

## Data is Truth & Truth Data

by George Sandifer-Smith

This resource is based on the [Inventive podcast](#). The podcast mixes engineering fact with fiction. Each podcast features an interview with an engineer. That interview was used as inspiration by a variety of authors and poets to create a piece of fiction.



### George Sandifer-Smith

George Sandifer-Smith is a lecturer and writer of poetry and fiction.

He was inspired by the interview with Enass and Manjot to write a science fiction story set in the near future about misinformation and the energy crisis.

**Your Name:**

**Class:**

**Teacher:**

# 1. Meet the Engineers

## Enass Abo-Hamed Chemical Engineer and Entrepreneur

Enass is the Chief Executive Officer (CEO) of H2GO Power. Enass describes herself as an activist. She is committed to tackling climate change through the use of hydrogen as an energy resource.

She is also working to solve the 'injustice' of power distribution across the world. In some countries there are many people who don't have access to electricity. Sometimes hospitals have to cancel operations because power is a luxury.

Despite the enormity of her cause, Enass is optimistic; "there is a solution to every problem" she says. She believes hydrogen is "the past, present and future" to the power and climate problem.

*"If there would be one thing I could change I would use more engineering to accelerate progress towards tackling climate change ... we are working at a slower pace than we should be."*

Enass Abo-Hamed



My superpower would be "the ability to convince anyone to give you the money you need"



[https://nustem.uk/inventive/#enas\\_manjot](https://nustem.uk/inventive/#enas_manjot)



## Manjot Chana Integration engineer

Manjot is an integration engineer. That means that he makes different machines work together. His knowledge of engineering needs to be broader, but shallower, than other engineers.

Manjot talks about being inspired towards engineering at an early age after watching Power Rangers. He loved to see how they would combine to make one large robot.

Manjot started engineering through a degree apprenticeship. It took him six years to complete his degree, but could earn money to help his family whilst working and studying.

In both his personal and professional life Manjot is driven by data; "the data never lies" is his motto.

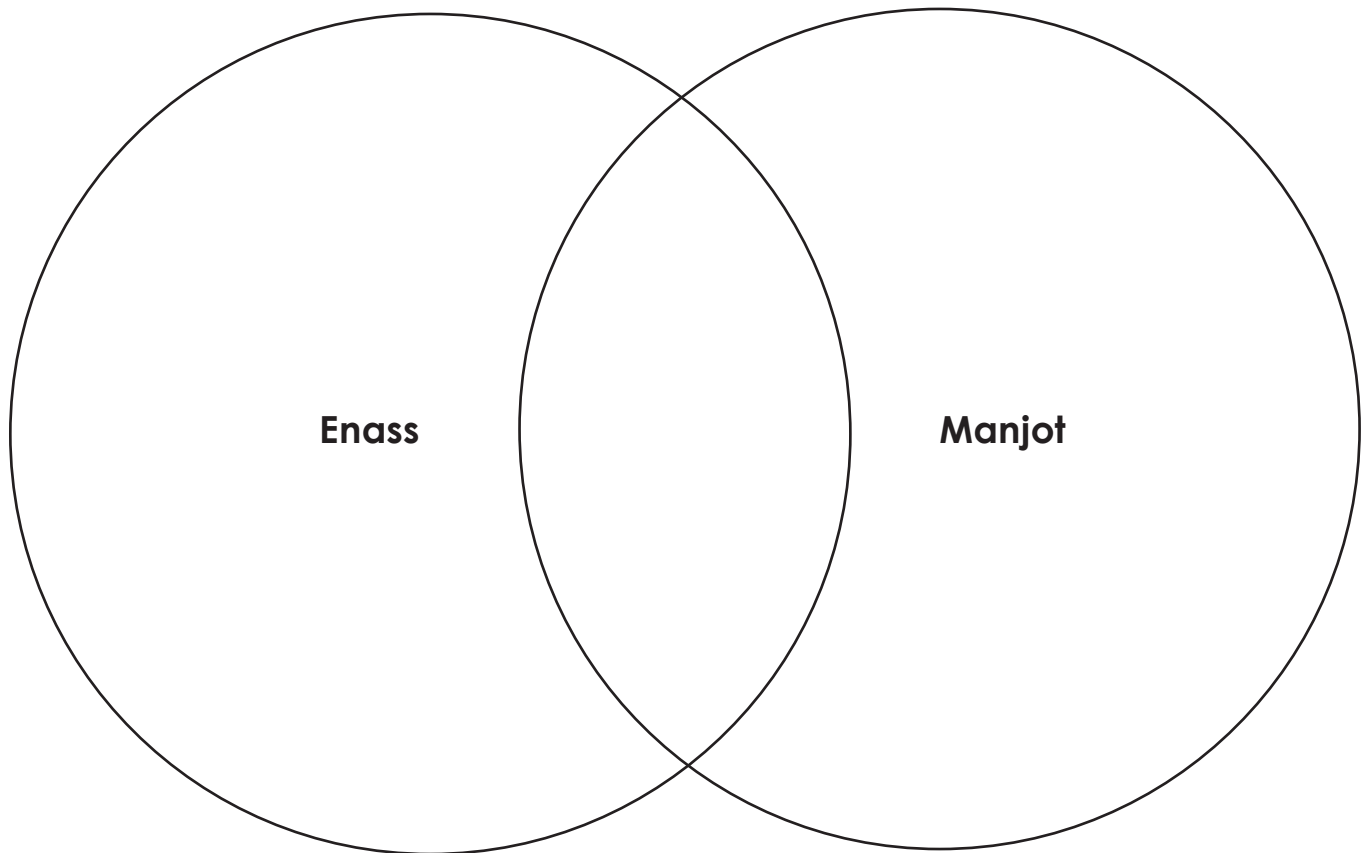
*I have always wanted to be able to read fast. That is the superpower I would like.*

Summarise the similarities and differences between Enass and Manjot.

# 1. Meet the engineers continued

## Enass and Manjot

Engineers come from a lot of different backgrounds, and have different interests. Some become engineers through studying for a degree, but others study an apprenticeship. Use information from the podcast and from the information sheet to compare and contrast the background and interests of the two engineers Enass and Manjot



# 1. Meet the engineers prompts

## Enass and Manjot

Your similarities and differences might have looked like this

|              |   |
|--------------|---|
| Similarities | <ul style="list-style-type: none"><li>• Engineers</li><li>• Working for (or own) H2GO</li><li>• committed to tackling climate change</li><li>• interested in solving problems</li><li>• Driven by a moral purpose to help people</li></ul>  |
| Differences  |   |
| Enass        | <ul style="list-style-type: none"><li>• Studied for a degree in Chemical engineering</li><li>• Set up her own company (entrepreneur)</li><li>• Parents were both engineers and taught her to think logically</li><li>• Concerned about injustice of electrical power distribution around the world</li><li>• Describes herself as an activist</li></ul> |
| Manjot       | <ul style="list-style-type: none"><li>• Family difficulties meant that he wanted to earn money whilst he studied</li><li>• Followed an apprenticeship route into engineering</li><li>• Worked for a car company, but wanted a more ethical career</li><li>• Interested and led by data personally and professionally</li></ul>                          |

### Data is Truth & Truth Data

When we read a story, we make inferences about the text.

Inference means to look at the evidence we have and make a prediction.

Look at the title of the story. We will make some predictions about the text based on the title.

Think about:

- What does the name suggest?
- What do we know about Enass and Manjot? How does this effect your first impressions about the story?
- What data might be included in the story?
- What questions do you have?
- What do you think the story is going to be about?



## Data is Truth & Truth Data

### George Sandifer-Smith

Five minutes from now – relative time – Nav is making sure the directions on the navigation system line up with the road signs. This is her fourth callout in two weeks **shadowing** Roscoe, and his expression matches the bruise by his eye. Nearing the end of her apprenticeship, Nav is getting a handle on where the clean hydrogen system lines up with the difficult bit of green energy: the people.

'If you like, I can drive us back,' says Nav.

Roscoe winces. 'It's fine. It only hurts a bit when I look to the right.' Nav knows Roscoe is brilliant – a year from now, she'll **graduate** from her apprenticeship fully and it'll be thanks to him. He's an old hand at this – a former engineer at a car factory, dating back to a time when most of the cars on the road ran on **fossil fuels**. Even though he's moved over to green energy, he still loves cars. Not in a sporty way, she thinks. It's the feel of the drive – the notion that a foot on a pedal activates a series of electrical signals that keep the car in motion and control its speed. Nav likes Roscoe because she feels the same. There's a beauty to every part of it – even the window-wipers.

There's a sharp turn-off, and they're at the Franklin Business Park. The owner, Mr. Franklin, is already waiting, his eyes fixed on his app tracking their van. Franklin is clearly older than Roscoe. Nav can see it, not just in the grey of Franklin's hair, but the shortness of his sleeves and the tightness of his shirt. He's clearly going to retire soon – no need to buy a new work shirt when you can wear the old one for one last year. Nav wonders when she'll retire. She can't imagine ever wanting to give this up. 'You can jump out and do the introductions,' says Roscoe. 'I'll park up.'

Nav nods and gets out. Franklin looks her up and down, and returns to his screen. 'Mr. Franklin?'

This time he manages to put the screen to sleep, gives her a polite nod. 'That's me. You're early.'

'Traffic was good,' says Nav. 'I'm Nav, your **integration engineer**.'

Shadowing: observing someone working at a job to help understand the role better

Graduate: (verb) complete a degree or course of study;

Fossil fuels; Energy resources that were created millions of years ago i.e. oil, gas, coal

Integration engineer: an engineer who makes different parts of a system or machine work together.

### 3. Activity: Text analysis continued

'You mean repairman?' asks Franklin. He's had a lifetime of repairmen – electricians, plumbers, the whole park in need of some sort of repair work every day for the fourteen years he's owned the land and rented it out. The publisher needs someone to look at their printer. The boiler in Unit Nine needs draining, there's no pressure. Now, the trouble comes in these silver boxes on every unit.

'I suppose,' says Nav. 'Roscoe - he's my supervisor – will be out in a minute. Can I ask what happened, in your own words?'

'Like I said on the phone,' says Franklin. 'Four units all around the park, your Green Boxes – all smashed up. Totally stopped working, which means I've got buildings with people in not able to do business. No power at all.'

'No backup?' asks Nav, knowing what the response will be.

'We've got the old **generator**,' says Franklin. 'I thought it would start up. But it hasn't. Old is...too old.' He looks pointedly at her. 'Your people won't look at it.'

'I can give it a going-over,' says Nav, 'but I'm not qualified to do any repair work. Neither's Roscoe. We're contracted for the Hydrogen Splitters in the Green Boxes, that's it.'

'Green Boxes,' mutters Franklin, rolling his eyes without shame. Like he'd rehearsed it. 'All well and good until they blow themselves up. Then where's the real power? We used to process it, mine it. Made an economy and a power supply run on it.'

'They didn't just blow up though, did they?' says Roscoe, joining them. 'You said on the phone. They've been damaged.'

'Kids,' says Franklin, already frowning at the bruise by Roscoe's eye. 'They muck around, ride the bikes around the buildings. Last year they started a fire in the garden area, but this is the first time they've broken anything.' In truth, Franklin hasn't seen the kids in about three weeks. He told them to go away and threatened to call the police when they didn't, and that seems to have done the job. But then, who else would be smashing the Green Boxes, if not them?

'Do you know it was the kids?' asks Nav.

'Leave it,' says Roscoe.

Generator: Machine which can be used to make electricity.

## 4. Activity: Text analysis continued

'Who else could it be?' says Franklin. He starts walking them towards one of the buildings, and maybe away from the conversation.

'Last week we got a call out to another one of these damaged boxes,' says Nav. 'Outside a school, powering the gym. When we got there, we decided-'

'Nav, mate, leave it,' says Roscoe, interrupting her. Roscoe knows when Nav is about to say something that'll land them both in trouble. He knows this because they're too similar, and because the last time he went rushing in to argue with a **cynic**, well...black eye. It shouldn't be dangerous work, but there are times when people are just ignorant. He's watched that stain spread since he was a teenager, deferring a university placement during the Coronavirus pandemic. Safety must be maintained.

'No,' says Nav. She pointedly marches a little ahead of Franklin. 'We decided, after taking a look at the box, to go to the next one on the route – they're sequenced for routine repairs to follow a map. The next one, up the road at a garage, was being smashed by some idiots with a cricket bat.'

'Kids from the school?' asks Franklin.

'Well, no,' says Nav. 'Adults. Actual adults. We told them to stop. Roscoe-'

'That's the bruise, Mr Franklin,' says Roscoe, pointing to the smear of burst vessels by his eye. 'That's how I got it.'

'So, what? These people were going from box to box smashing them?' says Franklin.

'Because of that stupid thing with the tracking system,' says Nav.

'To be fair,' says Franklin, 'I've done a lot of research into that. Had to when these bloody Green Boxes were forced onto my business.' They reach the first damaged Green Box. In spite of its name, the Box itself is silver, sleek with a slit across its midsection. Or it would be had it not had its outer casing **crowbarred** open. It's innards no longer glowed – the energy shut off immediately when damage was sustained – although shorted circuits had left ugly scorch marks around the inside of the machinery.

Cynic: someone who believes that other people are motivated by self-interest

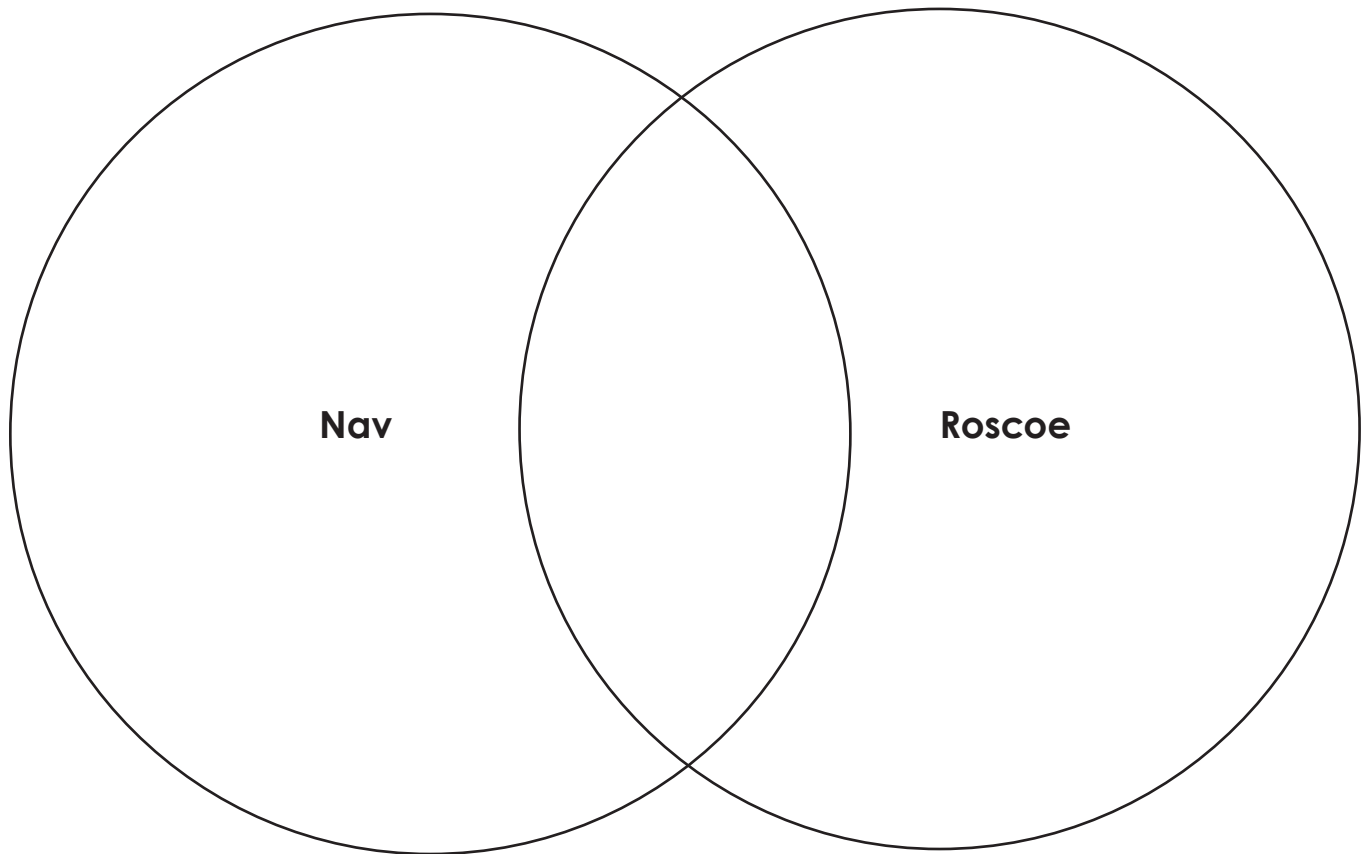
Crowbarred: using a crowbar to open something



## 4. Activity: Text analysis continued

### Data is Truth & Truth data

You've now read the opening of the story. It sets the scene and indicates what is to come. Complete a venn diagram to compare the two main protagonists: Nav and Roscoe.



The story was inspired by the work of the engineers Enass and Manjot.

Identify how the author has used the work of these two engineers to shape the context and characters introduced in the story.

Use evidence from the story to support your answer.

### Data is Truth & Truth Data

*The story continues...*

'What did your research tell you, Mr Franklin?' asks Nav. 'I hope nothing to do with some deep-level organisation tracking your every movement?'

Franklin puffs air out of his cheeks. He's either feeling caught out or is just **exasperated**. 'Well, there has to be something to it, right? Why have all the boxes networking to each other?'

'Because we use them like a circuit to measure one another,' says Nav, ignoring Roscoe's look. 'They talk to each other, making it easier for us to talk to them and determine whether or not they're working to an **optimal** level.'

'I read that information is getting relayed though,' says Franklin. 'There was this policy with the last government, what, fifteen years ago? Reduce carbon **emissions**. Fine. I can get behind that. I don't have to believe everything I read about it, but the planet's getting hotter. Not much need to fly to Spain anymore. But then they bring in this **mandatory** thing, barring a few exceptions – the Green Boxes. Hydrogen-based power for homes and businesses of every size.' He pauses, willing a response from Nav.

'But that's good, isn't it?' says Nav. 'They're diverting the economic saving they're making to research climate change reversal. It's slow, but ecosystems are being rebuilt. A big part of that is the application of these.' She taps the Box. The outer casing falls to the ground with a soft thud. 'Doesn't look so elegant all battered like this, but the power of this thing has changed the whole world.'

Franklin shrugs. 'Maybe to engineers like you. The birds still sing the same to me. The kettle doesn't sound any different when it boils. The internet speed is still rubbish.'

Exasperated: to be irritated or angry

Optimal: best, most appropriate

Emissions: producing and releasing something, often gases

Mandatory: required by law

## 5. Exploring context: Climate change continued

### What is climate change?

'There was this policy with the last government, what, fifteen years ago? Reduce carbon emissions. Fine. I can get behind that. I don't have to believe everything I read about it, but the planet's getting hotter. Not much need to fly to Spain anymore.'

*Franklin*

Climate change means that there is a long-term change in the typical weather patterns on Earth. This can include changes to the maximum or minimum temperatures in different areas on the planet.

Some changes to the climate may be caused by natural events - for example cooler temperatures are measured after major volcanic explosions or asteroid impacts.

However, since the 1800's human activities have been the main cause of climate change. The development of industry has meant that more and more fossil fuels have been burnt. This releases carbon dioxide and other gases into the atmosphere. The gases help to trap the sun's heat causing temperatures on Earth to rise. These are known as greenhouse gases.

#### Fossil fuels and carbon

Carbon is found in all living things; including plants and animals. In the past, when these things die they are squashed down underground; this created fossil fuels. When fossil fuels are burned they release carbon dioxide (CO<sub>2</sub>). Carbon dioxide stays in the atmosphere and causes warming of the planet.

#### Why is this a problem?

As the average temperature on Earth increases the patterns of weather that humanity has been used to are changing.

The temperatures at the poles are rising more than the temperatures in other areas. Glaciers in the polar regions are melting and this will lead to sea level rises. Increasing sea levels will lead to areas of land near coastlines being flooded and uninhabitable.

The warming seas are also becoming more acidic, destroying ocean habitats such as coral reefs.

The change in average temperature is also leading to more extreme weather events.

## 5. Exploring context: Climate change continued

### What is climate change?

#### What is the solution?

There is no single solution to climate change. There needs to be national and international policy changes to significantly reduce the amount of fossil fuels removed from the ground and burnt.

Net Carbon Zero means that overall any carbon released into the atmosphere is balanced by an equivalent amount removed from the atmosphere.

Many countries have pledged to reach 'Net Carbon Zero' by 2050. They, and their citizens, will need to make big changes to reach this figure. Each year there is a COP conference where countries discuss the changes they need to make, and agree to them.

A lot of companies have also said that they will aim to reach Net Zero as well.

#### Examples of national policies to tackle climate change:

- Invest in renewable energy such as wind turbines, solar panels, and storage technology such as batteries or hydrogen (like Enass and Manjot are working on).
- Legislate to improve energy efficiency in industry and buildings e.g. increase standards of insulation for house building, use of triple glazing in industrial buildings
- Improve public transport to reduce the need for cars

#### What can individuals do to tackle climate change?

- Make sure houses are well insulated and reduce the amount of electricity and gas used e.g. by turning the thermostat on their heating down.
- Use more public transport and walking/cycling for travel
- Reduce the amount of meat they eat
- Support organisations that are working to change local and national government practices

### Task:

1. Look back at Franklin's statement. What does he mean by "No need to fly to Spain anymore"?
2. Find out what your local council is doing to tackle climate change. Write a paragraph summarising their plans.



## 6. Activity: Research task

### Climate Change Activists

In the interview with Enass Abo-Hamed she describes herself as an 'activist'. She feels that it is important to talk about the problem so that people are aware whilst engineers are working on a solution.

An **activist** is a person who campaigns to bring about political or social change. Around the world there are many young people who are working towards climate justice.



Image: Paul Wamali Ssegujja CC-SA 4.0

**Vanessa Nakata**  
**Uganda**



Image: Stefan Muller CC-A2.0

**Greta Thunberg**  
**Sweden**

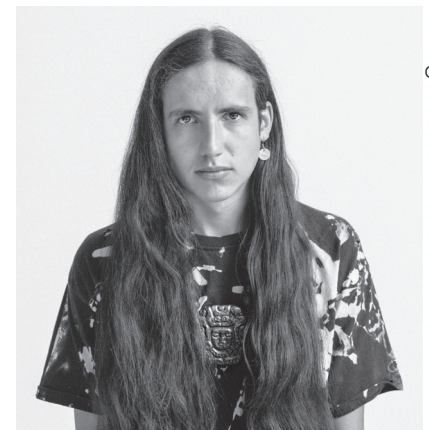


Image: Josue Rivas CC-SA 4.0

**Xiuhtezcatl Martinez**  
**USA**

#### Task:

Research the life and actions of a climate change activist and create a biography for them.

You could choose Vanessa Nakate, Greta Thunberg or Xiuhtezcatl Martinez, or someone else you know about. Remember to following the writing rules.

#### Biography Writing Rules

Different writing formats have different rules. Biographies have their own set of writing rules.

Things to check for:

- ✓ Have you written in the third person?
- ✓ Have you written in the past tense for events in the past?
- ✓ Have you included specific facts about achievements, influences and specific people?
- ✓ Have you opened with an attention-grabbing statement that summarises the main events?
- ✓ Are key events in chronological (date) order?
- ✓ Does your conclusion include what they are doing now or what they will be remembered for?
- ✓ Have you included adverbials such as accordingly, consequently, therefore, and hence?



# Data is Truth & Truth Data

## George Sandifer-Smith

*The story continues...*

'I'm just going to start the report,' says Roscoe, stepping between them with his tablet. He doesn't need to write anything on it – as soon as it catches sight of the Box's shattered innards, it immediately starts taking photographs, generating 3D models to **ascertain** the most efficient solutions to the breakages.

Ascertain: to find out, to make certain

Franklin peers over Roscoe's shoulder. 'Amazing what computers can do now.'

'That's engineering,' says Nav. 'It's amazing what engineering can do now.'

'That's all automated though,' says Franklin. 'Your boss's little **widget** on his tablet does its magic and then you do the bit with the spanners.'

Widget: slang term for tool or app

'Do you know who wrote the code for the widget so it would understand all the physical tampering required though?' Roscoe doesn't look up from his tablet, but he does grin.

Nobody should be as old-school as Franklin seems to be – so this is a good opportunity to wipe the smug look off his face.

'Probably the Steve Jobs type who designed the tablet,' says Franklin.

Nav holds two thumbs up to herself. 'This person, right here. Integration engineer, remember? I keep everything elegant, like the hydrogen-splitting process itself.'

'So you know how to repair the Green Boxes?' asks Franklin. 'And you coded the software?'

Roscoe opens his bag of instruments, kneeling by the box. 'Going from physical to digital and back again is pretty normal in this profession,' he says, looking up at Franklin. 'I reckon it's what's giving people the willies. They know that on some level the software and the hardware are interlinked, and they're scared. That fear's making them violent.'

## 7. Activity: Textual analysis continued

'Roscoe's being kind,' says Nav. 'He's like that. Kind. The fact is, people should get over their fear. These people attacked Roscoe out of ignorance, right? They kept yelling that they knew the truth, but they don't have any data to support that. Just someone else's opinion that was yelled at them.'

'I read that there were all sorts of studies,' says Franklin, 'saying that all the info from the Boxes gets relayed to a private data farm-'

'Kept private by our company for customer data security,' says Nav. 'That's where it is, making private information more secure, not less.'

'Mr Franklin's entitled to his opinion,' says Roscoe. Soundlessly, he is **soldering** together damaged components.

'Exactly,' says Franklin, 'that's free speech, isn't it?'

'You believe that the Boxes are here to sell information about your power usage on? Really?' asks Nav.

'Not exactly,' says Franklin. 'Just that there's more to it than you or I know. I certainly wouldn't have voluntarily had these installed.'

'Take it from an insider, someone who's in on the secret world of Green Hydrogen energy,' says Nav, 'there's no **conspiracy**. It's like Roscoe repairing the Box here-'

'Which you should be observing,' mumbles Roscoe.

She ignores him. 'He took the data from the damage first. He then fitted it to the correct method in order to repair it. He's using the data to influence the knowledge, he's not letting a pre-conceived idea filter how he sees the data.' She holds up her wrist and folds back the sleeve of her shirt, revealing a thin silver watch. 'See this?'

'Smart watch,' says Franklin. 'Watched a lot of videos on those too.'

'But,' says Nav, 'I want the data from this. It's monitoring my heartrate, my sleep-cycles, how much exercise I get a day. I combine this with the data I journal about my life, how it balances with work every day, in order to tell me the truth about my life. When I have the truth, I can influence how I react. But not before. Think of it like this: data is truth. Truth...is data. It's that elegant.'

Soldering: A method of joining parts of electrical circuits together

Conspiracy: The idea that there are secret plans or hidden knowledge that are harmful

## 7. Activity: Textual analysis

An hour later, they're about to leave. The boxes should be back online by the end of the afternoon. 'You don't need to give every cynical customer the **philosophy** lesson.' Roscoe slams his door a little hard when he gets back in the van.

Nav is cycling through playlists on her smart watch. 'If you don't break it down for people, they'll join in with the mobs breaking these boxes. It's common courtesy – the planet is half-dead. If Franklin picks up on even twenty percent of what I argued, he might not go on believing that it's all some conspiracy to find out where he goes on holiday. **Critical thinking-**'

'Should know its place in a reasonable debate with another person,' finishes Roscoe.

'Half-dead planet,' says Nav. 'Let's leave it at that, yeah?'

They exit the business park and navigate the difficult turn-off in silence. When they get on the motorway, Roscoe speaks. 'You are right about the data though.'

'The figures close the loop,' says Nav. 'They decide the sensible course of action. It's where we come in – knowing that, and acting upon that knowledge.'

Roscoe laughs. 'Who's "we"? The integration engineers?'

'No,' says Nav. 'People. Humans.' The van makes a courtesy whirring noise, generated by electricity to warn pedestrians. They maneuver out of the park, to close more loops.

Philosophy: the study of the nature of reality, including ethics and understanding of right and wrong.

Critical thinking: careful analysis and evaluation of facts and evidence to form an opinion

## 7. Activity: Textual Analysis continued

### *Climate change and people*

The story Data is Truth & Truth Data by Sandifer-Smith is about how different people react to climate change.

#### **Task:**

1. Re-read the story and highlight phrases in the text that show:

- how governments have dealt with climate change
- how people have reacted to climate change or government measures.

2. *It has been said that:*

*“One of the biggest challenges to reducing the impact of climate change is changing the behaviour of people.”*

**Write about how Sandifer-Smith expresses this challenge through the conversations between Nav, Franklin and Roscoe.**

Use references to the text in your answer.

### Dystopian Fiction

Dystopian fiction often has three main aims:

- It criticises real aspects of current society and it acts as a warning to the reader about social and political structures.
- It teaches about the danger of technology
- It can tell the reader about the author's beliefs.

This story has some features of dystopian fiction. There are also lots of references to data and it being the truth.

'Roscoe's being kind,' says Nav. 'He's like that. Kind. The fact is, people should get over their fear. These people attacked Roscoe out of ignorance, right? They kept yelling that they knew the truth, but they don't have any data to support that. Just someone else's opinion that was yelled at them.'

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In the podcast interview Manjot Chana says that his mantra is "the data never lies". He explains that the data will tell the story if you listen to it.

Answer the following questions:

1. How do you think the author of 'Data is Truth & Truth Data' is influenced by Manjot's statement?
2. How do you think the title of the story rejects conspiracy theory?
3. Can you think of times in your life when you rely on data?