SOCIO-BEE
Community for Change

How to do the science loop?

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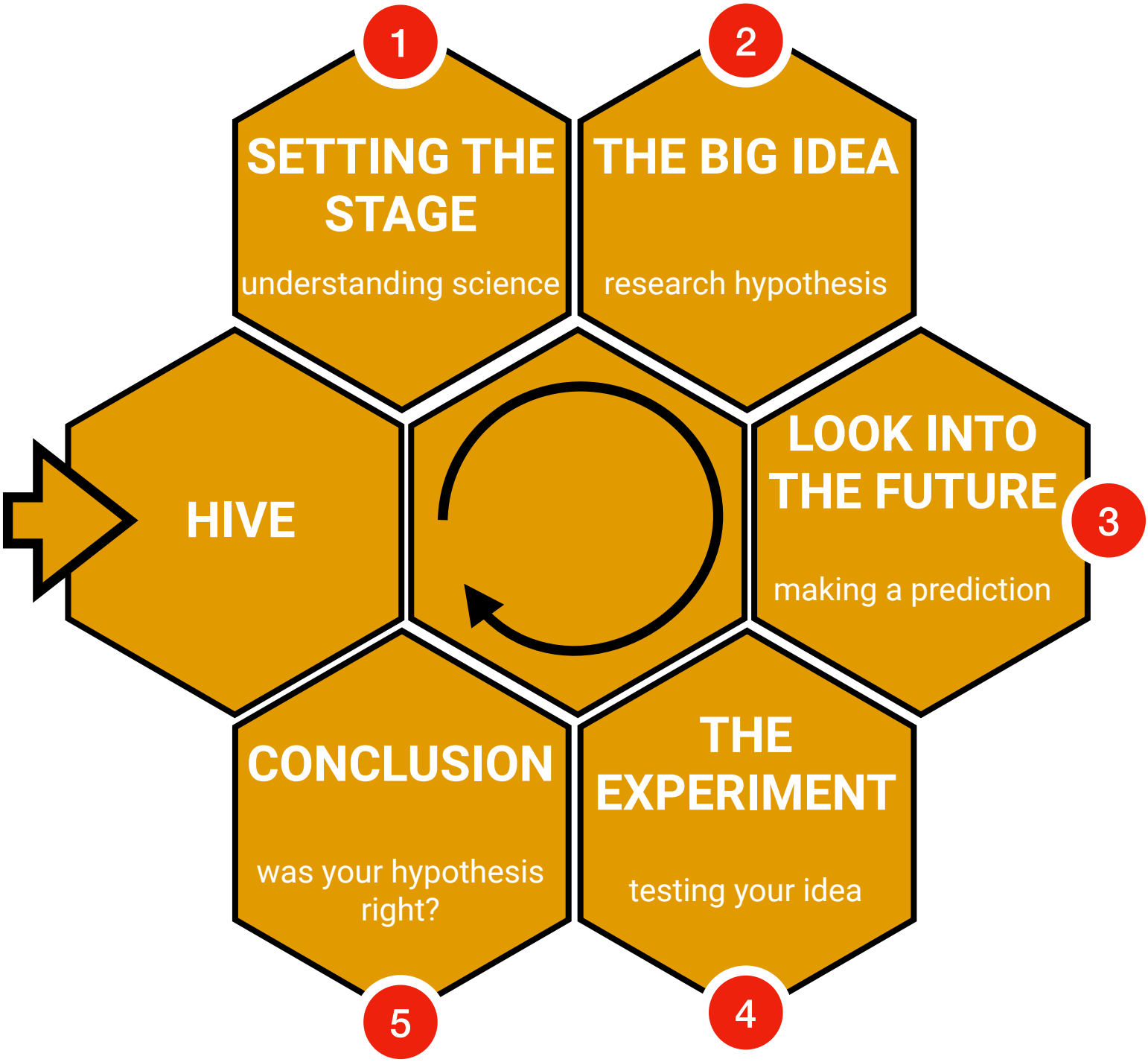
1. Setting the Stage: Understanding Science



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1. Setting the Stage: Understanding Science

You’re now part of a Hive. As a Hive, you’re a group of citizen scientists. But what do scientists do? Scientists conduct research to better understand the world around us. Let us explain how science works.

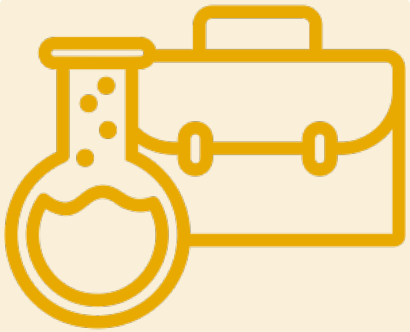
Scientists (and you) start by observing the world around us. In our case, this is about air pollution. We told you that air pollution is nasty, since it can often not be seen, or smelled. We need special sensors to measure it, finer than our own noses.

First, let's imagine you're a detective! But instead of solving mysteries about missing toys or secret codes, you solve science mysteries about the world around you. This kind of investigating is called "empirical research." It means we use real-life experiments and observations to find out things. In our Hive, we’re going to measure air quality as experiments and observations.

2. THE BIG IDEA
a research hypothesis

So, as a science detective, you start with a "research hypothesis." This is a smart guess about what you think will happen in your investigation. It's like saying, "I believe the secret of the mystery is this thing!"

Let's pretend you believe that cars and buses cause air pollution. Your research hypothesis is, “Air pollution is worse closer to a road than further away from a road”.



It's not just a random thought — it's a guess you can test by doing measurements!

Doing research is finding out if your hypothesis is correct (and you solved the mystery) or you need… a new hypothesis!

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Campaign HYPOTHESIS template

1	Queen Bee name:	
2	Date of Prediction:	
3	**Location of Measurement:**	
4	**Factors Affecting Air Quality:** [List out factors such as recent fires, construction activities, traffic congestion, industrial activities, etc.]	
5	**Our Hypothesis Statement is:** *[Frame your hypothesis in a clear and testable statement. For example: "Increased construction activity in our neighbourhood over the past month will result in higher pollution levels compared to the previous month."*	
6	**Expected Outcomes:** **If Hypothesis is True:** *[What do you expect to find if your hypothesis is accurate? E.g., "We will see an increase in pollution measurements compared to previous measurements."]*	
7	**If Hypothesis is False:** *[What might the data show if your hypothesis is not supported?]*	
8	**Potential Implications:** [If your hypothesis is true, what might this mean for the community, policy makers, or future research?]	

3. Looking into the Future: making a prediction

Now, a "prediction" is a bit different. This is when you get more specific about what you expect to see if your research hypothesis is true. It's like saying, "If my idea about the mystery is right, then we should find these clues."

Back to our pollution example, based on your hypothesis you make a prediction, like, “if I go to a road and take measurements of air pollution, the values should be higher than in a park away from the road”.

See, it's more specific!

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Campaign PREDICTION template

1	Queen Bee name:	
2	Date of Prediction:	
3	**Location of Measurement:**	
4	**Factors Affecting Air Quality:** [List out factors such as recent fires, construction activities, traffic congestion, industrial activities, etc.]	
5	**Our prediction is:** *Predictions often take an "if... then..." format. For example, based on the hypothesis, a prediction might be: "If we are nearer to the construction activities, the pollution will be higher than further away"*	
6	**Brief Justification:** [Provide a brief rationale for your prediction. Why do you expect this outcome?	
7	What do you think could be potential Sources of Error? • **Internal Factors:** [e.g., calibration of measuring instruments, participant's level of training, etc.] • **External Factors:** [e.g., sudden changes in weather, unexpected industrial discharge, etc.]	
8	6. Additional Notes/Comments: [Any other observations or notes you want to record related to this prediction.]	

4. The Experiment: Testing Your Ideas

Next, you'll do the experiment. In our project, we call this a campaign.

In a campaign, your Queen Bee will define an area in your city to do measurements.

Using the Socio-Bee app and the Socio-Bee sensor, you can now do an experiment! You login into the app, walk to the recommended measurement spot and take a measurement! The more measurements you do as a Hive, the better the results. This part of science is super important because it's like gathering the clues for your mystery and helping to solve it.

But this is really important. Science is very, very precise. Take some time to read the measurement manual! Your sensor is a scientific instrument. It’s very sensitive and it’s easy to confuse. So, getting a good measurement requires skill and patience.

5. Conclusion: Was Your Hypothesis Right?

After your Campaign is finished, you now have to look at all the results. {RED: insert reference to heat map later here}
Was the pollution higher near the road than in the park? If you see that result in your measurements, your prediction was right and it looks like your hypothesis was too! But if there's no difference or if the park was more polluted than near the road. then your prediction wasn't correct, and you might need a new hypothesis. And that's OK! Science detectives often have to try many different ideas before they can solve the mystery!

So, remember, your research hypothesis is your big idea or main guess about the science mystery, and your prediction is the specific clues you expect to find that will help you figure out if your big idea is right. And no matter what, you're learning and solving mysteries, which is what being a science detective is all about!