

MERCEDES-BENZ DESIGN PROCESS

Made by: VORTEX, 21549B

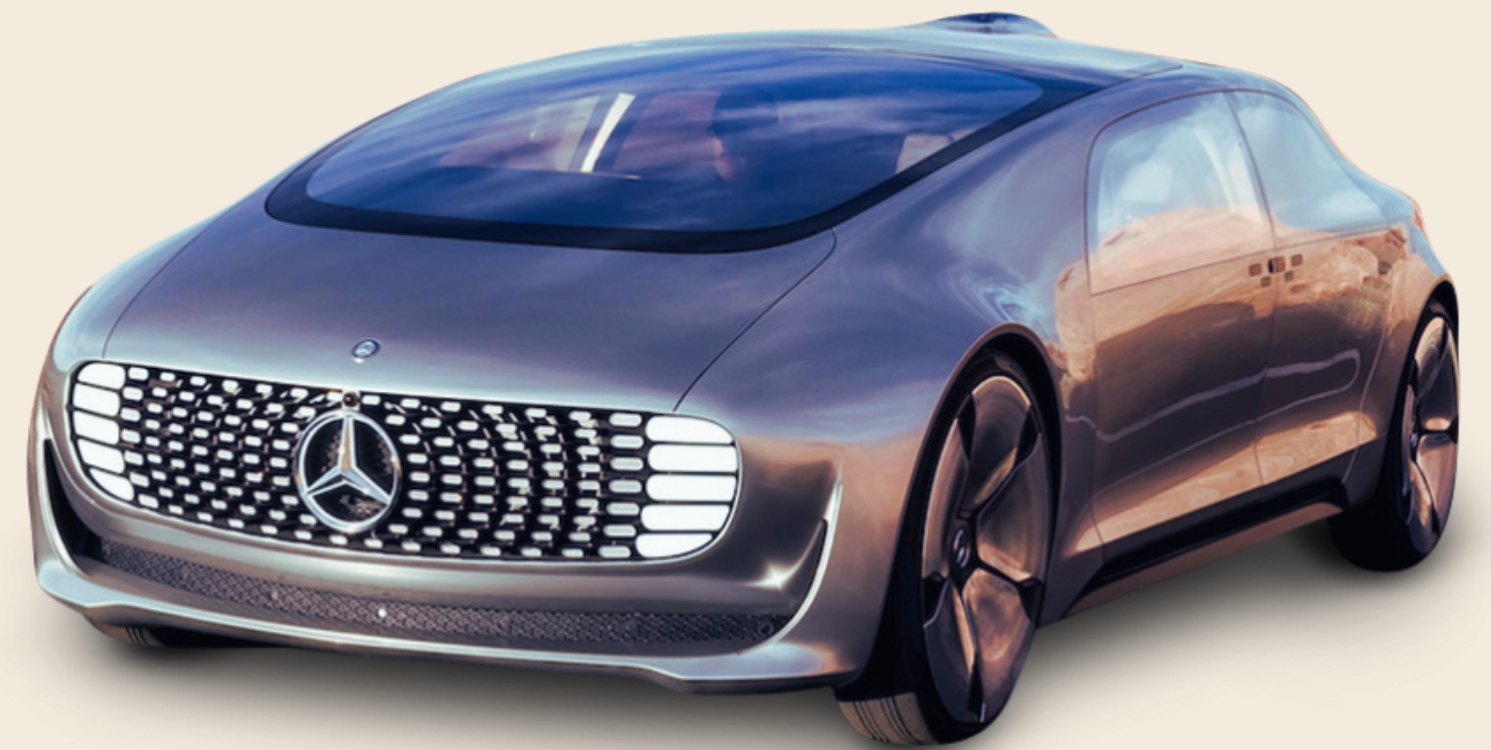
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WHAT IS MERCEDES-BENZ?

- Mercedes-Benz is one of the world's most successful automobile companies
- They specialise in making luxurious cars and vans at an affordable price
- They are a world leader in the shift to electric cars
- They plan to go fully electric by 2030



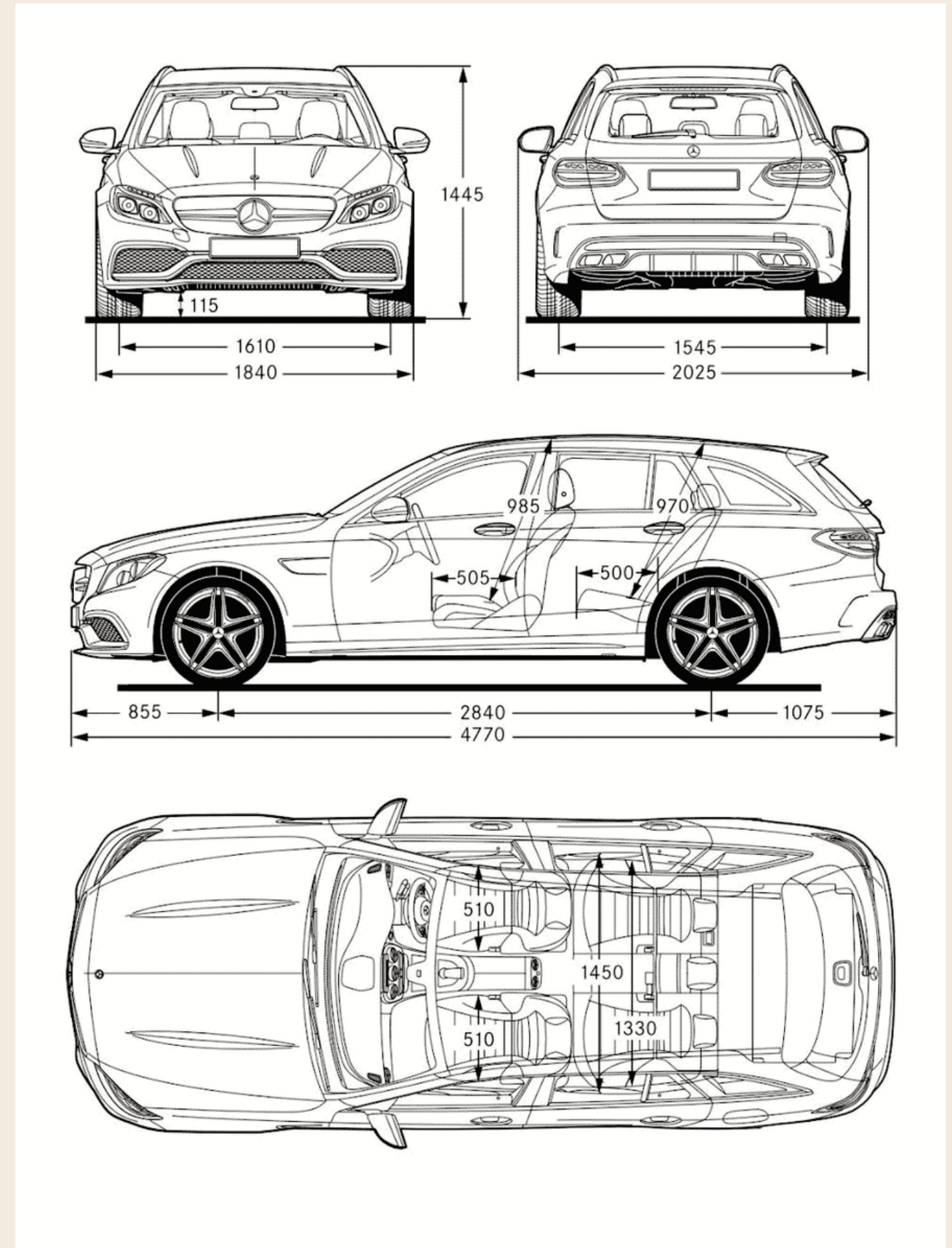
WHY MERCEDES-BENZ?

- Mercedes is a global leader in both electric and autonomous cars
- They sell approximately 2 million of their vehicles every single year
- Their new concept car (the Vision AVTR) is deemed to be the 'car of the future'
- None of these accomplishments would be possible without a design process

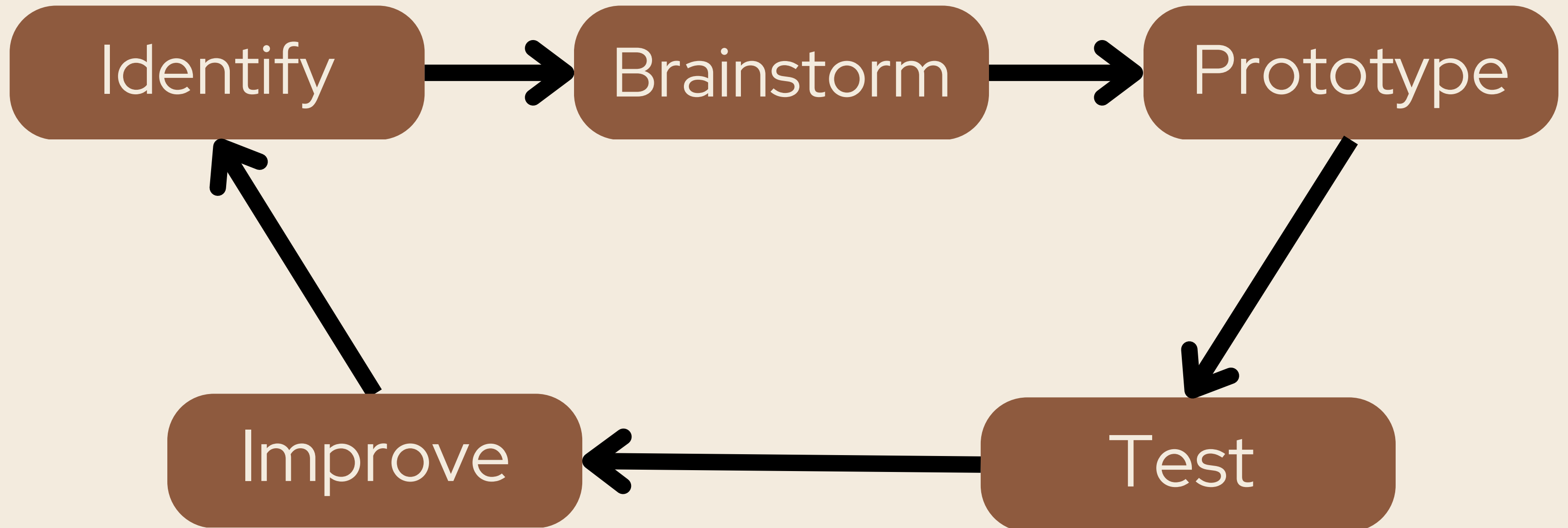


WHAT IS A DESIGN PROCESS?

- The 'design process' is a set of steps which are used to create/improve a product.
- Using this systematic process, you can evaluate many different options and eventually choose the best one
- The step-by-step method ensures that any errors or faults are minimised

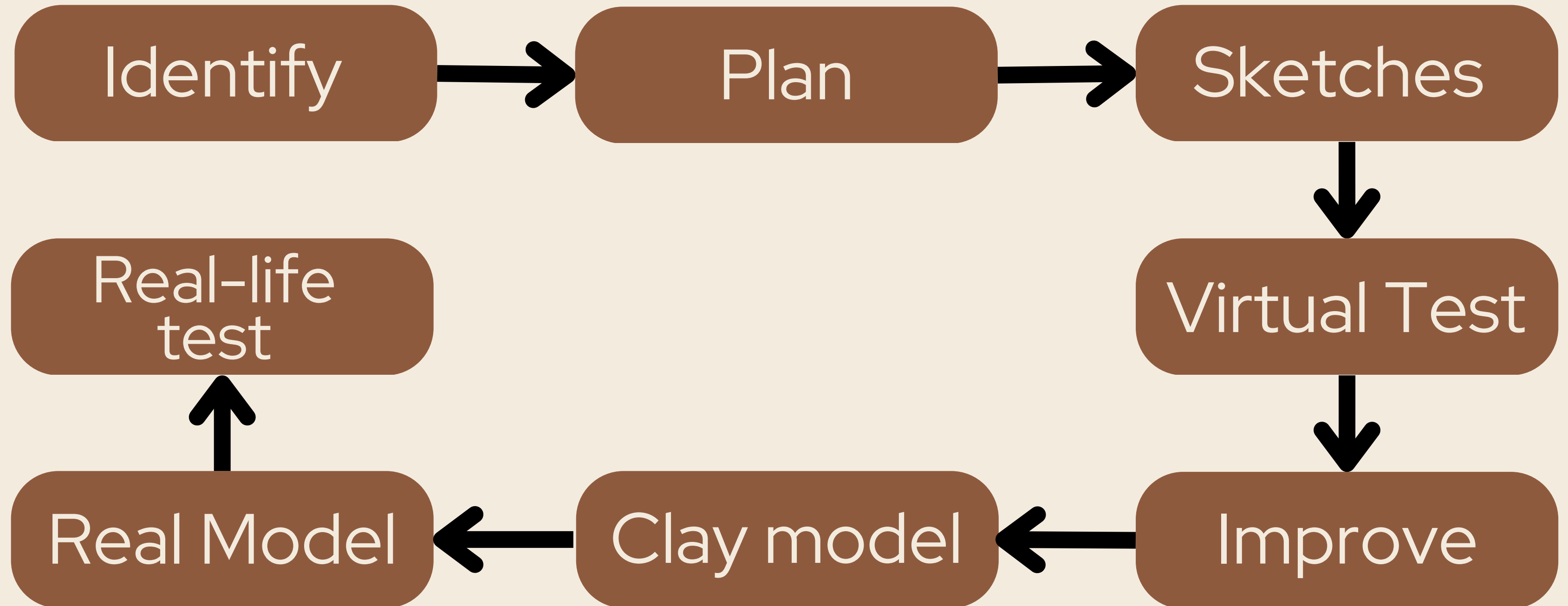


21549B'S DESIGN PROCESS



This is the process that we use to create each individual part of our robot.

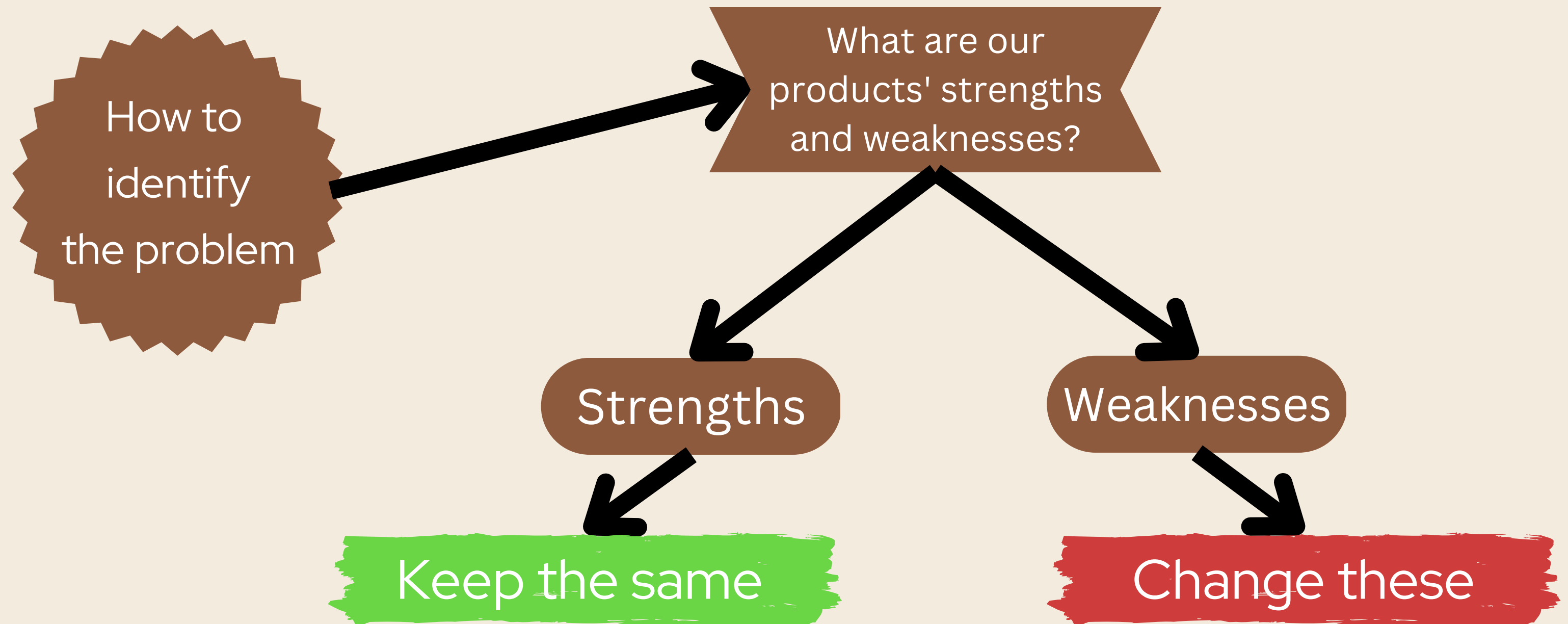
MERCEDES' DESIGN PROCESS*



*This is only a simplified version of Mercedes' design process.

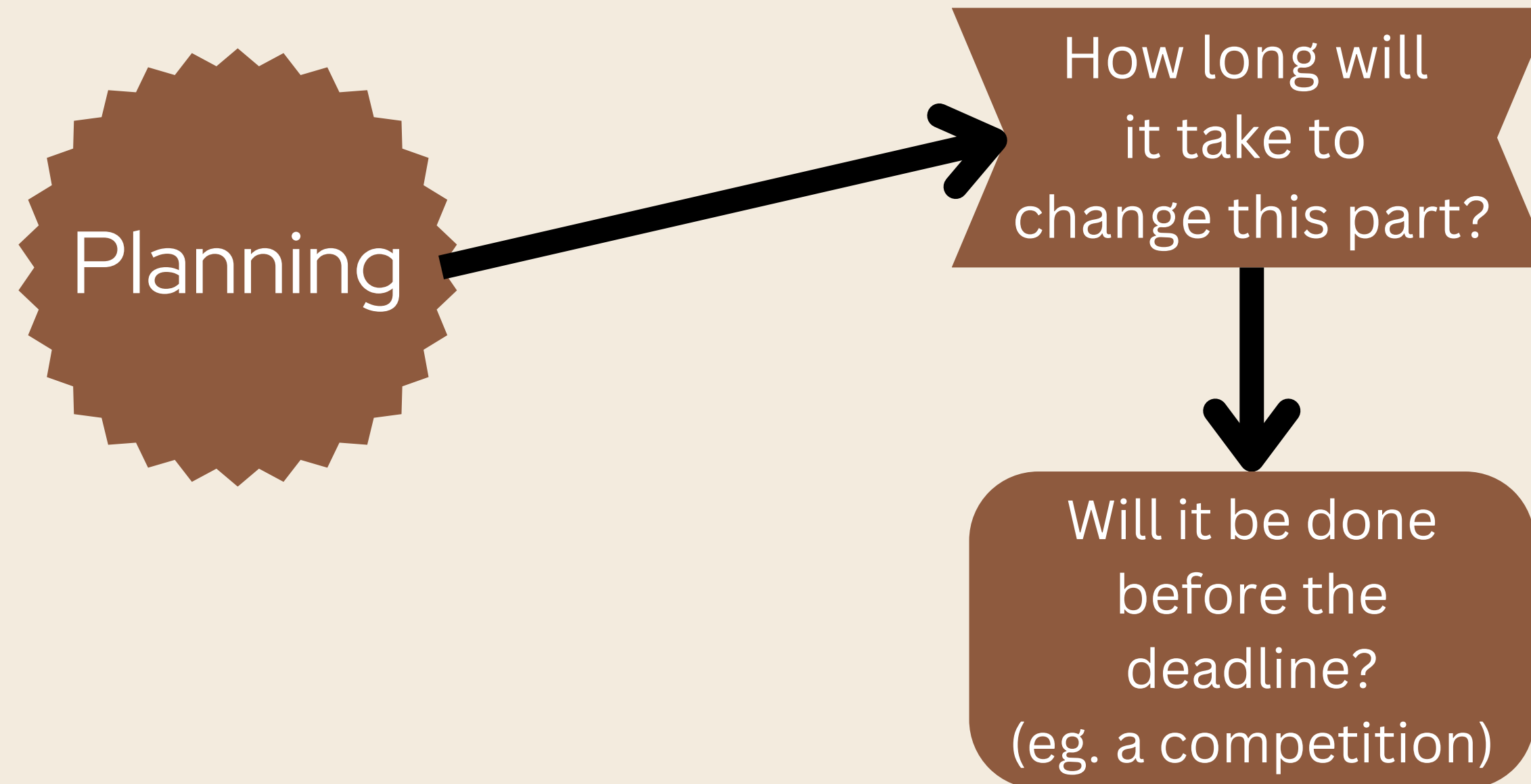
STEP 1: IDENTIFY

Identifying an problem is the first step of solving it. Being specific with what you need to change will help you find more relevant solutions.



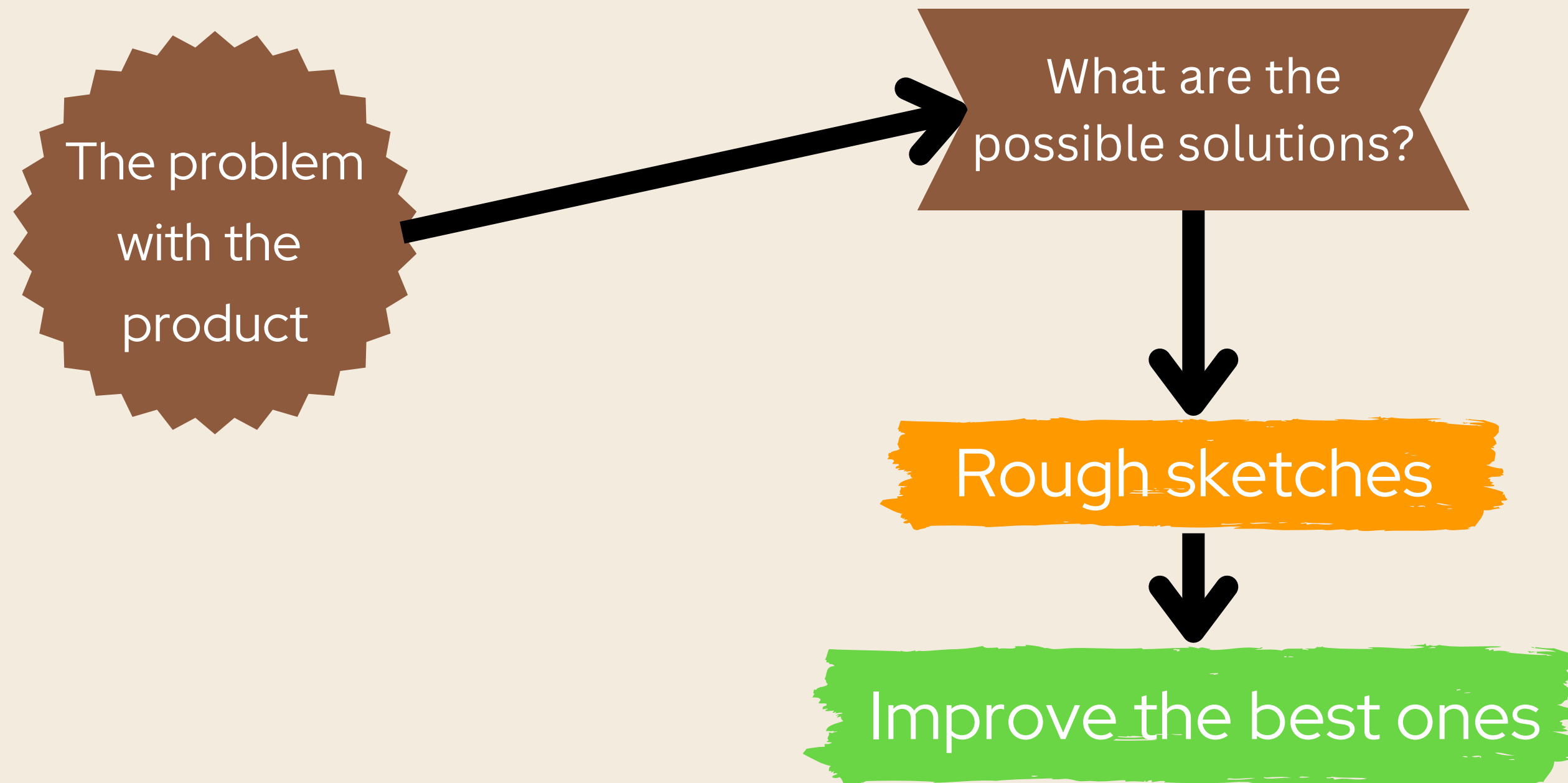
STEP 2: PLAN

This is a step which is good for if your product has a deadline. In VEX IQ, the deadline is your competition day; you need to have a fully working robot before that day.



STEP 3: SKETCHES

Sketching is a quick and easy way to convey your concepts. You can find sketches of all sorts of ideas in the [VEX IQ Notebook](#).



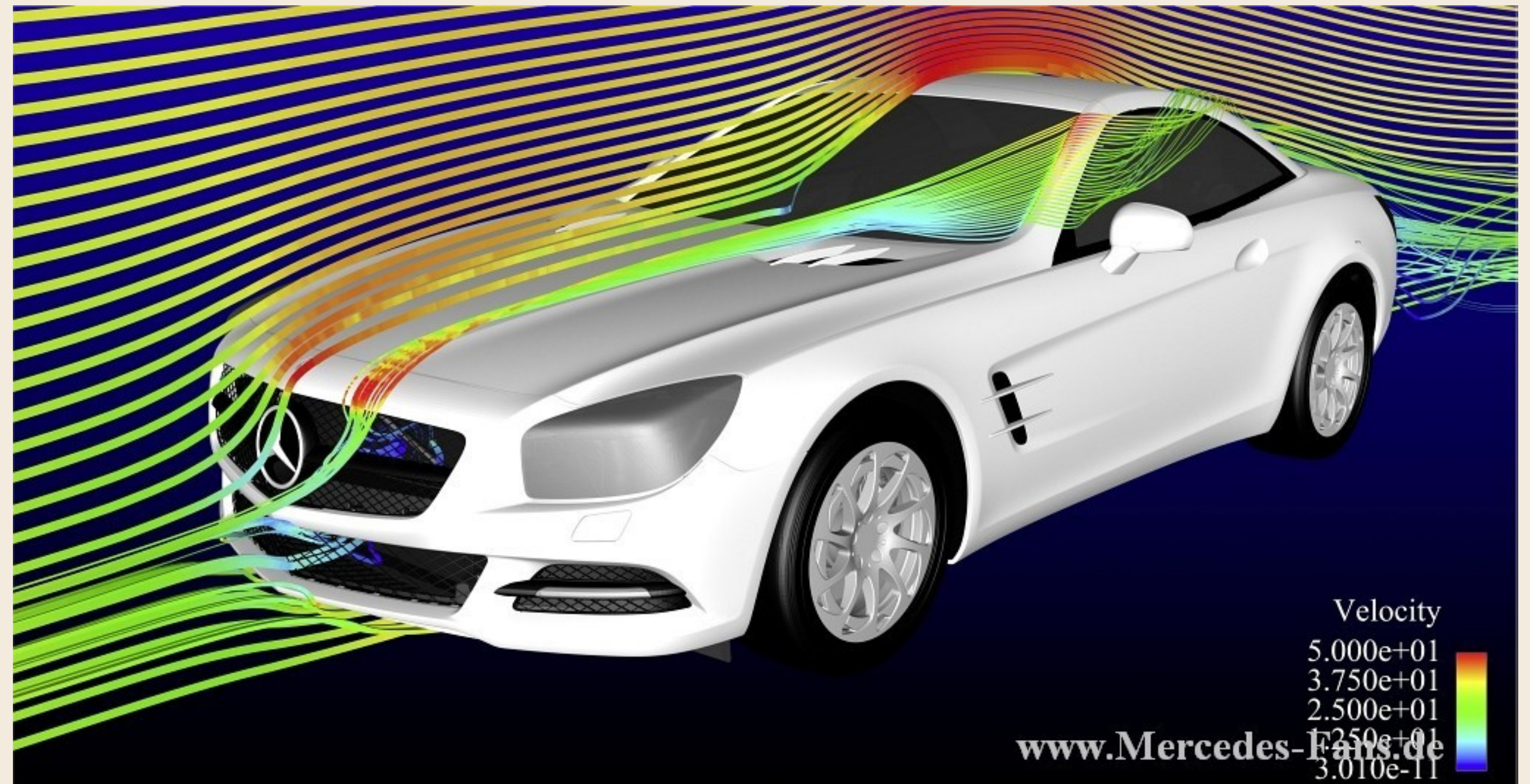
STEP 4: VIRTUAL TEST (CFD)

This is a step that is not widely used in VEX IQ. It is specific to industries dealing with aerodynamics. Still, it is interesting to learn about it.

CFD stands for Computational Fluid Dynamics

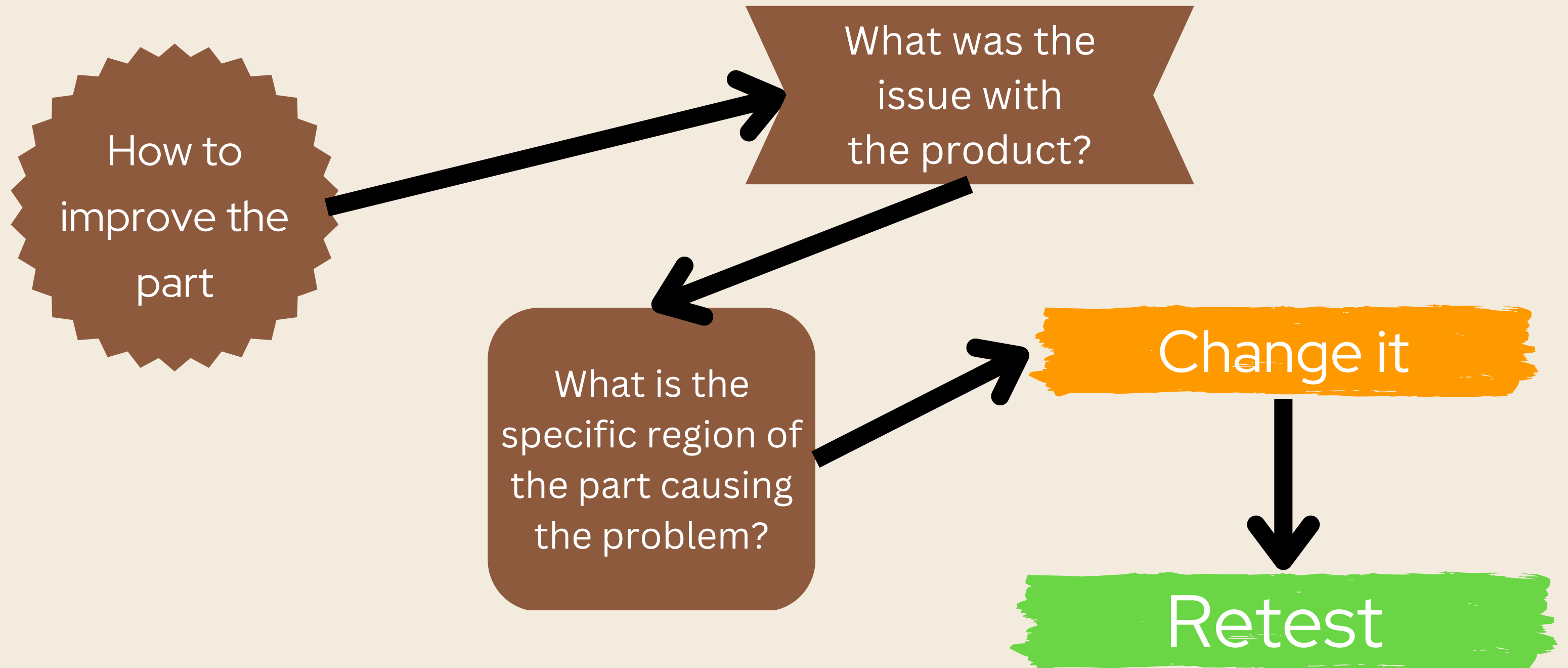
It simulates the movements of fluids (liquids and gases)

Mercedes uses it to observe the aerodynamism of their vehicles



STEP 5: IMPROVE

After testing the product, you can use the results/observations to improve it.



STEP 6: CLAY MODELLING

This step is also not currently used in VEX IQ. Our alternative is to use CAD Software (21549B uses Onshape)

Mercedes creates clay models on the scale 1:4

This provides a physical 3D replica of the car

The clay model makes it easier to visualise dimensions/features



STEP 7: REAL MODELLING

Next you need to make the prototype (or the real product if there's only going to be one of them). You can refer to your CAD/clay model to make sure everything is as planned.

A full-scale product is created with the proper materials

This allows you to observe the product physically with all the correct materials

Mistakes can be identified, but usually there are none due to the realism of 3D models



STEP 8: REAL TESTING

Now that you have your prototype/real product, you should test it to make sure everything functions correctly.

The Mercedes prototype is tested in many ways

This includes wind tunnels, extreme weather conditions, braking tests etc.

This is to make sure the car can work efficiently and safely in any condition



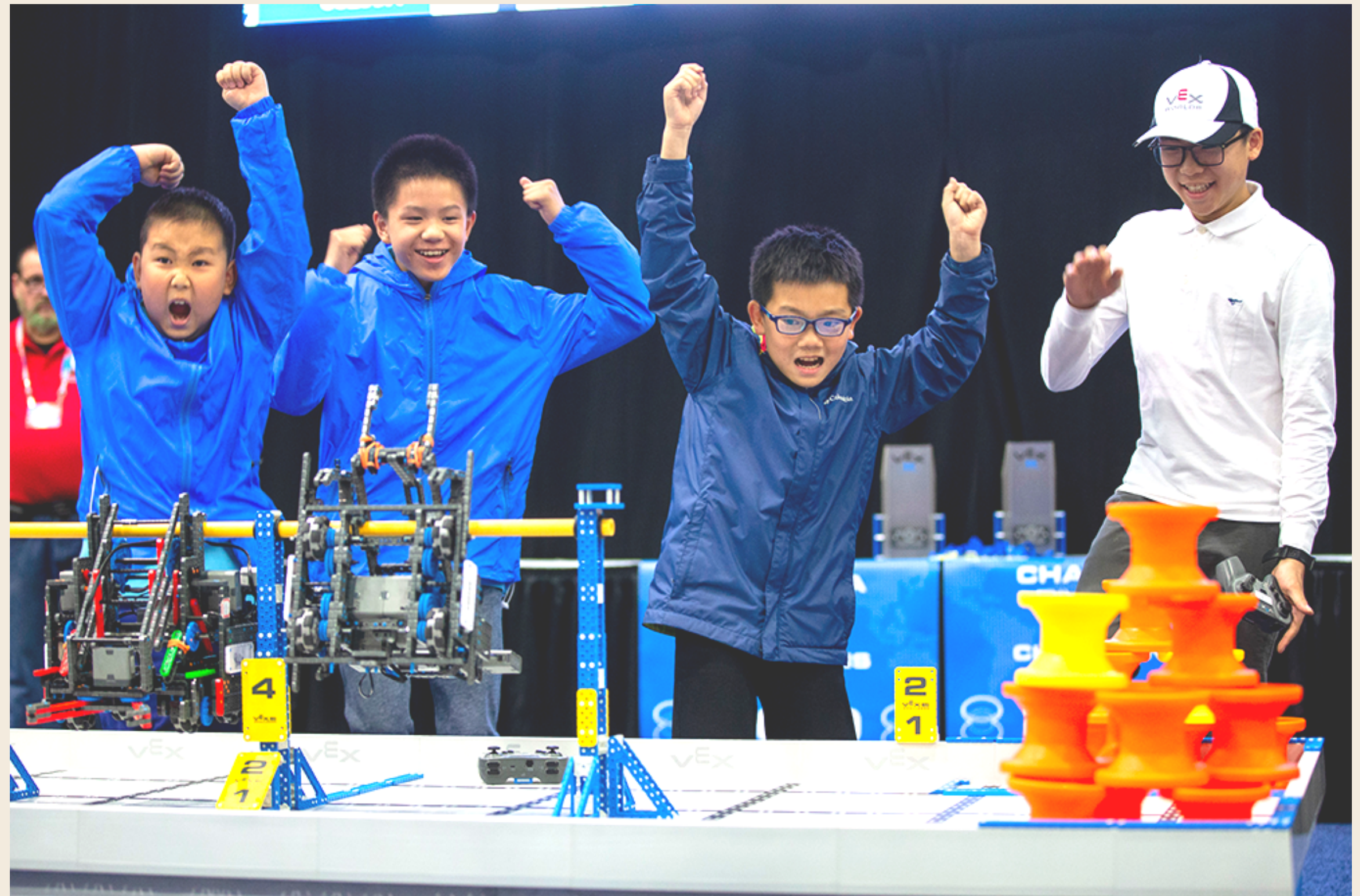
WE ARE DONE! RIGHT?

Not really. The design process is a repetitive process. Nothing is 'perfect' – everything has room for improvement. You can identify a problem in your product and restart the design process. Even though in Mercedes' case, it may seem like they are finished when they start production of the car, Mercedes will take the feedback from that car and improve it for the next car.

Designing is not a 'finite' concept – there is always something that can be done better.

HOW VEX PREPARES YOU..

- VEX is an international robotics competition
- You can design and create plastic/metal robots
- VEX gives you the opportunity to collaborate and compete with thousands of teams from across the planet
- Joining VEX will help you learn vital skills such as: communication, design, coding, critical thinking, problem solving and much more!



SOURCES

- [Mercedes-Benz Group at a Glance](#) (Mercedes-Benz Group)
- [The design process: from the idea to the prototype](#) (Mercedes-Benz Group)
- [The FORMula for design success](#) (Mercedes-Benz Group)
- [Mercedes-Benz Design Insight: Process](#) (Mercedes-Benz Group)
- [Advanced Design Studios](#) (Mercedes-Benz Group)
- [CFD Simulation](#) (SIEMENS)
- [Peter Stevens on the importance of clay models](#) (Peter Stevens)
- [How Car Testing Works](#) (How Stuff Works)



THANK YOU!

