

Trainers Support



Algorithmic
Thinking

Algorithmic Thinking for Migrants Teachers Education

2021-1-EL01-KA210-ADU-000035033

LESSON #5

TITLE: ABSTRACTION



LESSON #5 – ABSTRACTION

LESSON REQUIREMENTS



GROUP: 15 TRAINEES



DURATION: 75 MIN



PROJECTOR, PCS, QUESTIONS SHEET



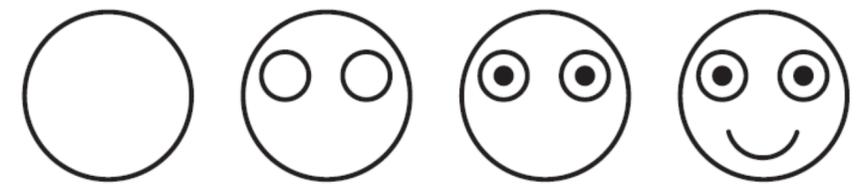
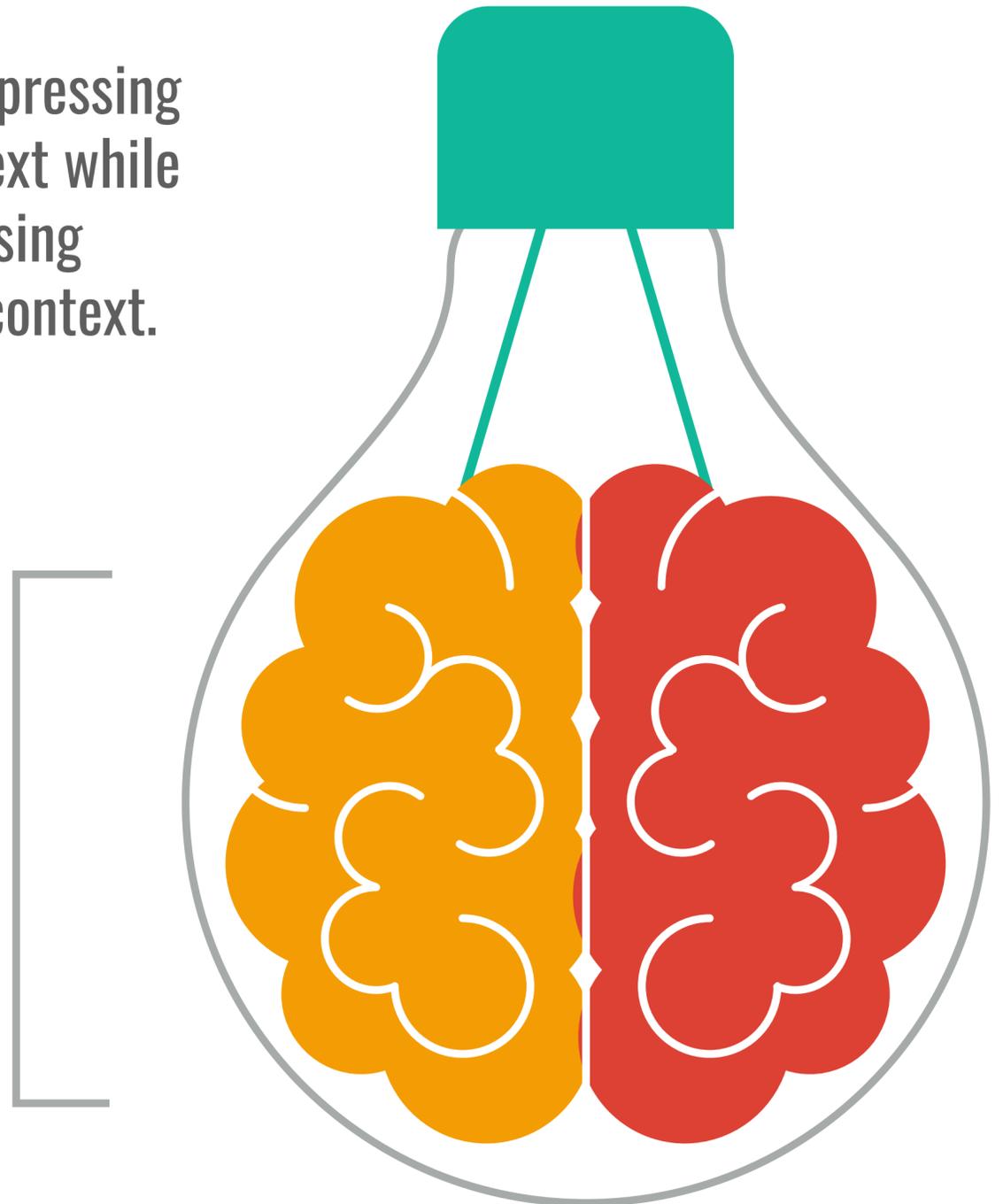
OBJECTIVES

- INTRODUCE THE CONCEPT OF ABSTRACTION AND EXPLAIN ITS IMPORTANCE.
- SHOW THE IMPORTANCE OF LAYERING ABSTRACTIONS.
- DISCUSS THE DANGERS AND LIMITATIONS OF ABSTRACTION.

LESSON #5 – ABSTRACTION

FROM GENERALIZATION TO ABSTRACTION

Abstraction: a way of expressing an idea in a specific context while at the same time suppressing details irrelevant in that context.



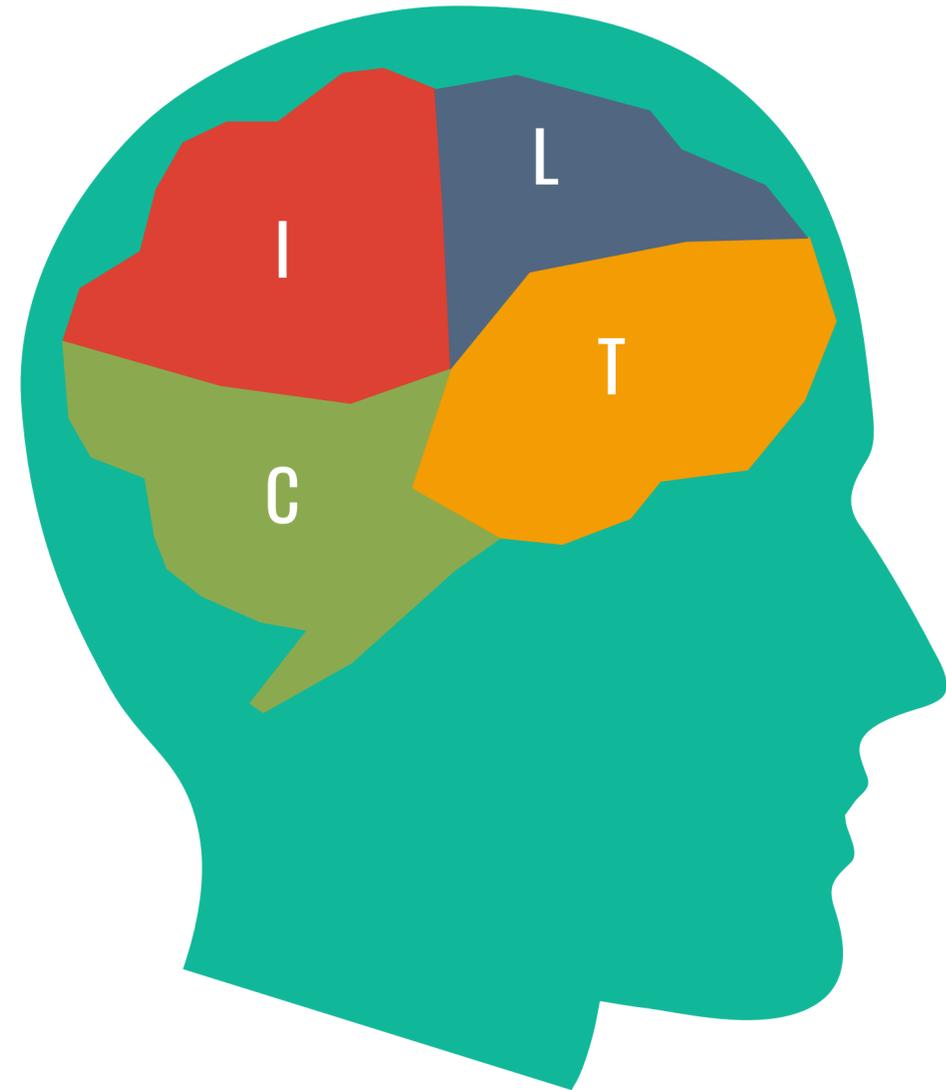
The resulting generic eye is an example of an **abstraction**.

LESSON #5 – ABSTRACTION

THE IMPORTANCE OF ABSTRACTIONS

Perhaps if we were hyper-intelligent superbeings with limitless mental capacity, we wouldn't need abstractions, and we could take into account every minute detail of our solutions. I hate to be the one to break it to you, but we're not superbeings; we're an intelligent species of ape with the ability to keep about seven or so pieces of information in working memory at any one time.

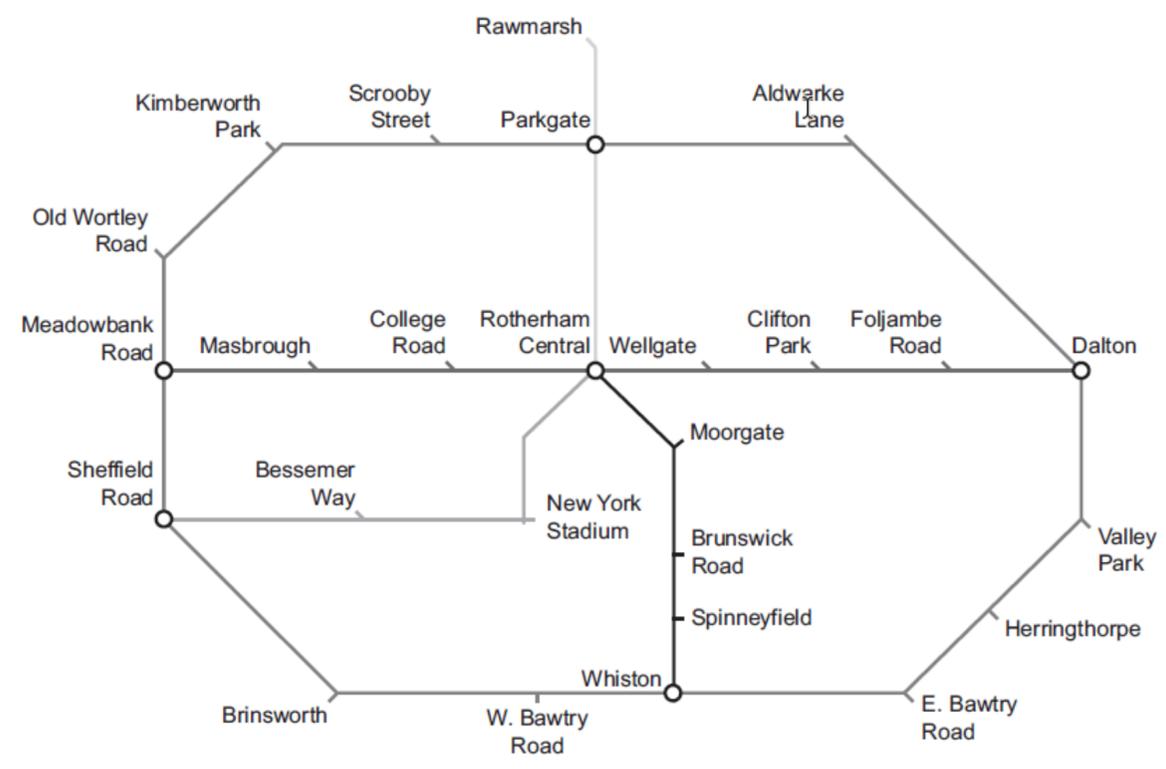
Consequently, we're stuck struggling to understand the world via our own models of it.



LESSON #5 – ABSTRACTION

EXAMPLES OF ABSTRACTIONS

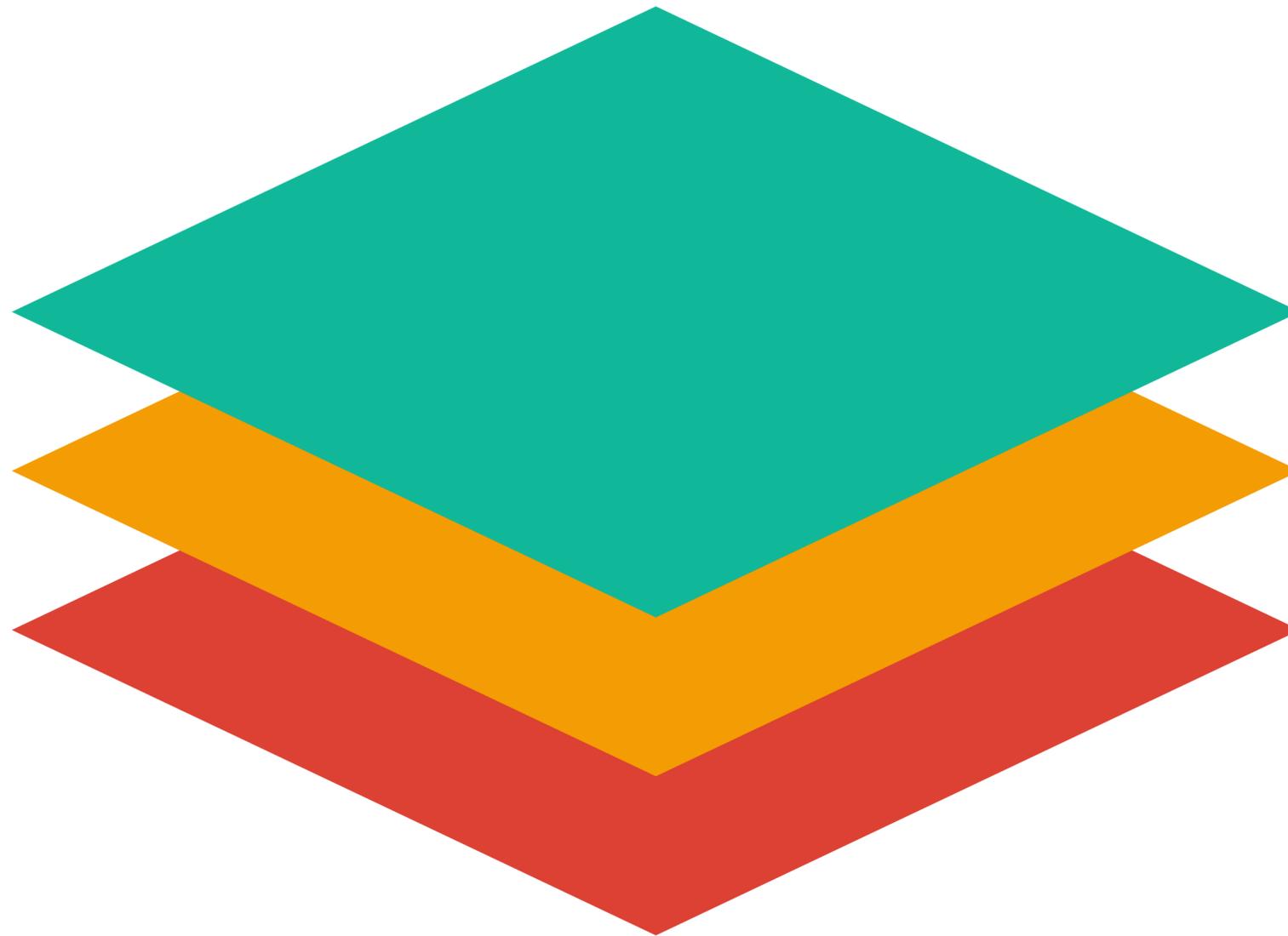
A metro map of the Rotherham underground and more realistic map of the Rotherham underground



- WHAT'S IMPORTANT IS:**
1. THE ORDERING OF THE STATIONS
 2. WHICH LINES THEY'RE ON AND
 3. WHERE THOSE LINES CONVERGE AS INTERCHANGES.

CONTEXT AND LAYERS

Consider this block:



LAYER ONE



LAYER TWO

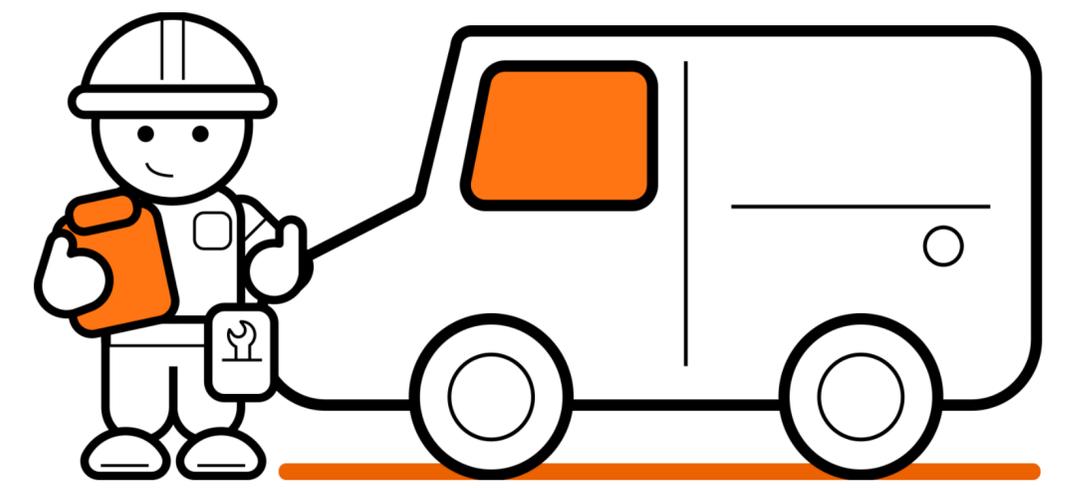
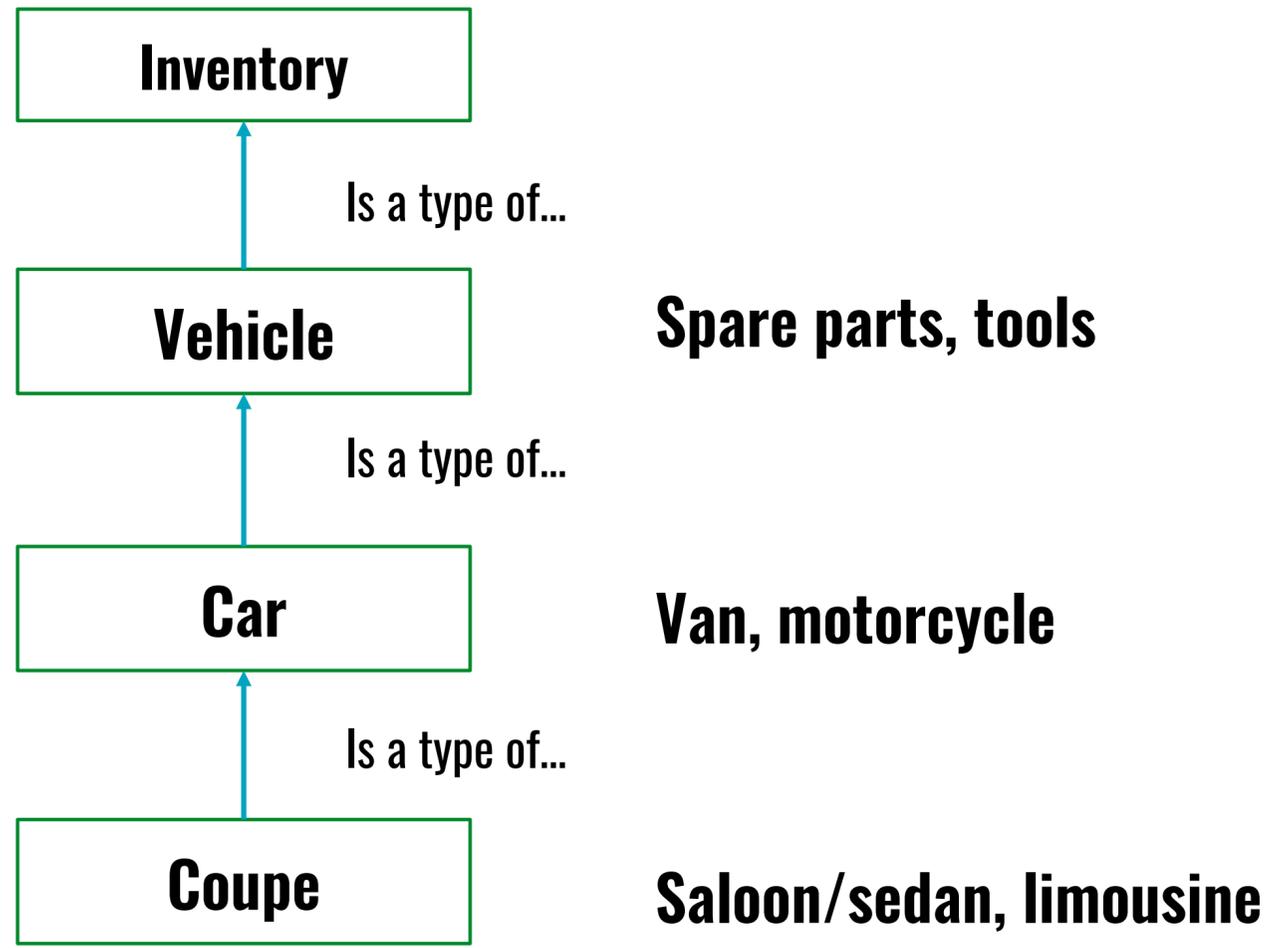


LAYER THREE

LESSON #5 – ABSTRACTION

CONTEXT AND LAYERS

Some layers of abstraction in the car rental company



LESSON #5 – ABSTRACTION

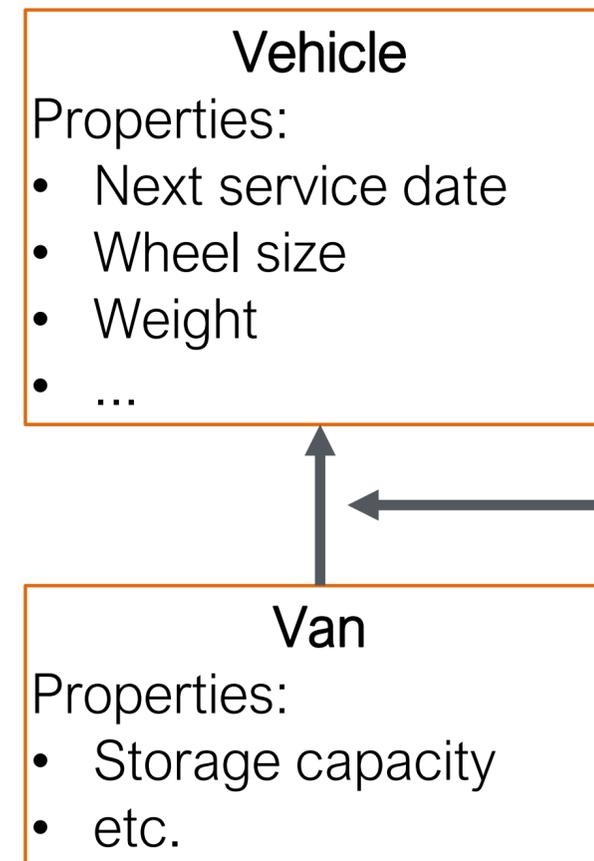
EXERCISING CAUTION

Abstractions undoubtedly help, but they should also come with a warning label.

Perhaps ‘Caution: Abstractions may distract from reality.’



Layers of abstraction including Vehicle and Van



A van has all the properties of a vehicle, plus its own properties.

LESSON #5 – ABSTRACTION

NETFLIX EXAMPLE

An online video service like **YouTube** or **Netflix** can recommend videos to a user because it has built an abstract model of them.

They know almost nothing about the viewer aside from their video-watching habits.

This means the video service has to reduce the customer to an abstract video-watching entity.



ACTIVITY #5.1

Trainer shares a sheet with two exercises.

Trainees, write down the answers for the next 25 minutes and at the end they all together discuss the results.

The discussion follows last 10 minutes.



CORE SKILLS DEVELOPED

- Introduce the concept of abstraction and explain its importance.
- Show the importance of layering abstractions.
- Discuss the dangers and limitations of abstraction.

TIMING

30 min

REQUIRED TOOLS

PC, projector, sheet

REFERENCES

PANE, J. F. ET AL. (2001) STUDYING THE LANGUAGE AND STRUCTURE IN NON-PROGRAMMER'S SOLUTIONS TO PROGRAMMING PROBLEMS. *INTERNATIONAL JOURNAL OF HUMAN-COMPUTER STUDIES*, 54 (2). 237.

BEECHER, KARL. 2017. COMPUTATIONAL THINKING: A BEGINNER'S GUIDE TO PROBLEM-SOLVING AND PROGRAMMING. SWINDON, ENGLAND: BCS: THE CHARTERED INSTITUTE FOR IT.