

How Cognitive Biases Affect the Preparation and Demonstration of a Safety Case

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Safety Case
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Smart

Honest

Halo effect

Caring

Patient



Cognitive biases are errors in thinking that affects the decision and judgements



Cognitive Biases

Overconfidence Bias

Overconfidence Bias

- The tendency people have to be more confident in their own abilities, than is objectively reasonable



Are you a safe driver?

Compared with the drivers you encounter on the road, are you above average, average, or below average?



82%





40%

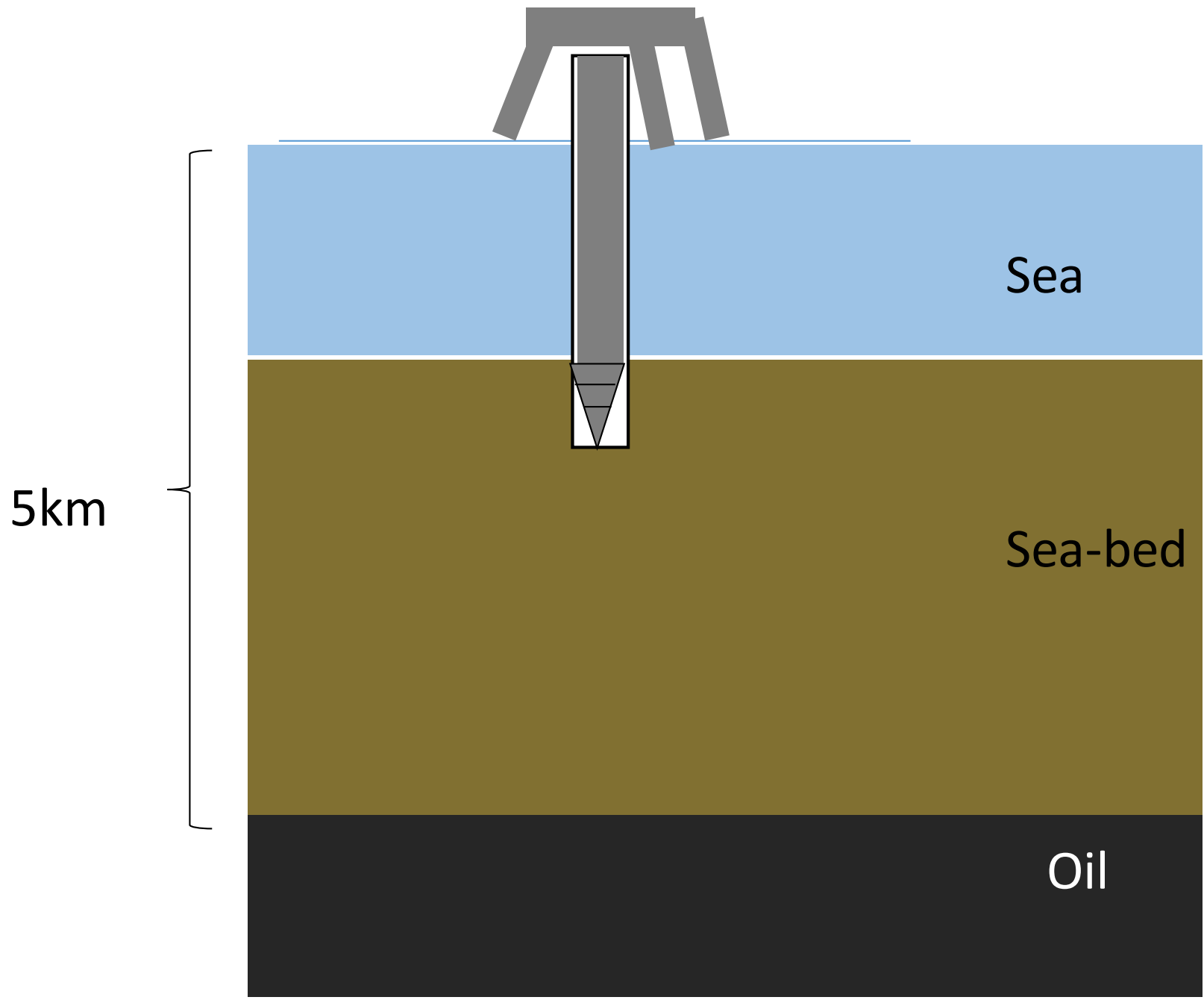
88%

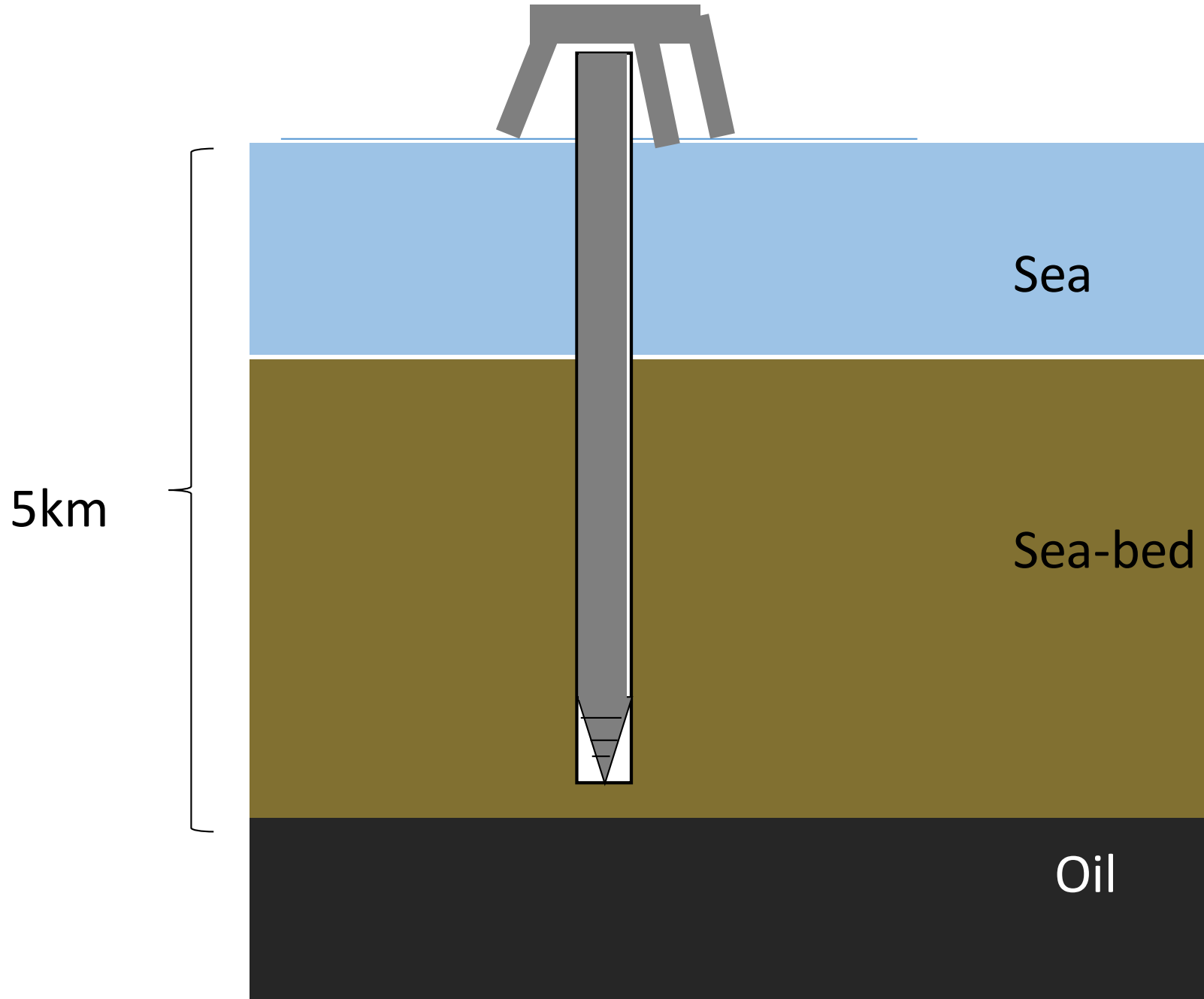


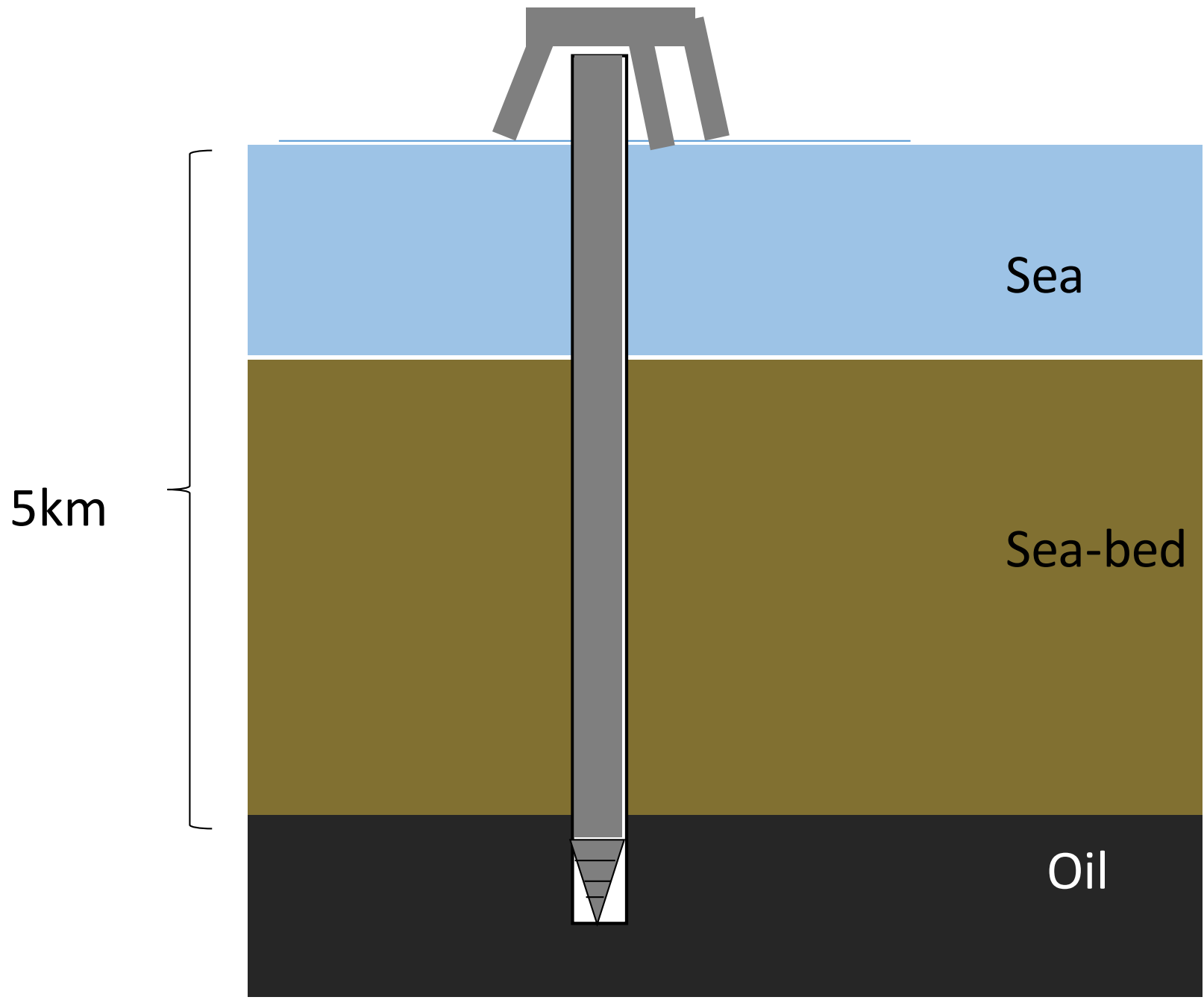


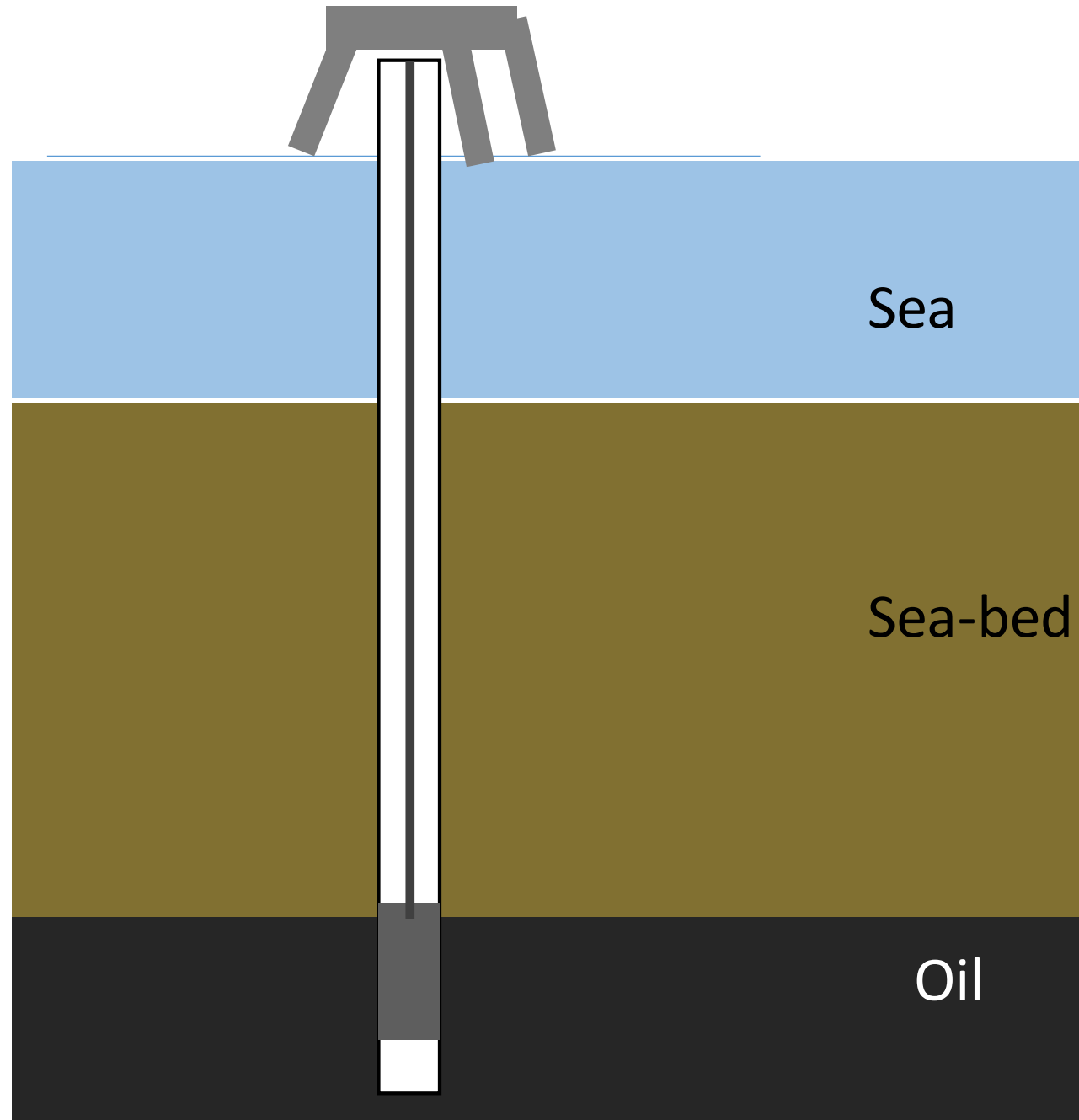
**Overconfidence
bias**

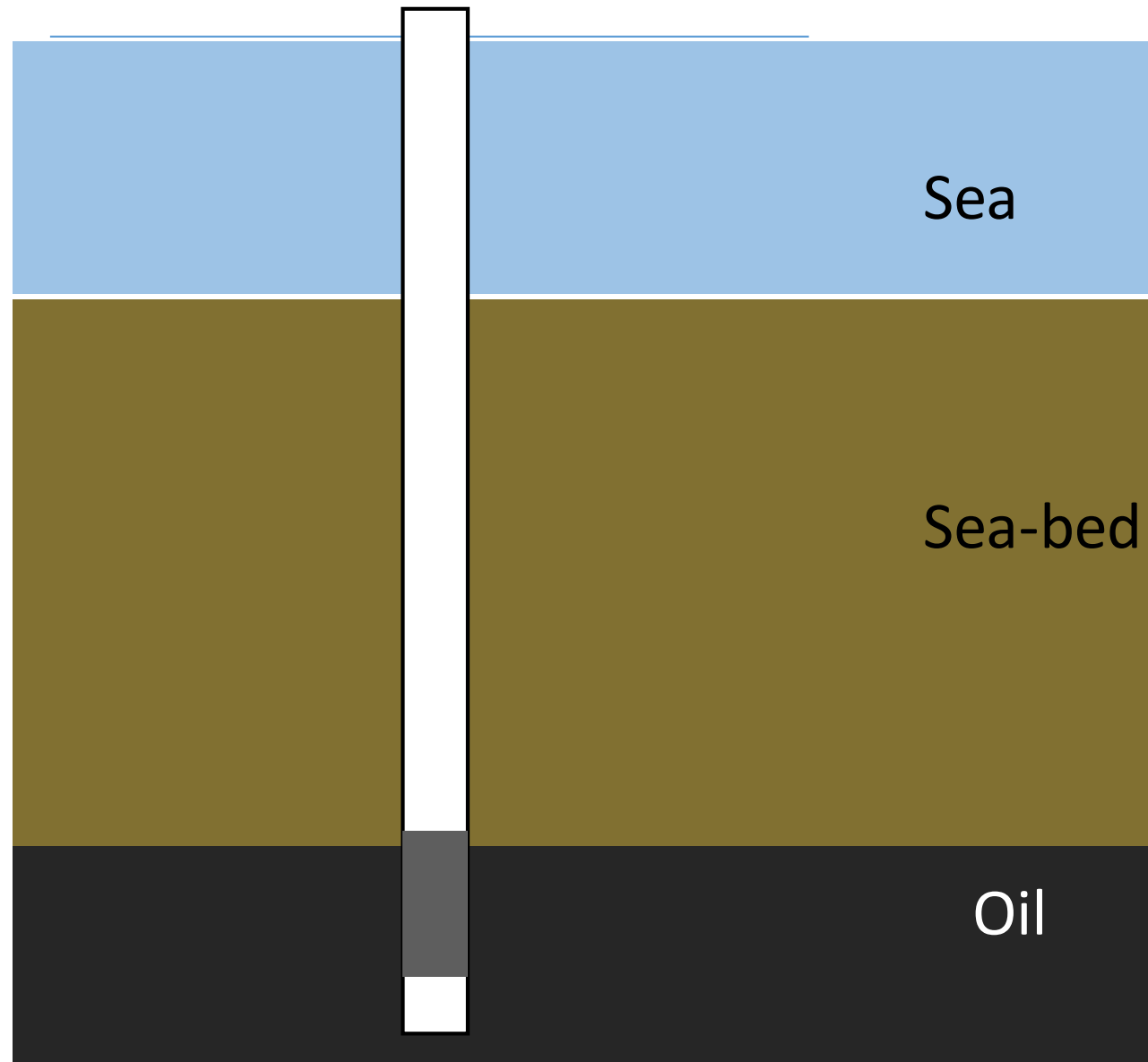


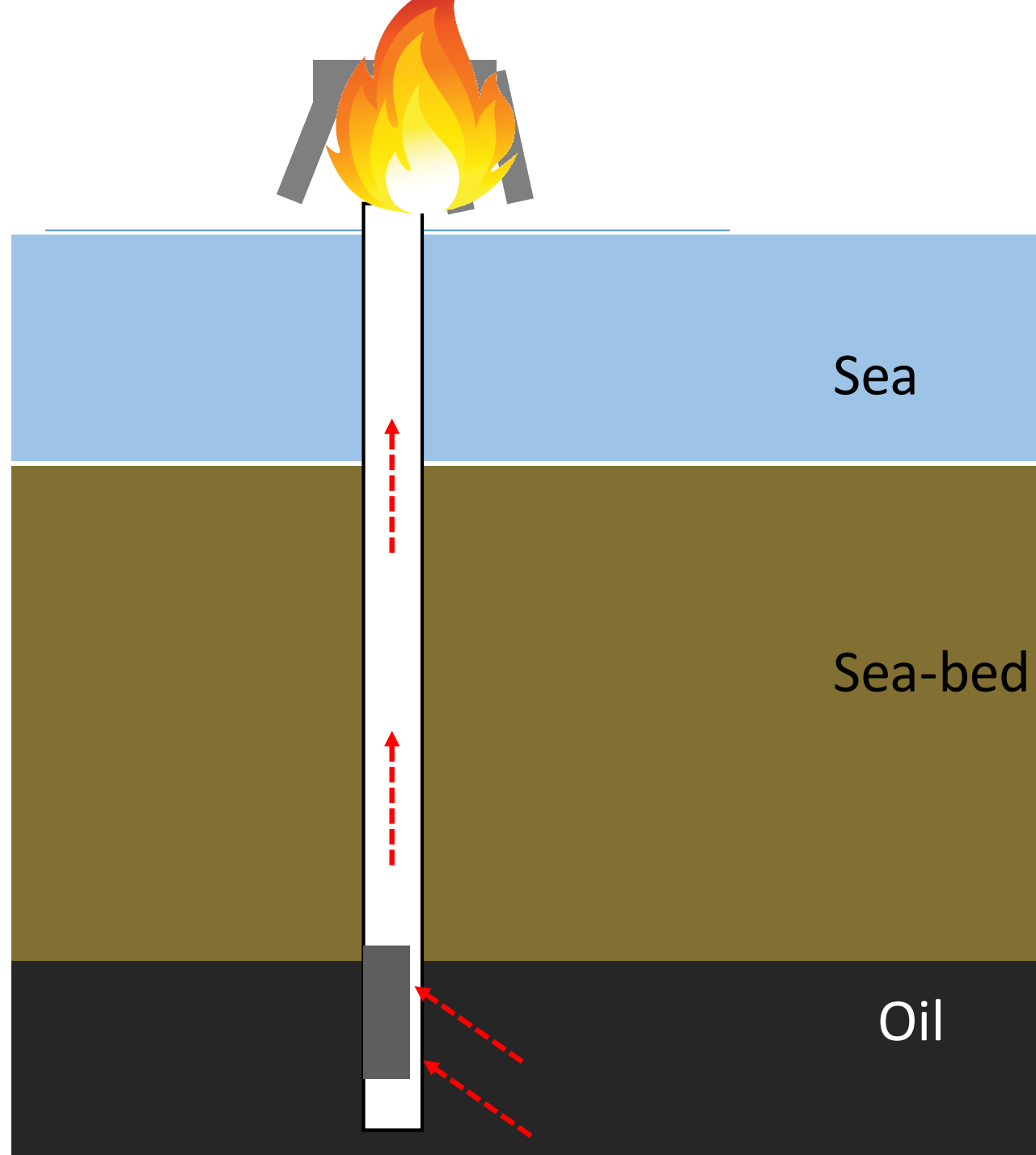




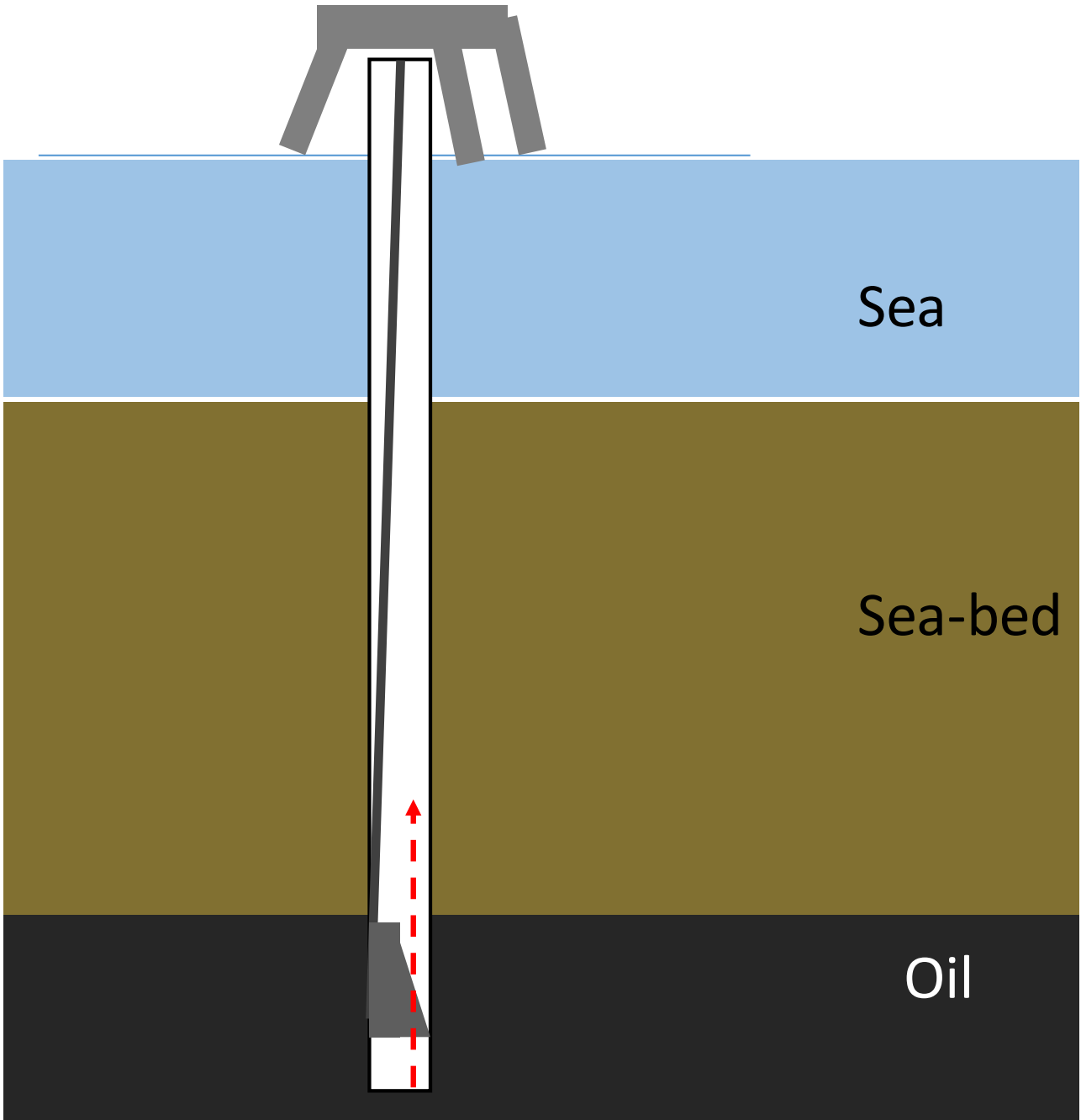


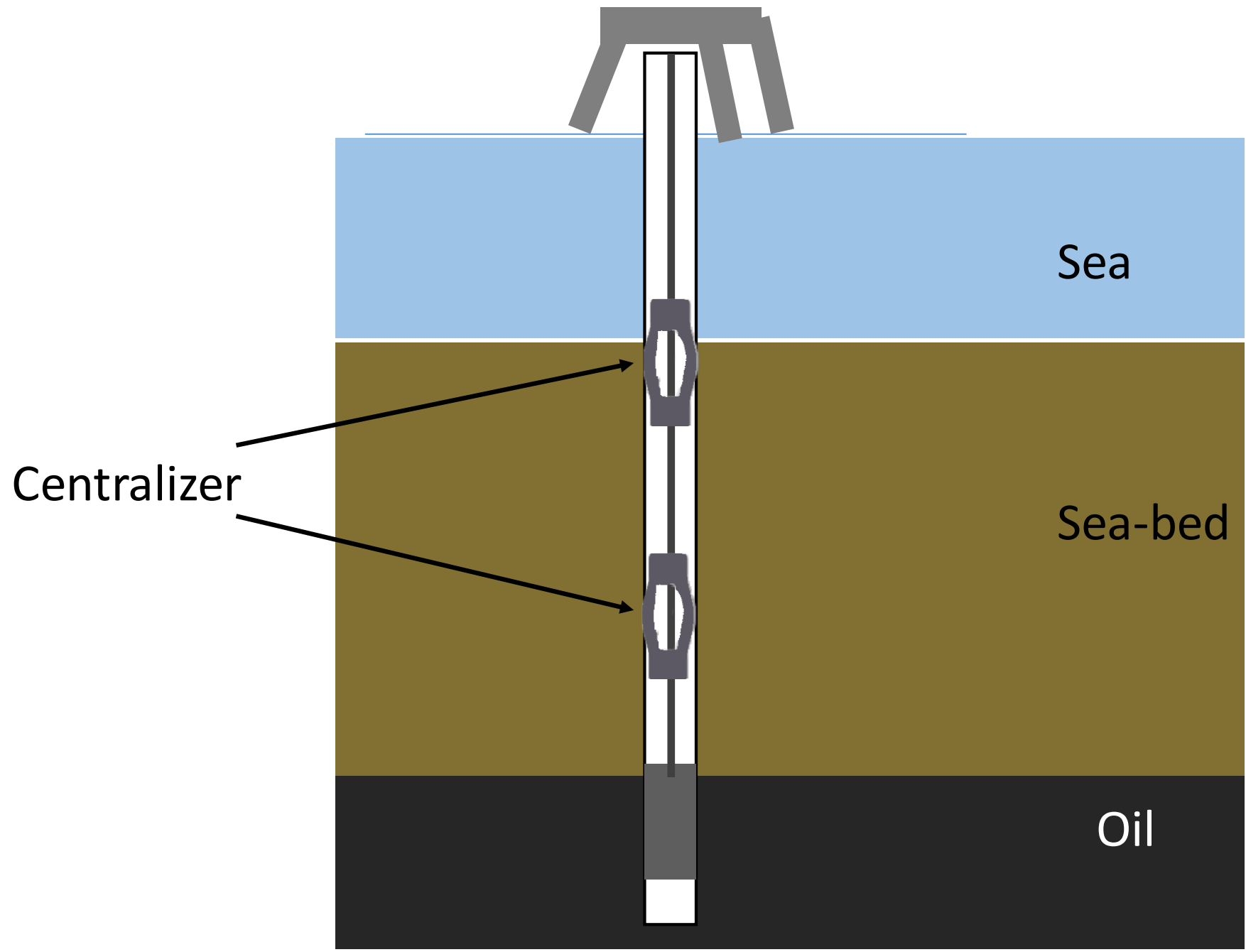






When carrying out cement job...






length	13293
	7
	6
height	14.5
volume	60
	0
	0


Number of centralizers used

6

 Advance Stage

Observations:

Severe risk of channeling

 Event Table

Number of
centralizers used

21

Low risk of
channeling

BP's drilling engineer:

- But who cares, it is done, end of story
- We will probably be fine, and we will get a good cement job
- John Guide is right on the risk/reward equation.



Overconfidence Bias

Right Technical
Expertise

Right Tools

Effect of Overconfidence Bias on Safety Case

We could be overlooking something.



Reality

Our Safety standards are OK. Just produce that document...



Reality



Chronic Unease

Healthy scepticism about what you see and do.



Reality

Our Safety standards are **Complacency** document for compliance purpose

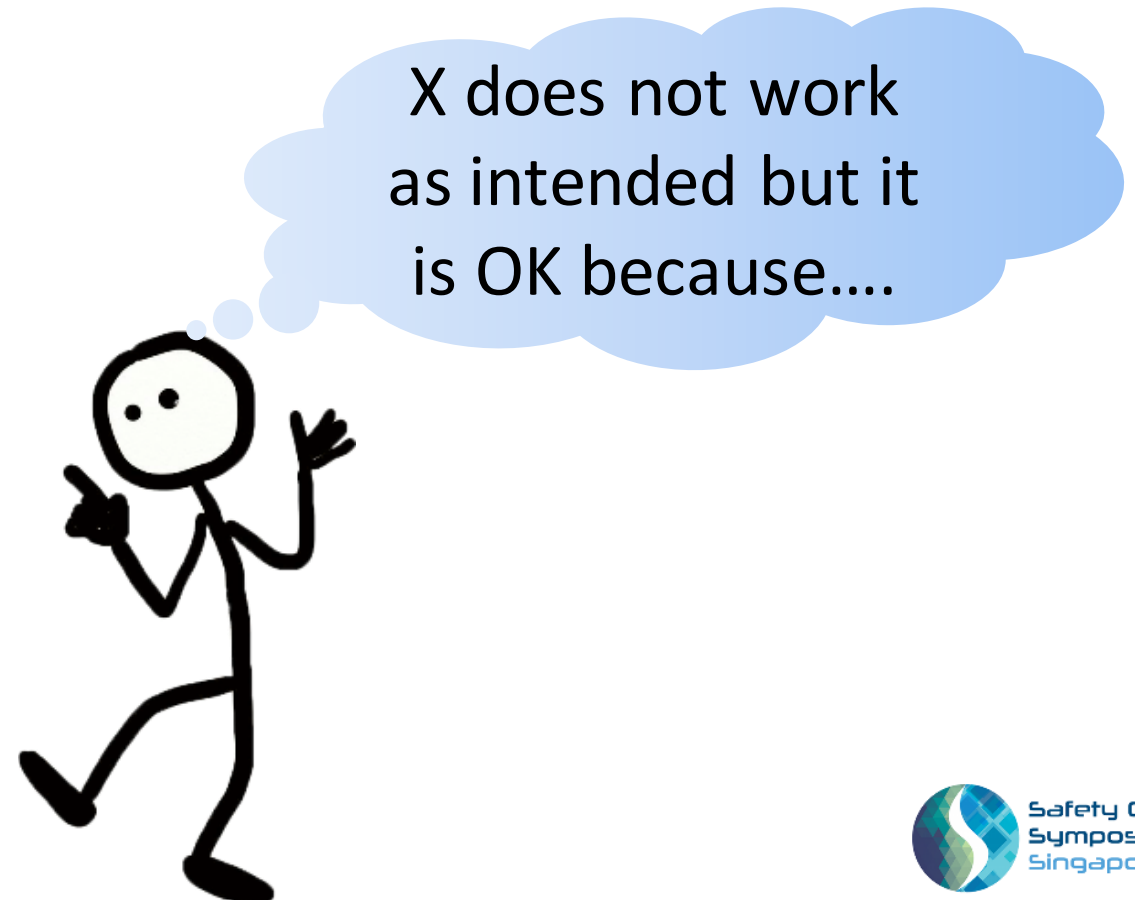


Reality

Confirmation Bias

Confirmation Bias

- Tendency to search for, interpret and recall information in a way that confirms one's pre-existing beliefs.



小紅樓海鮮

Red House

Seafood Restaurant since 1976



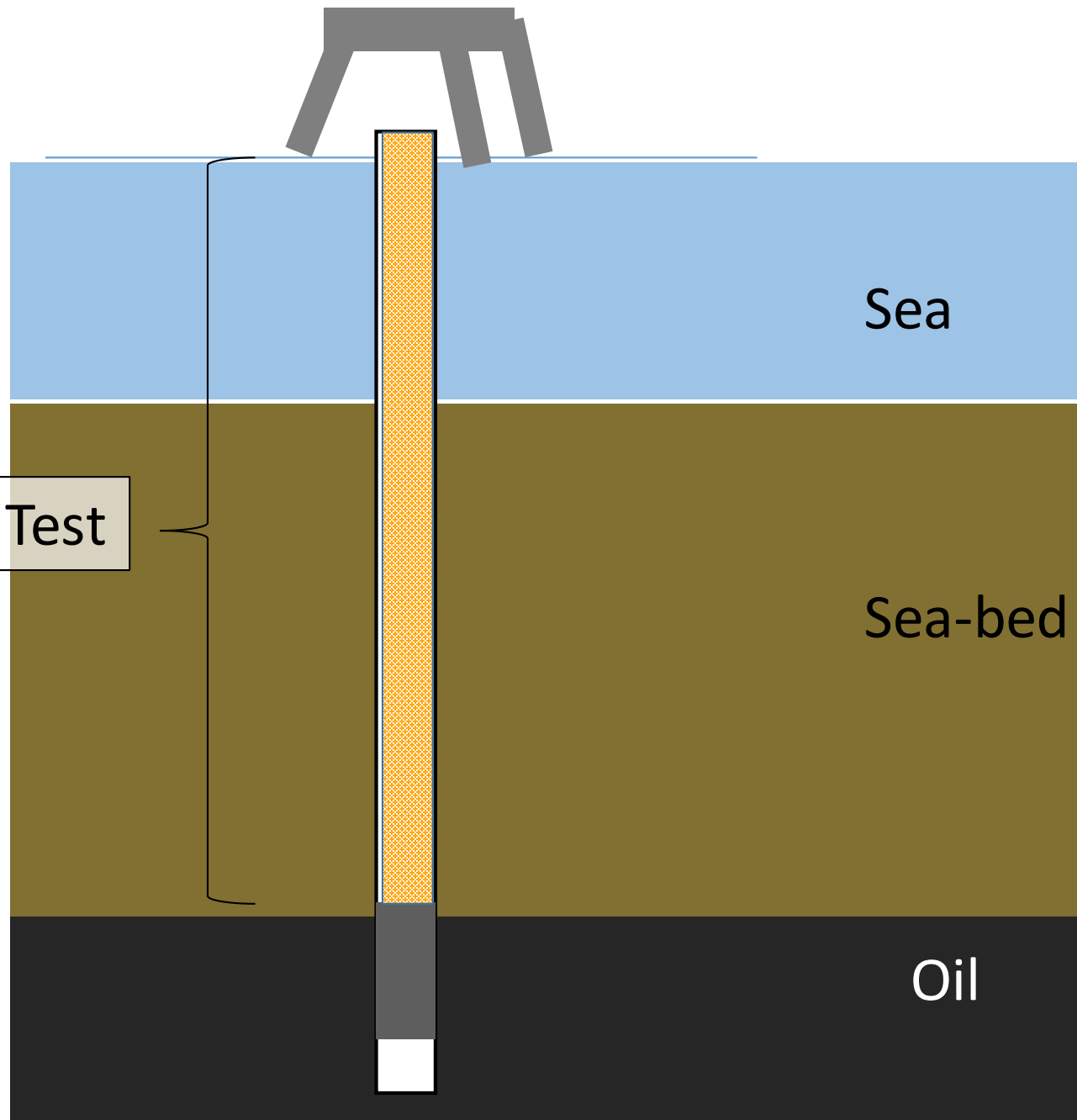
Evidences that do not support one's
view

Evidences that
support one's
view

Confirmation bias



Negative Pressure Test





Drill

1400 psi

Pressure
Flow
Speed

0	1	2	3
4	5	6	7
8	9	10	11
12	13	14	15

Mud Pump Series





Drill

1488 psi

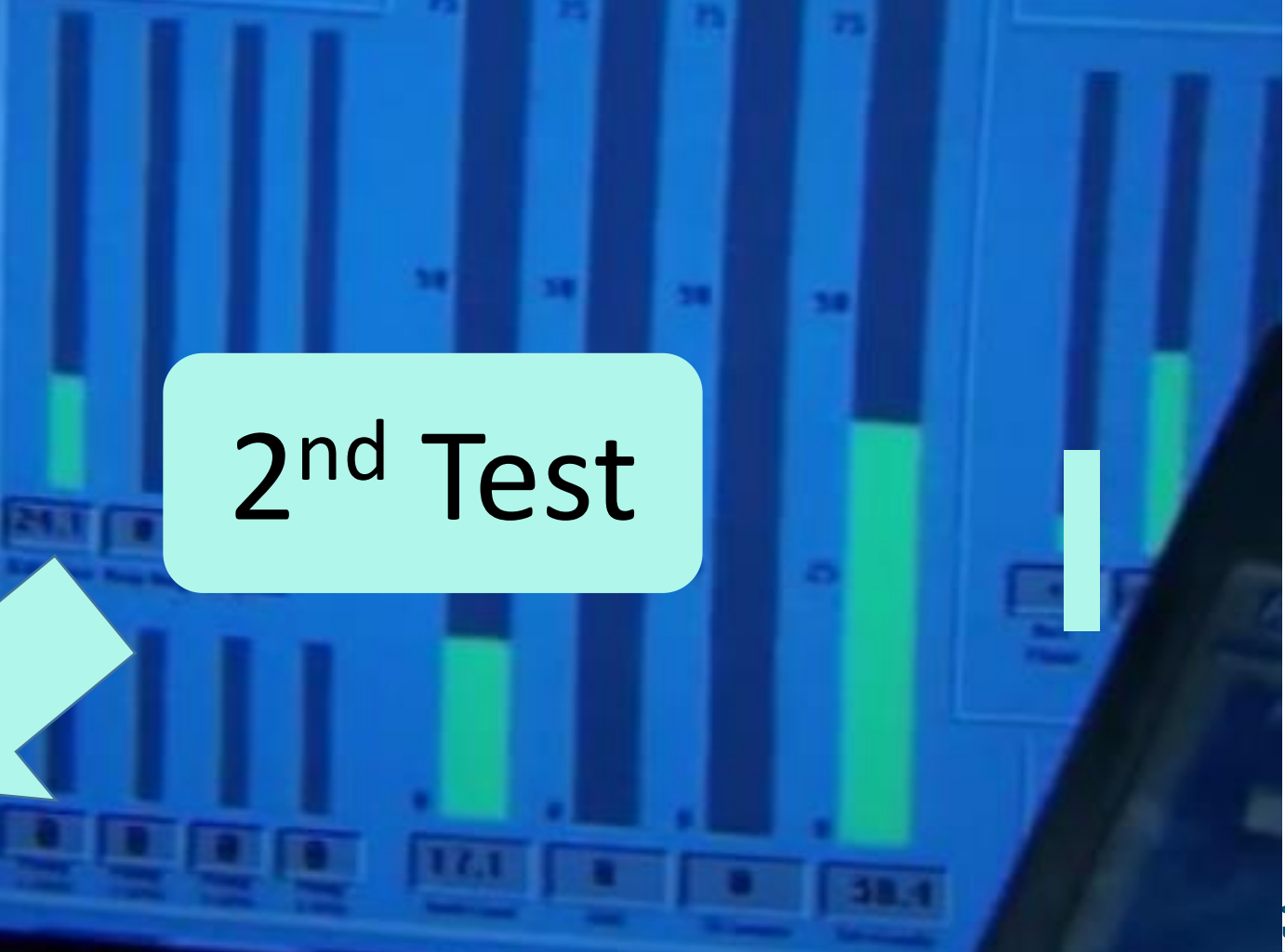


KIII

8 psi

Ign
Power
Speed

Head Pump Selection



2nd Test





A construction worker wearing a yellow hard hat, an orange t-shirt, and blue overalls is focused on cutting a wooden beam with a hand saw. He is wearing blue gloves and is positioned on a wooden structure against a clear blue sky. The image is overlaid with text boxes and a starburst graphic.

Confirmation Bias

Right Technical
Expertise

Right Tools

“Frequently we think of things as we want it to be, not as it is.”

“So if we want it to be Ok, we find everything we can to support that thinking.”

“They found an implausible explanation... to support their thinking, which is simple, logical and wrong.”

Professor Robert Bea
Human Dynamics Expert
“Seconds from Disaster”

Effects of Confirmation Bias on Safety Case

A dark, high-contrast photograph of a wooden floor. The floor is made of wide, dark wood planks with a visible grain. A bright, circular spotlight illuminates a central area of the floor, creating a strong contrast with the surrounding deep shadows. The text "We have high safety standards" is overlaid in white, sans-serif font in the center of the lit area.

We have high
safety standards

“Tick in the box” for
Permit to work

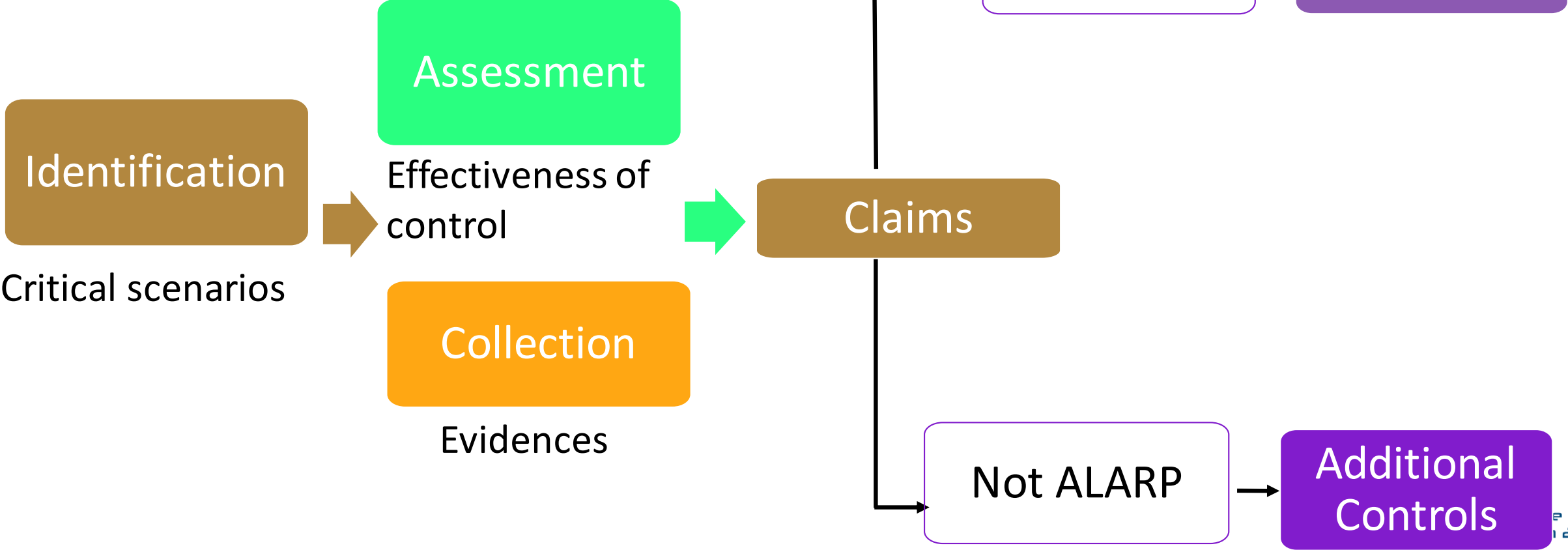
- Audit of SMS has revealed only minor findings
- Infrastructure has a high level of reliability
- Equipment used is state of the art

Uncertainties in
Reliability

Better and cheaper
alternatives available

Confirmation bias can look scientific

Flow of Safety Case





Mitigating effects of Cognitive Biases



Instill Chronic
Unease

Establish
Decision Process

Enhance
Awareness



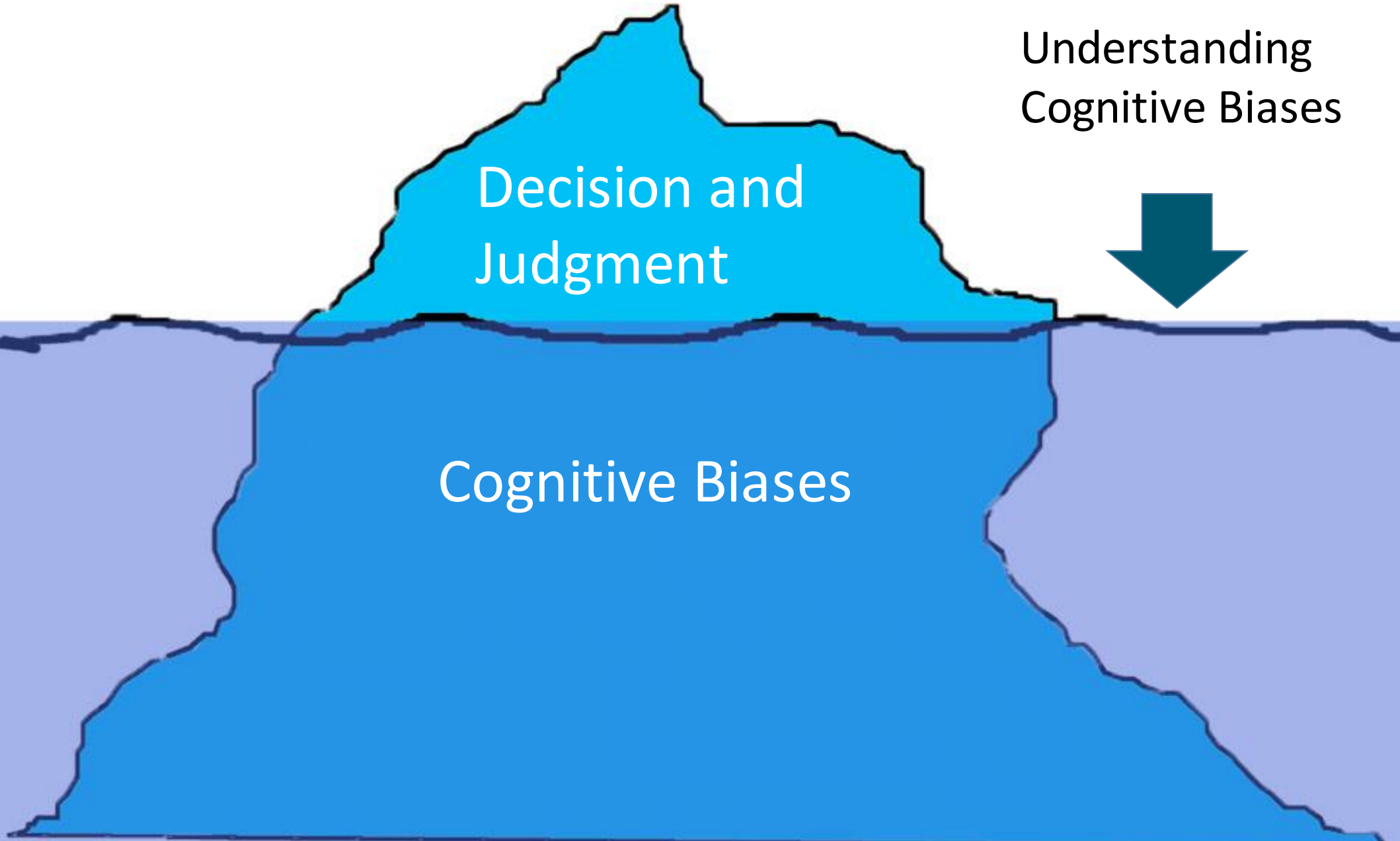
Enhance
Awareness

Understanding
Cognitive Biases

Decision and
Judgment



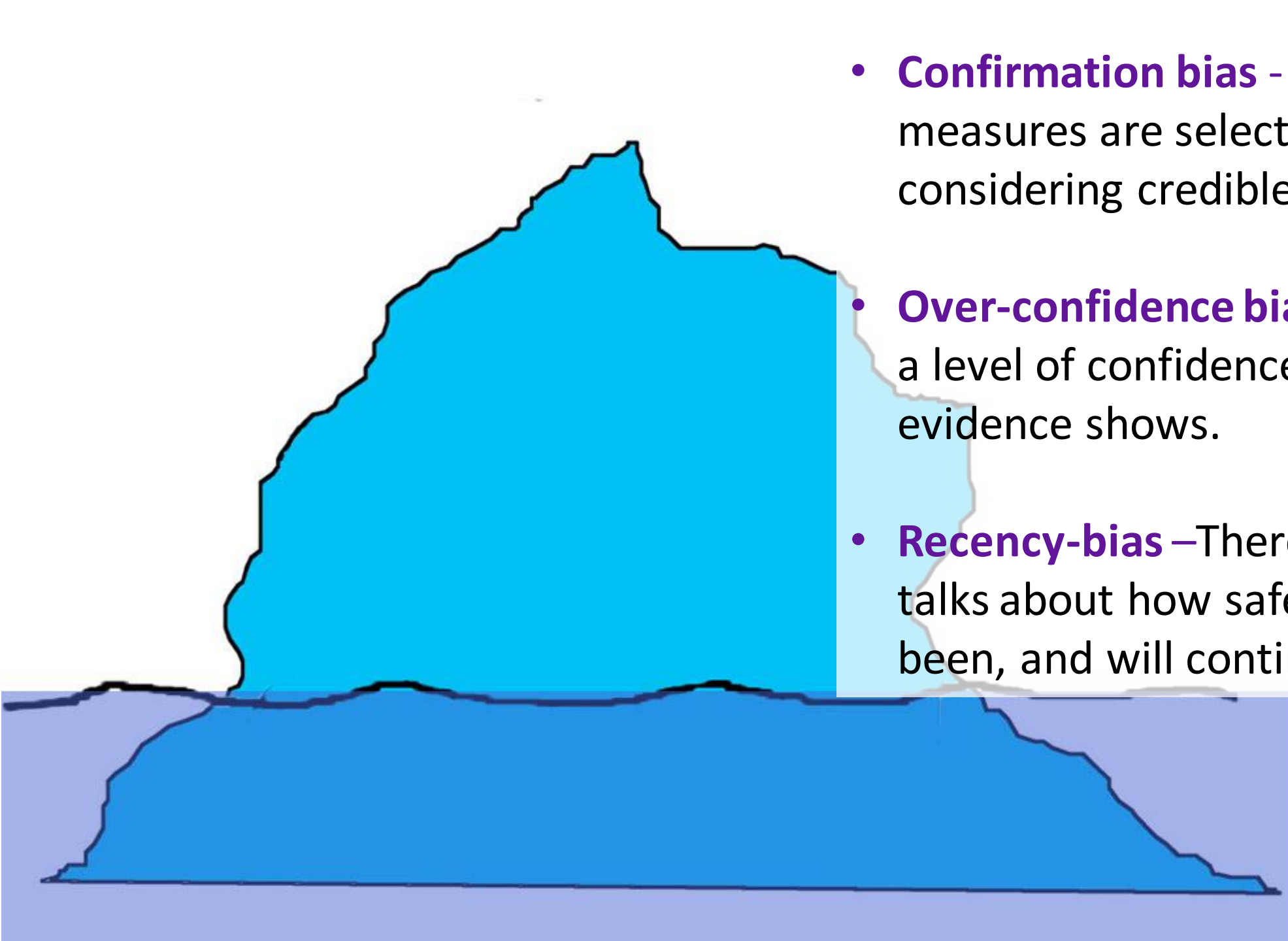
Cognitive Biases



An iceberg diagram where the visible tip is labeled 'Decision and Judgment' and the much larger submerged part is labeled 'Cognitive Biases'. The water level is indicated by a horizontal line.

Decision and
Judgment

Cognitive Biases

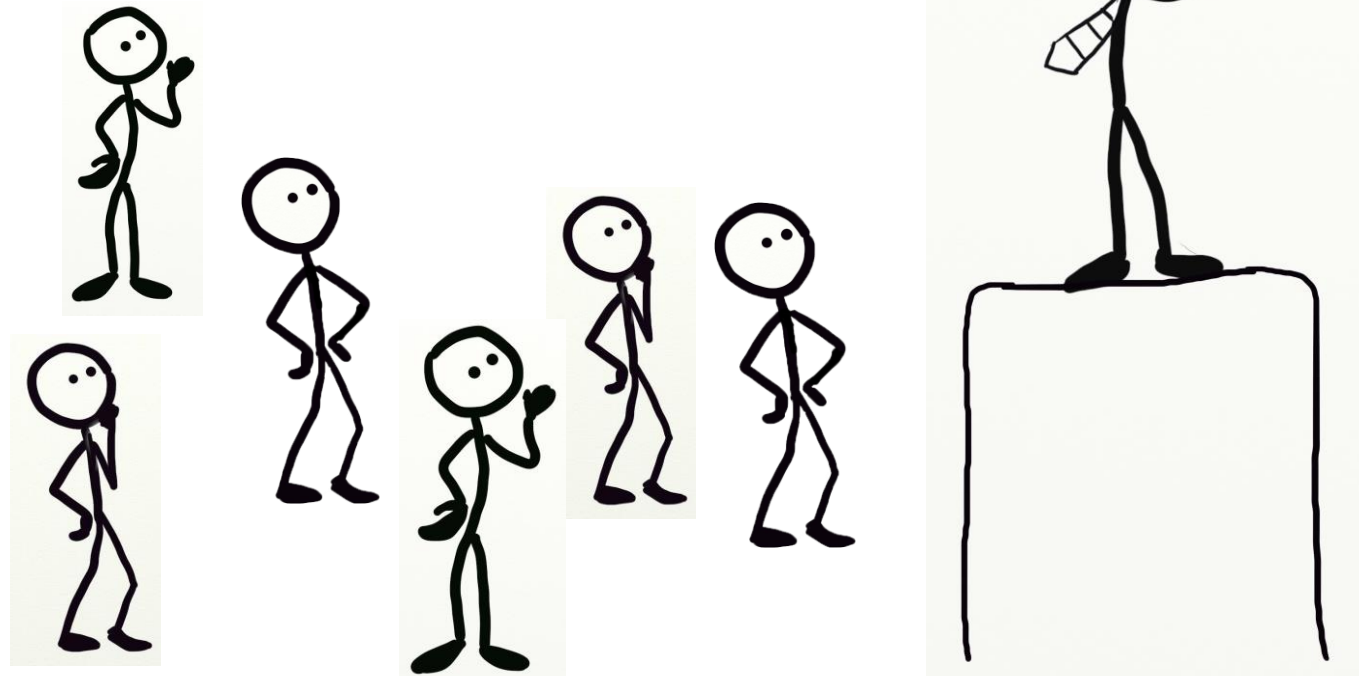
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- An iceberg diagram illustrating cognitive biases. The visible tip of the iceberg is colored light blue and represents the small portion of the problem that is apparent. The much larger, submerged part of the iceberg is colored dark blue and represents the hidden, underlying issues. The text on the right side of the slide lists three types of biases: Confirmation bias, Over-confidence bias, and Recency-bias, each with a brief description.
- **Confirmation bias** - Controls measures are selected without considering credible alternatives
 - **Over-confidence bias** - The team has a level of confidence beyond what evidence shows.
 - **Recency-bias** – There are frequent talks about how safe the MHI has been, and will continue to be.

Instill Chronic
Unease



Reduce Happy Talk

All is well...Nothing to worry about





Non-compliance to Permit-to-Work

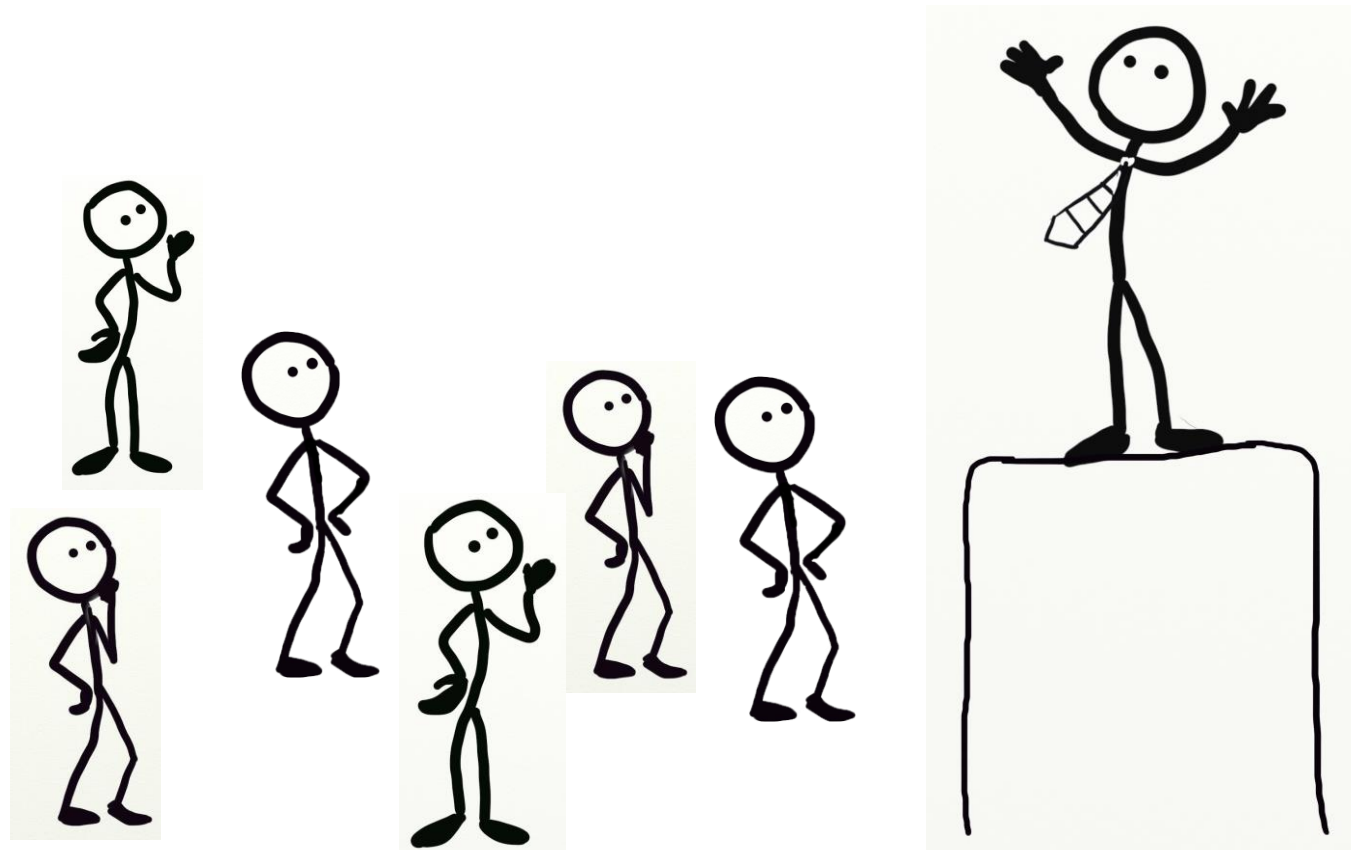


Depth > 1.5m

Sure, we have problems, but look at all we have accomplished.



This minor accident
could have been much
more serious!





Our accident rate is 4 times higher than the industry now.....Only a matter of time someone gets seriously injured.

Our accident rate has dropped by 20% over the last one year. ... good job.

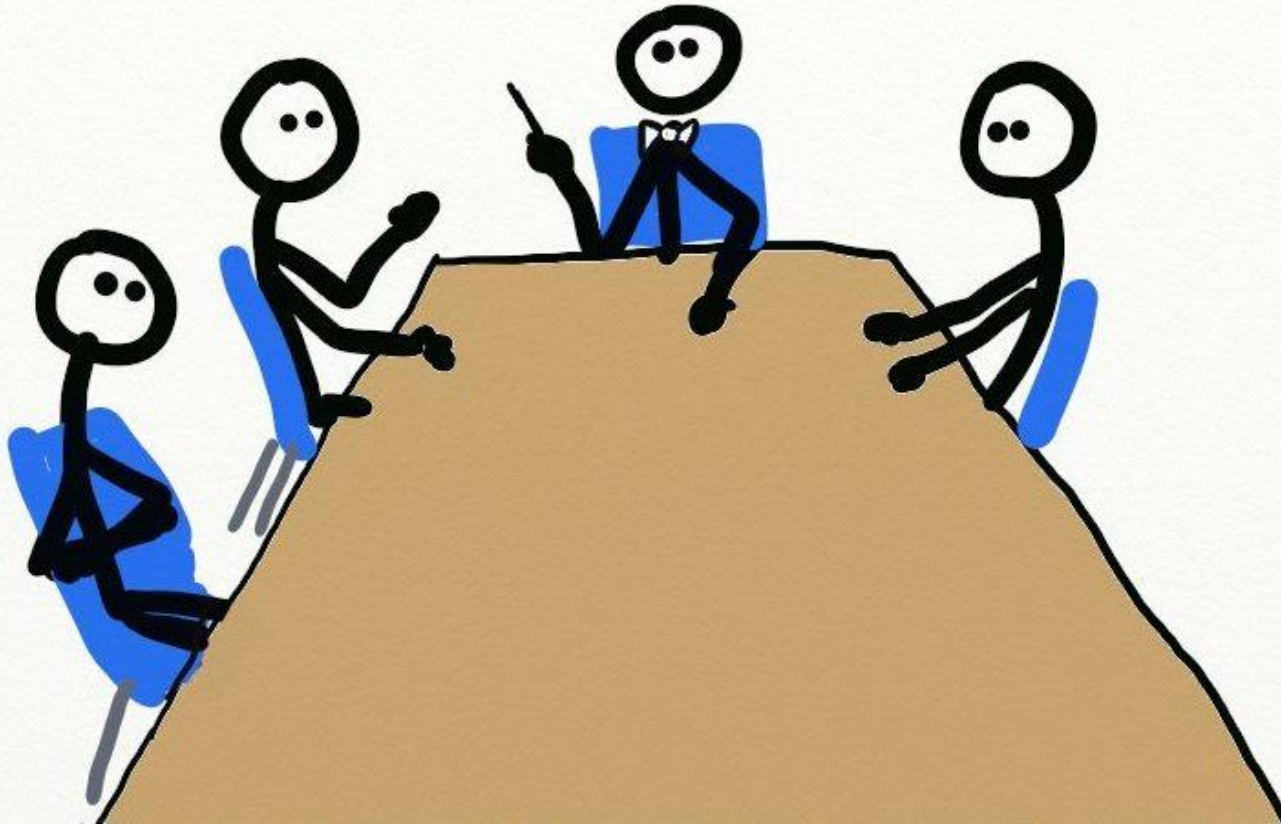


Establish
Decision Process



Alfred P. Sloan
Late CEO of General Motors

“Gentlemen, I take it we are all in complete agreement on the decision here?”



I proposed we postpone
further discussion until
next meeting



Right decision requires adequate disagreements.



amazon

Decision process is the less analytical side of the safety case

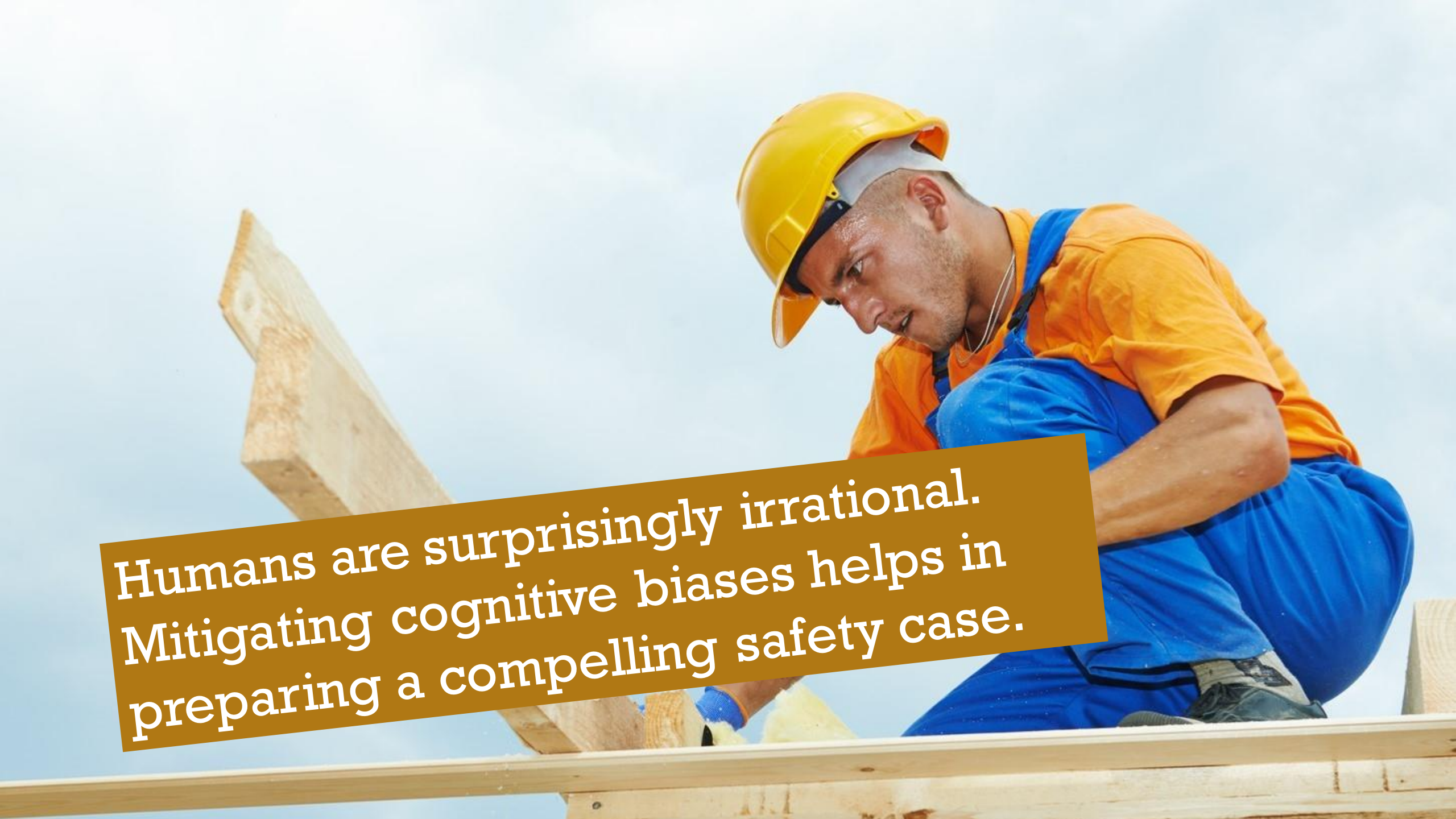
1. Seek diverse views (technicians, supervisors, experts)
2. Explicitly discuss what was uncertain
3. Encourage opposing views



Instill Chronic
Unease

Establish
Decision Process

Enhance
Awareness



Humans are surprisingly irrational.
Mitigating cognitive biases helps in
preparing a compelling safety case.