your turn. Use everything you have learned in this chapter to present the ideas you developed in the Warm-Up Assignment and then discuss them in a group.

- A. Review your notes from the Warm-Up Assignment (page 21) and prepare them for your presentation. Use what you learned in Focus on Speaking (page 19) to write brief cue-card notes for your key points about consequences and follow-up consequences. Divide up the tasks with your partner.



cue cards

STEPS IN YOUR PRESENTATION	BRIEF CUE-CARD NOTES
GREETING AND INTRODUCTION (explain the profession)	
OBJECTIVE (explain that you will explore the consequences of automation)	It’s possible that careers in _____ could disappear with automation and it’s important to consider the consequences if they do.
ORGANIZATION (explain your talk)	First, we will explain (the profession _____), then we will talk about how automation might cause it to disappear, and then we’ll discuss possible consequences.
MAIN POINTS (consequences and explanations)	CONSEQUENCE 1 + FOLLOW-UP:
	CONSEQUENCE 2 + FOLLOW-UP:
	CONSEQUENCE 3 + FOLLOW-UP:
CONCLUSION	

STEPS IN YOUR PRESENTATION	BRIEF CUE-CARD NOTES
QUESTIONS (ask if there are any questions)	
THANK THE AUDIENCE	

- B.** As others present, use what you learned in Academic Survival Skill (page 13) to take notes. Build on what you learned in Focus on Listening (page 4) to see what you can infer about each speaker's attitudes, emotions, and intentions. Use these inferences to ask questions.
- C.** When everyone has presented, look for connections between the consequences of different careers being automated. For example, if we have robot doctors and robot police officers, could the two robots be combined into one?
- D.** When everyone has finished presenting, ask your teacher and other students for feedback so you can improve your presentation and discussion skills.



Critical Connections

In today's homes and factories, automation increasingly relies on software to run computers, robots, and other machines. A threat to automation is malware: computer viruses aimed at disabling or destroying machines. In some cases, individual hackers spread malware to get money from victims. In other cases, governments use malware to attack their enemies. For example, a virus called Stuxnet was used to disable part of one country's nuclear weapons program.

- A.** Imagine yourself in ten years. What will you be doing in terms of a job?

I will be working as a _____.

- B.** Imagine yourself in this hypothetical situation: A malware virus similar to Stuxnet has spread and evolved to destroy every automated machine in the world. As you walk outside your suddenly dark home, you find a much quieter world. Dams and power plants that produce electricity have stopped working. Newer cars are still in the middle of the roads, and there are no airplanes in the sky. Many people are trapped in buildings where automatic doors will not open. Hardest hit are hospitals. The computers that could be used to battle the malware are largely disabled.

On a separate page, answer these questions using the conditional tenses you learned in Focus on Accuracy (page 11):

- 1 How will the loss of automation affect the job you identified in task A?
- 2 What do you think you will be doing from day to day if you can't do your chosen job?
- 3 What do you think you will try to do to help yourself and others?

- C.** Discuss the effects of the hypothetical situation in a small group. As others talk about their lives in the future, use what you learned in Focus on Listening (page 4) to infer their attitudes, emotions, and intentions.