

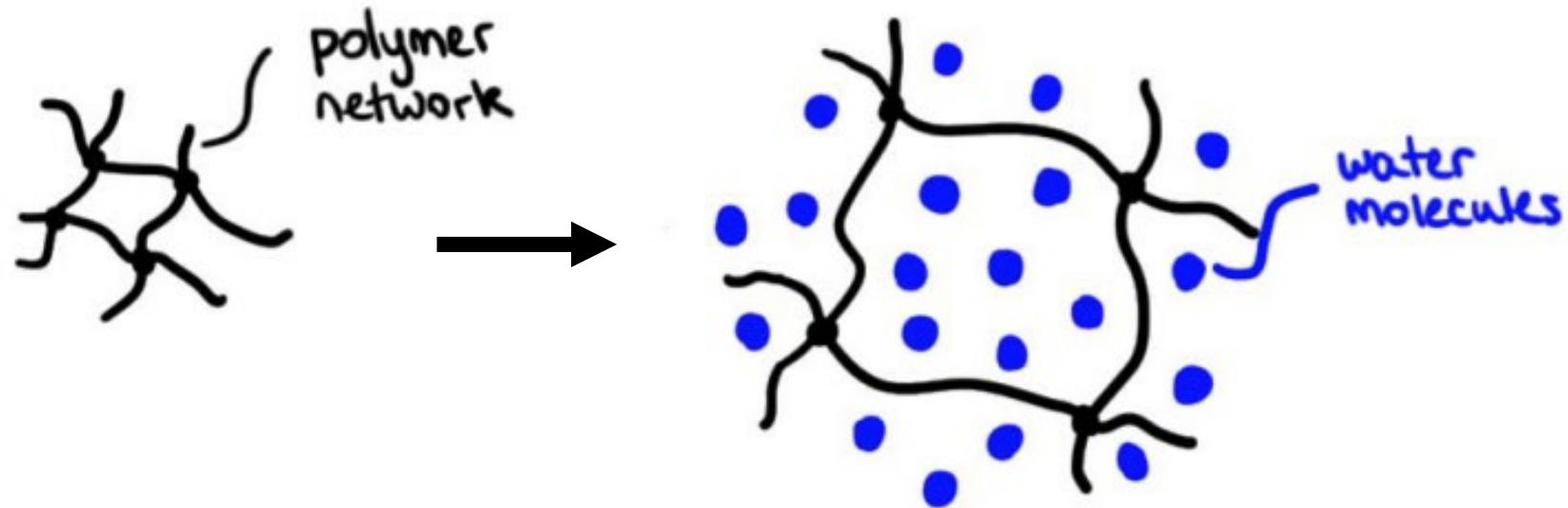
Hydrogels

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Dyson Day

What are hydrogels?

- Polymer network forming a gel-like material
- Network absorbs a lot of water, swelling in the process, but remaining dry
- Some can be up to 99% water



Hydrogel examples?

Jelly!



Orbeez



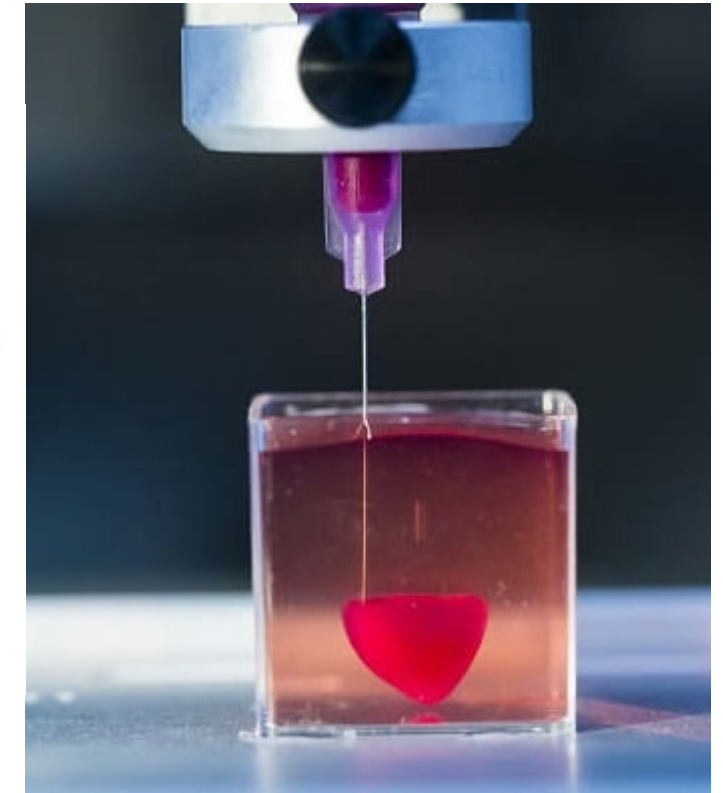
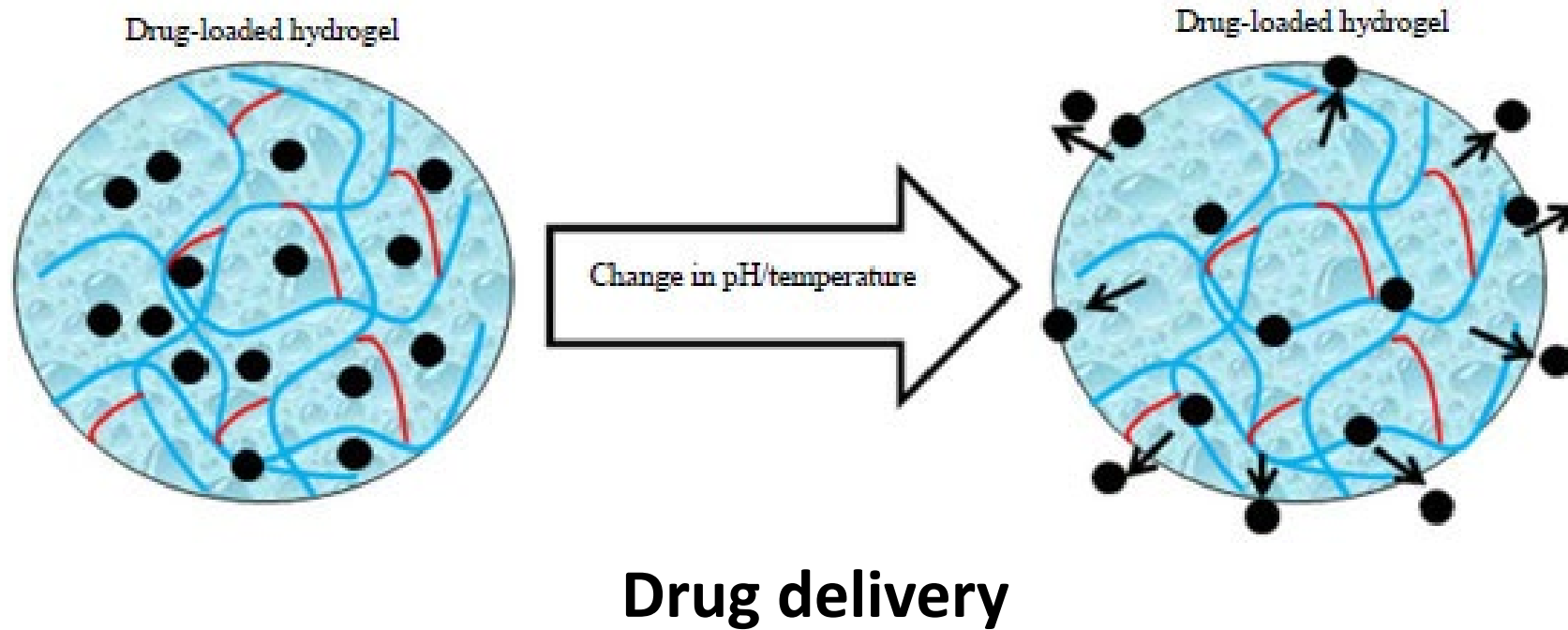
Contact lenses



Fake snow



Biomedical devices



Organ transplants

Hydrogel experiments

Making a hydrogel

- Nappies contain sodium polyacrylate gel
- No leaks!

1. Remove dry hydrogel from nappy and weigh
2. Hydrate hydrogel by adding water
3. Weigh hydrogel after maximum amount of water has been added
4. What observations can you make?



Making a hydrogel

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1. Remove dry hydrogel from nappy and weigh
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Collapsing a hydrogel

- Salt can be used to collapse the hydrogel structure
- We will use hair gel
- What do you observe?



Experiment time!

Please ask me if you get stuck, have any questions or if you finish early!



Conclusions

Conclusions

- Nappy experiment:
 - Observations?

Conclusions

- Nappy experiment:
 - Observations?
 - How much water could be added?

Conclusions

- Nappy experiment:
 - Observations?
 - How much water could be added?
- Hair gel experiment:
 - Observations?
 - Why?

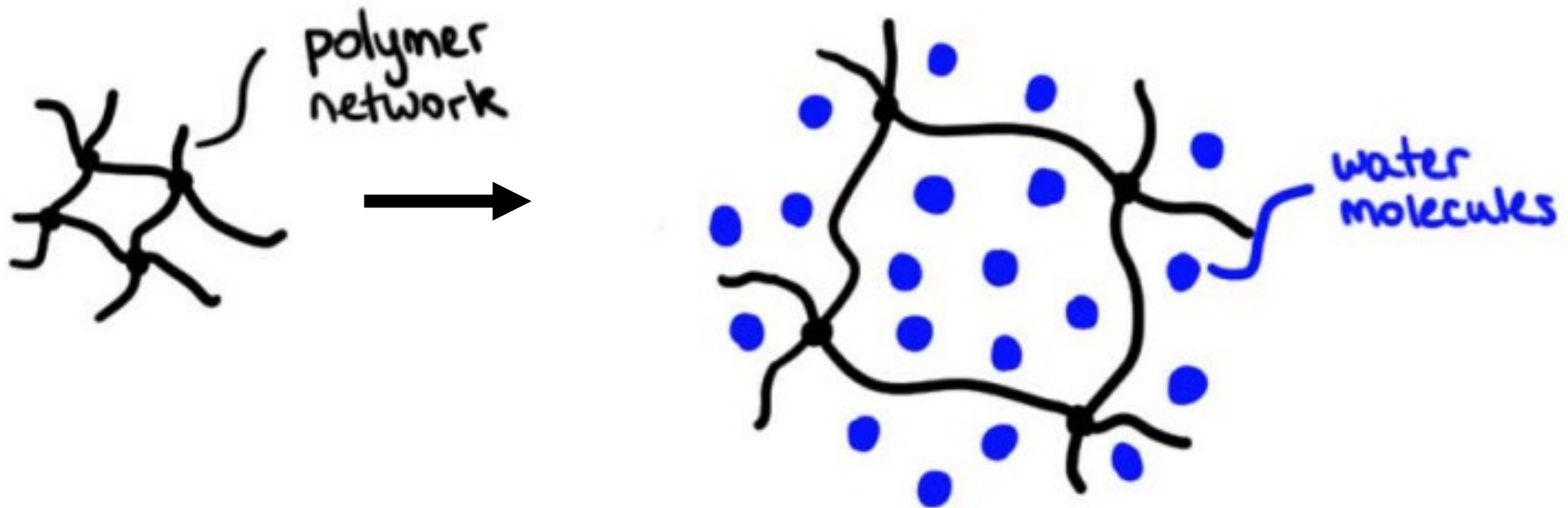
Conclusions

- Nappy experiment:
 - Observations?
 - How much water could be added?
- Hair gel experiment:
 - Observations?

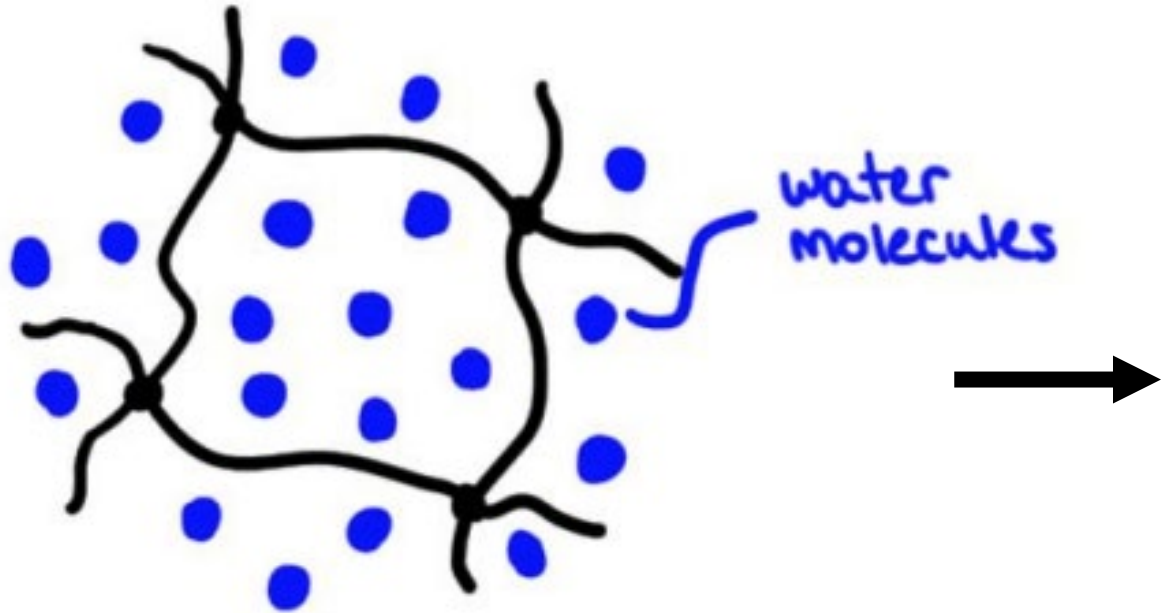
How do these experiments work?

Making a hydrogel

- Water is attracted to network, and sticks to chains
- Water trapped in the network



Collapsing a hydrogel



Water displaced by salt

Network collapses

My project using hydrogels

Tedex video?

- <https://www.youtube.com/watch?v=znSeL66e8qE>

Problem Statement

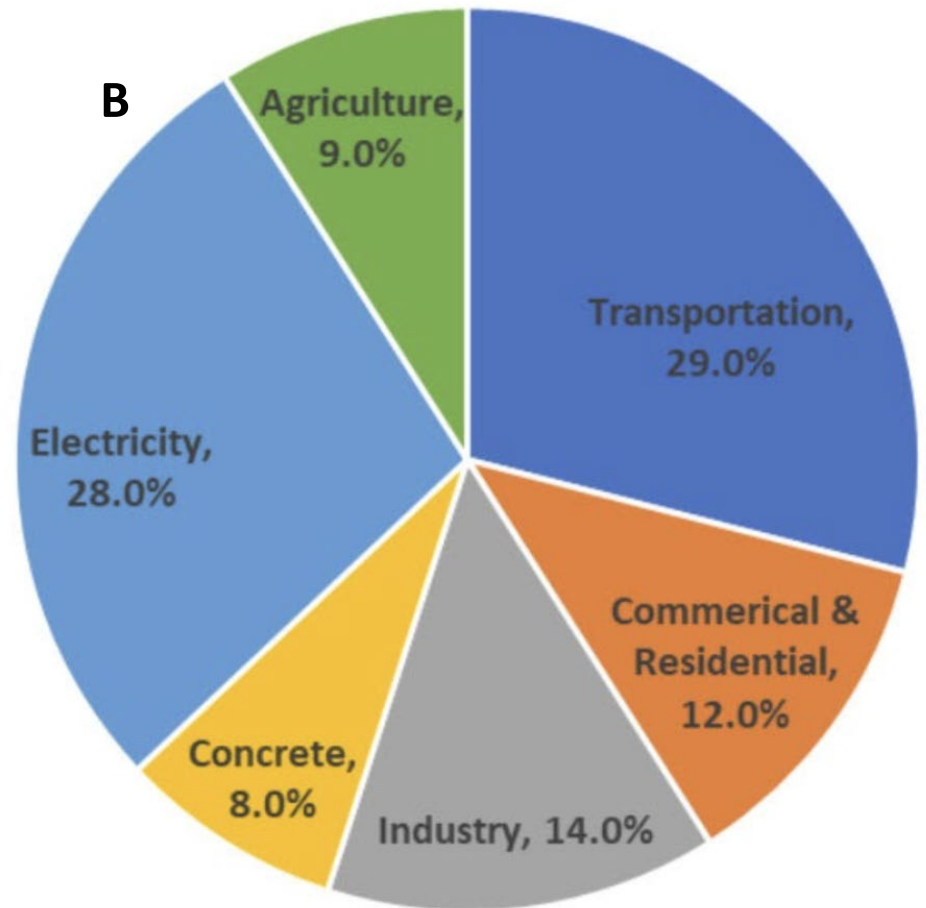


Source: Nast, C. (2018) *The 9 brutalist wonders of the architecture world*, GQ.

Problem Statement

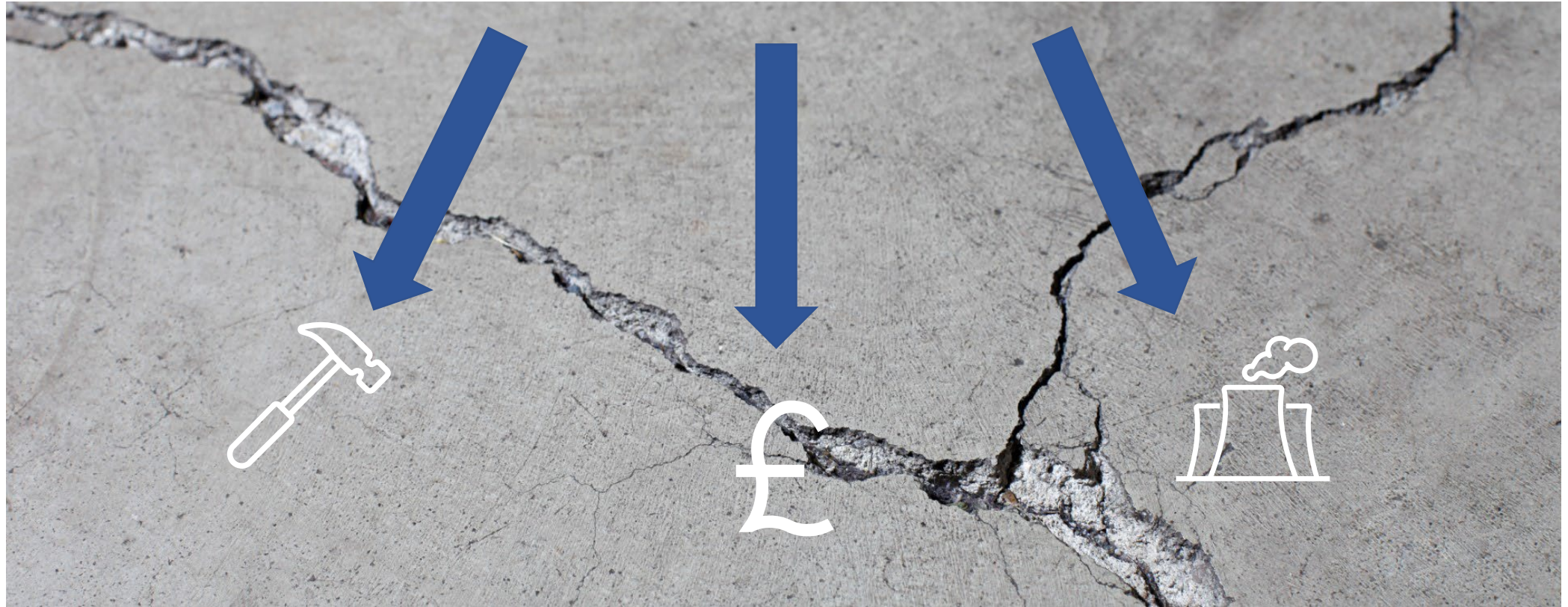


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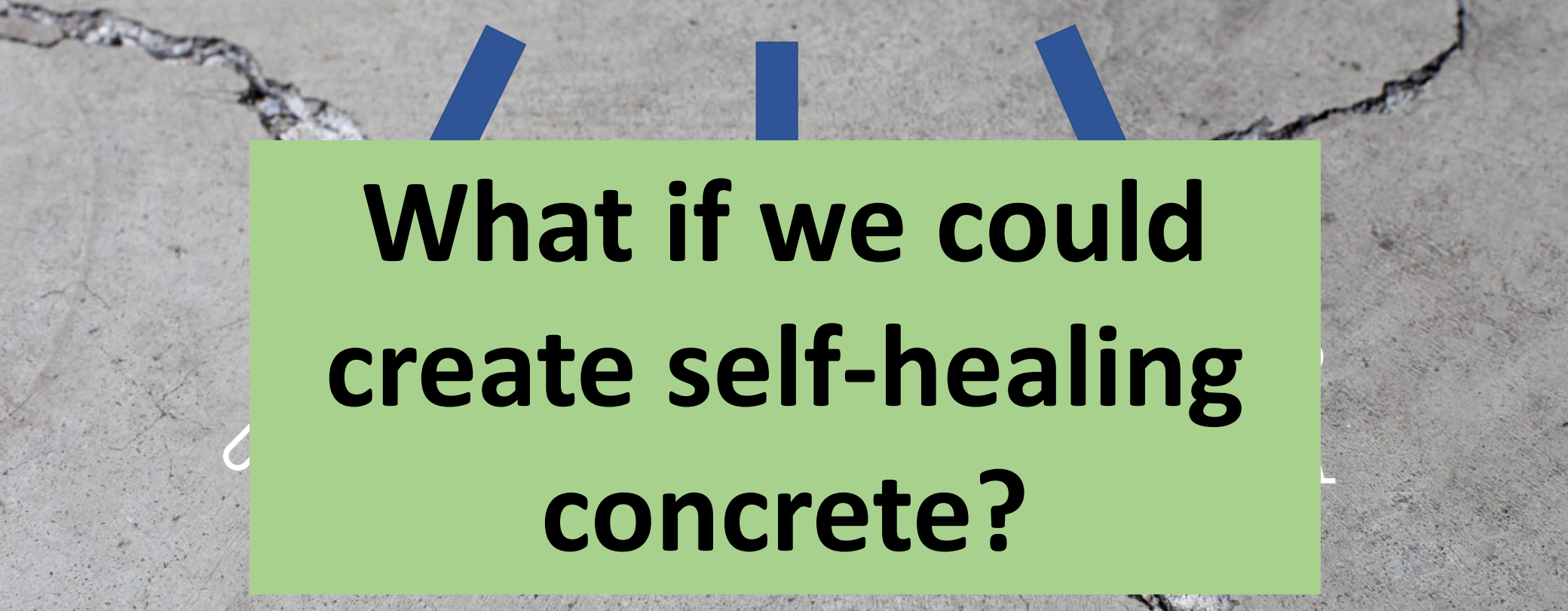


Source: Ramsden, Princeton Edu., 2020

Concrete cracks

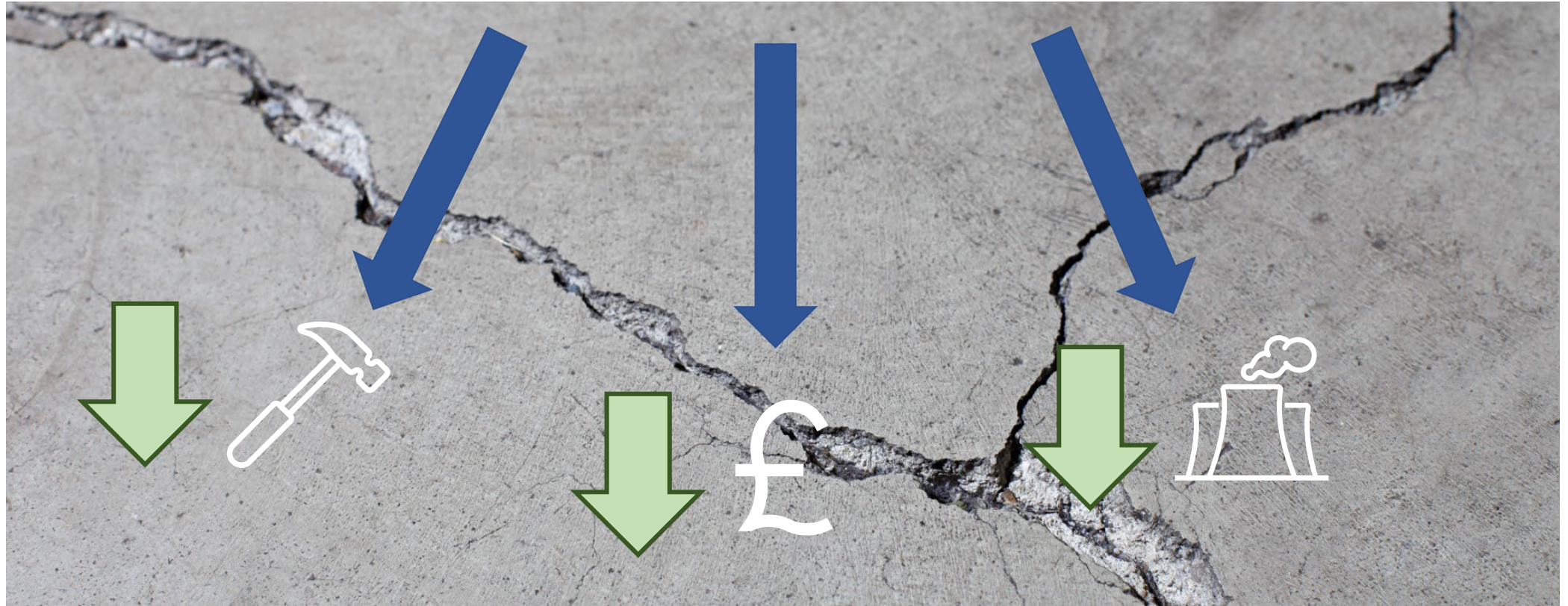


Concrete cracks

A photograph of a concrete surface with several cracks. Three blue, triangular repair patches are visible, placed over the cracks. A green rectangular box is overlaid on the center of the image, containing the text 'What if we could create self-healing concrete?'.

**What if we could
create self-healing
concrete?**

Concrete cracks



Overarching aim

