

ROTTERDAM
REACTOR



A nuclear fusion power
plant in Rotterdam...
moonshot for a star?

20 March 2024

The Rotterdam Reactor - guido.lange@rotterdamreactor.org - join.us@rotterdamreactor.org

We are here - consuming loads of energy



Credit: NASA (public domain)



Credit: [Krd - Creative Commons 4.0](#)



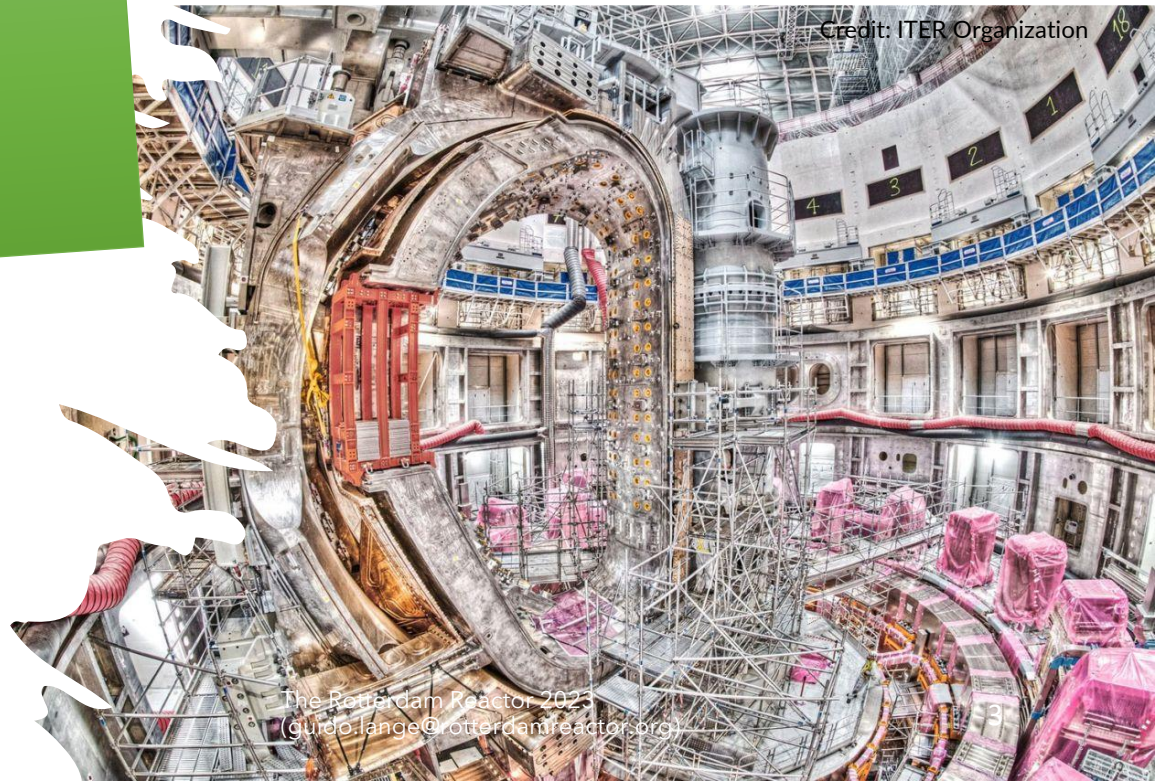
And we urgently need alternatives

Suppose we
want to
replace this...

1GW net fusion
power in The
Netherlands, by
2050?

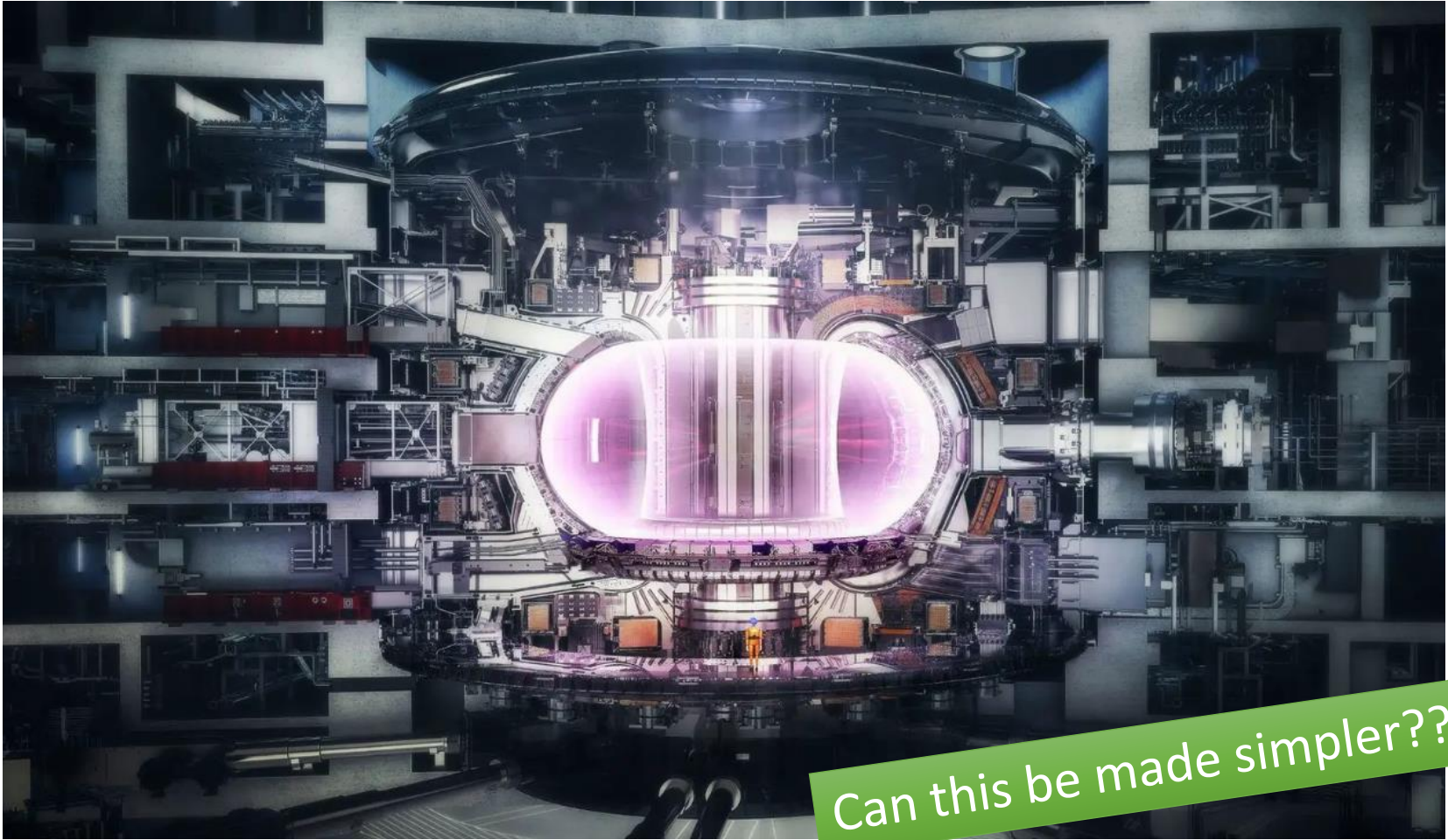
...with this?

(or any cleverer fusion concept)



Credit: ITER Organization

This means, millions of high-tech pieces to control a hundred million degrees hot gas!



Credit: ITER Organization

Would this be technically feasible?

We don't even know yet!

Material development and qualification

Heat load on plasma-facing components

Plant power balance

Machine Reliability and Availability

Plasma power multiplication

Mineral resource needs

Tritium breeding and recirculation

Millions of high-tech parts

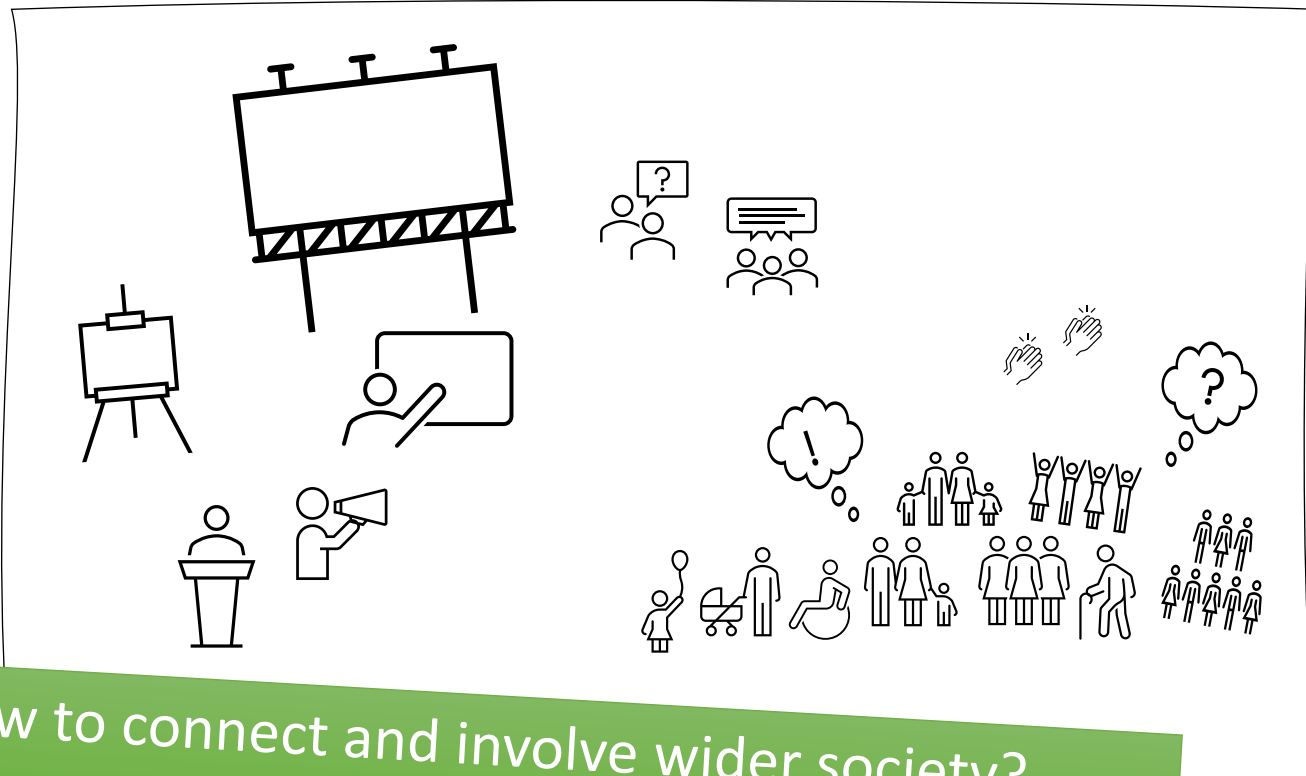
Impurity management



What skills do we need to organise, lead, develop, test, build, operate?



Can it be done societally responsible, just and inclusive?



How to connect and involve wider society?
What to think about access, ownership,
decision-making?

What about logistics, materials and supply chains?

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Fe_2O_3
 Fe_3O_4
 $2Fe_2O_3 \cdot 3H_2O$

Iron ore minerals

Photos by R. Weller/ Cochise College

Corundum
 Al_2O_3

Abrasives and gemstones

Bauxite
 $Al_2O_3 \cdot 2H_2O$
Aluminum ore

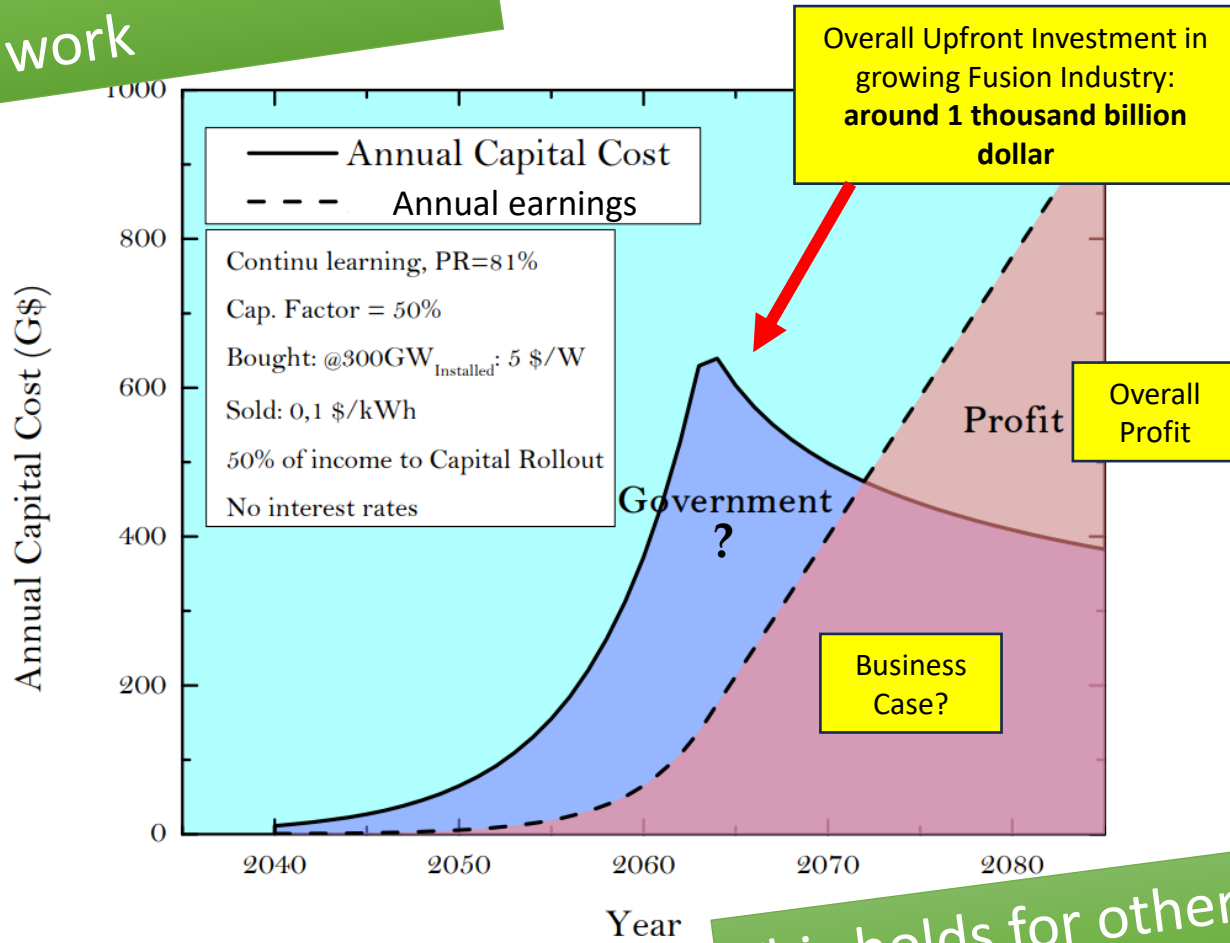
Everything in the right place, at the right time, millimeter precise installed. Developed world-wide.



Credit: ITER Organization

Can it become economically viable?

High-tech machines cost a lot before they work



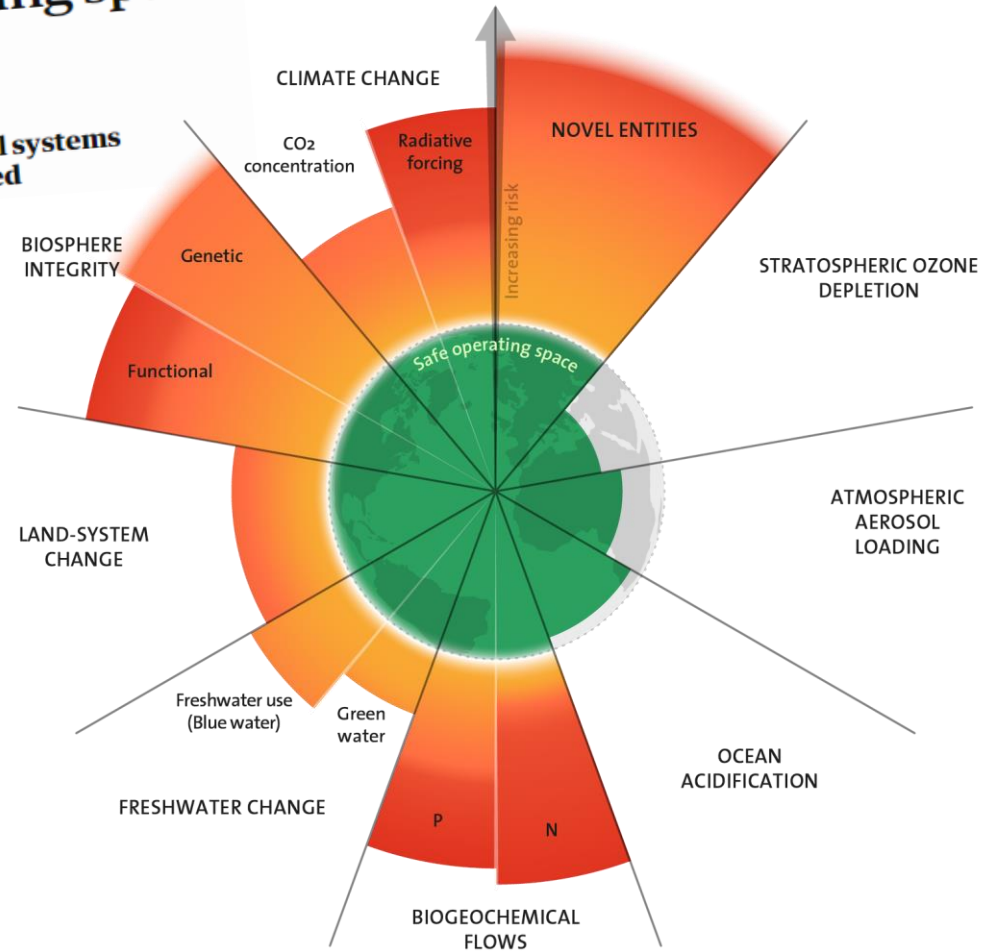
This holds for other energy technologies too

Can it be done while respecting our Planetary Boundaries?

Earth 'well outside safe operating space for humanity', scientists find

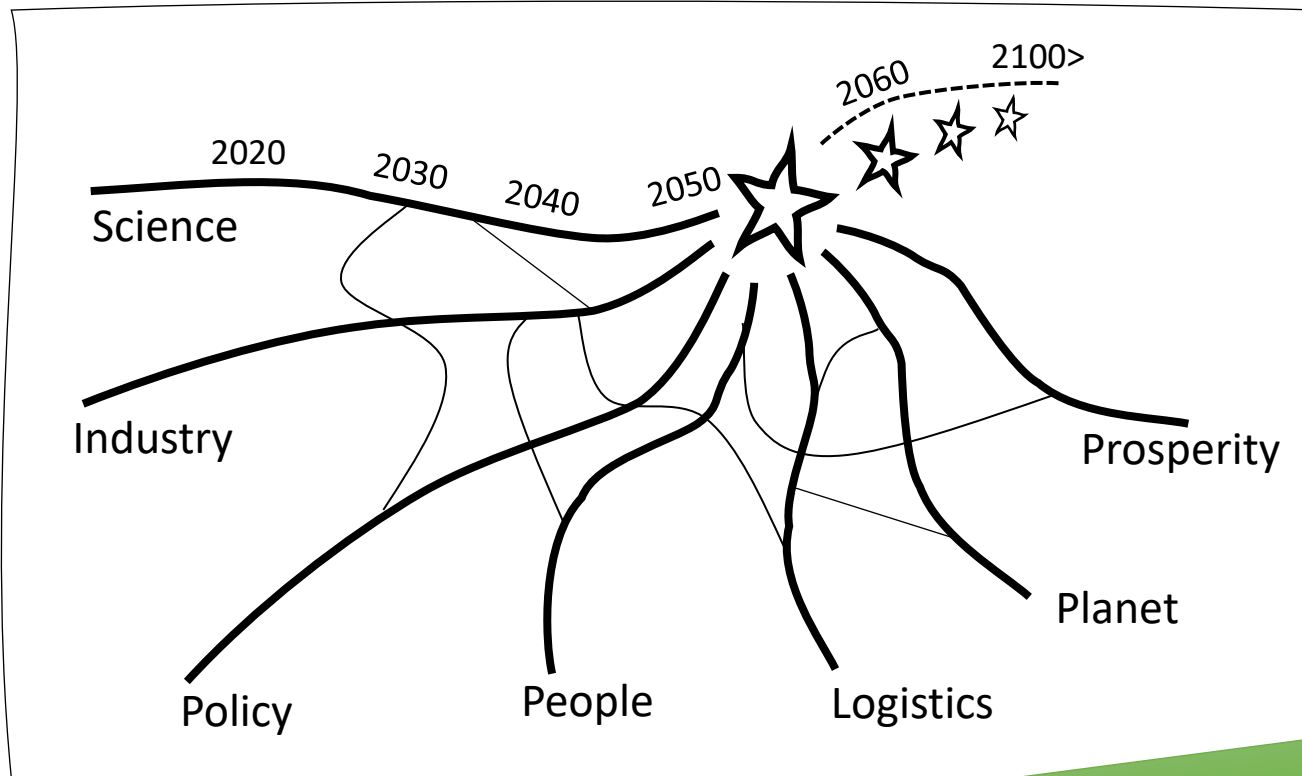
First complete 'scientific health check' shows most global systems beyond stable range in which modern civilisation emerged

[The Guardian \(Sept. 2023\)](#)



Credit: Azote for Stockholm Resilience Centre, based on analysis in Richardson et al 2023

It seems that realising this is quite a puzzle...

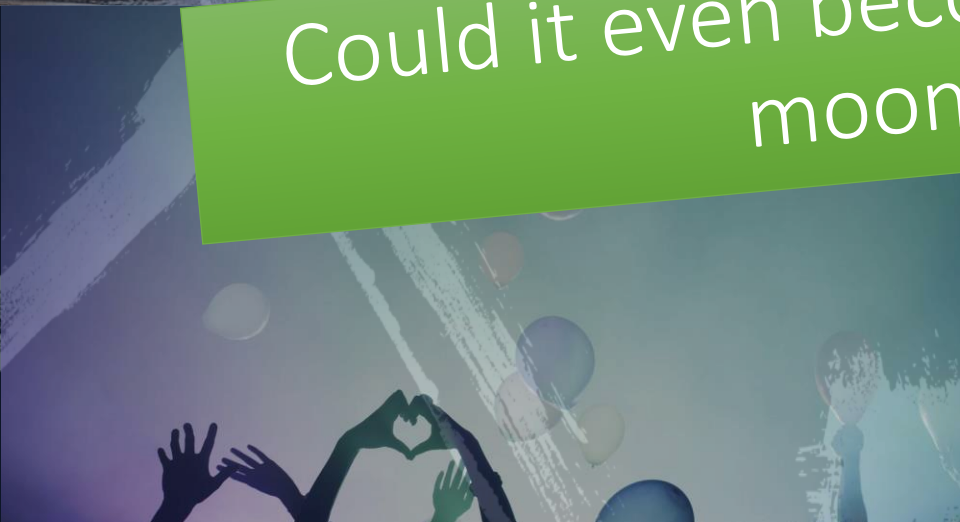


And all these domains are interdependent

But if we have a shot... what if we'd collectively aim for it??



Could it even become a connecting moonshot?



If so... how?

This is what YOU will be finding out!

We work through challenges via sprints!

Thus far:

- What do you find on a typical fusion site?
- How do people think about fusion?
- What does the Port industrial area look like?

- Analyse site options and needs
- Develop a communication plan
- Research economics, materials, licensing, energy demands, ...

Welcome to the team!

