

PHASE ONE

OF THE WALL

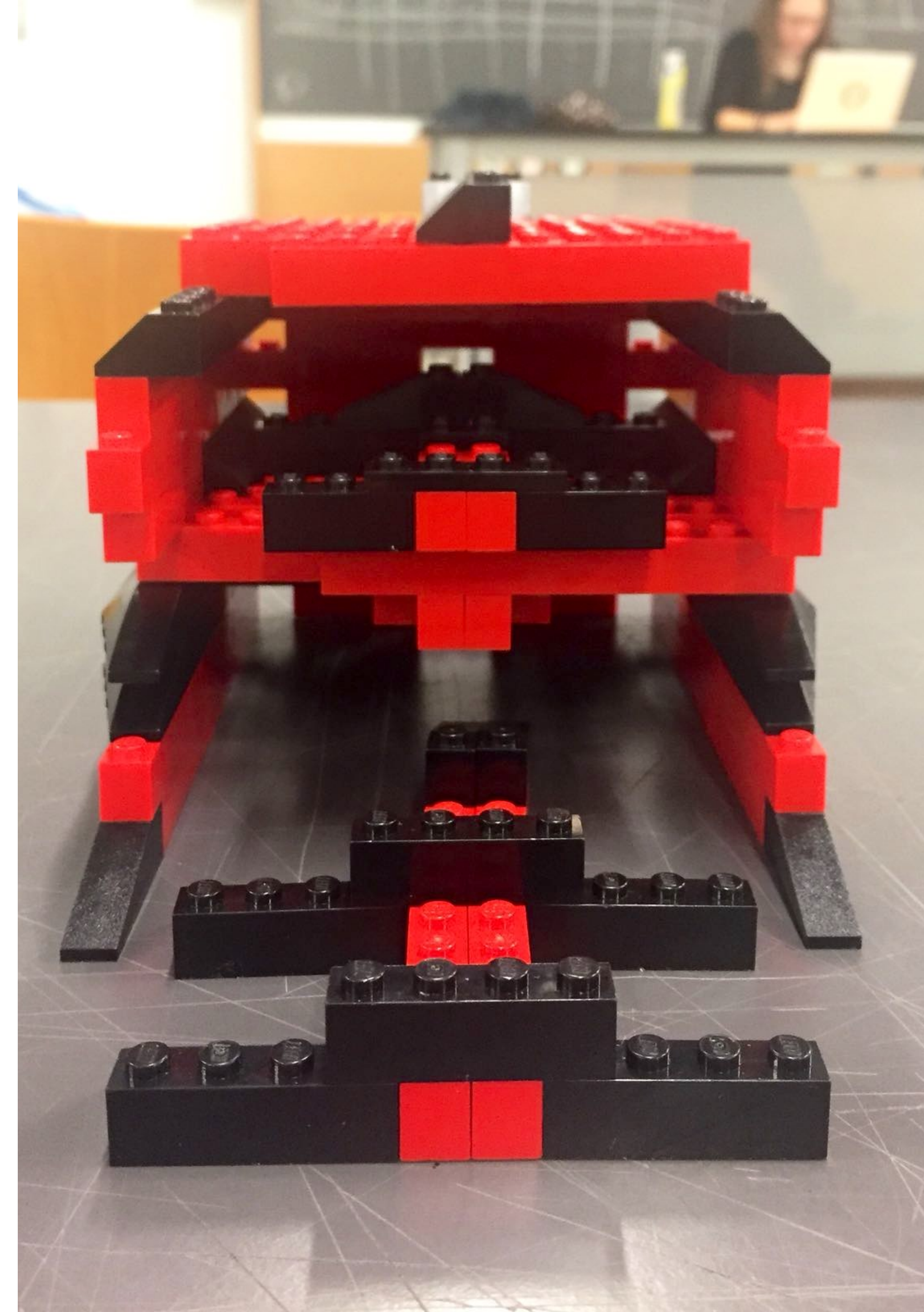
Customer 2



Q_1 WHICH STRATEGY DID YOU FOLLOW?

STRATEGY

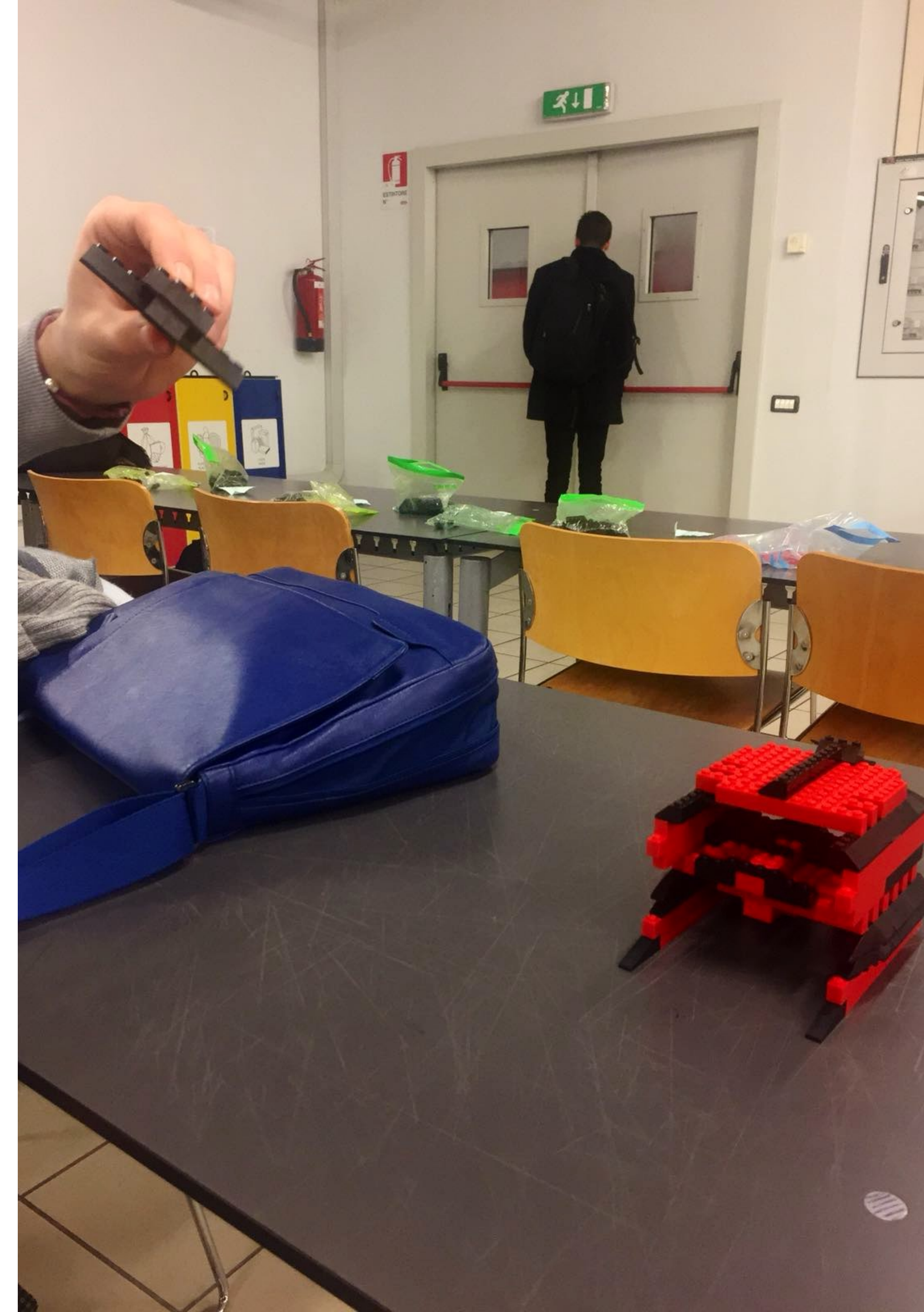
- WE STARTED FROM CUSTOMER CONSTRAINTS ABOUT PASSENGERS AND WEIGHT, SO WE STARTED FROM BUILDING THE BODY
- DURING THE TASK 1 WE REALIZED TWO ALTERNATIVE SOLUTIONS TO BE PROPOSED TO THE TESTING DEPARTMENT.
- IN ORDER TO DO THAT, WE DIVIDED INTO TWO DIFFERENT SUB-GROUPS, EACH ONE DEDICATED TO ONE PROJECT



Q_2 WHICH WAS THE MAIN CHALLENGE?

CHALLENGE

- WE JUST HAD CUSTOMER CONSTRAINTS, IN FACT TECHNICAL SPECIFICATIONS WERE GIVEN ONLY AT THE TESTING PHASE
- THE MAIN CHALLENGE WAS THE NECESSITY TO BE FLEXIBLE IN MAKING NEW HYPOTHESIS WHICH COULD FIT THE FURTHER SPECIFICATIONS GIVEN



Q_3 WHAT DID YOU DO **WRONG**?

ERRORS

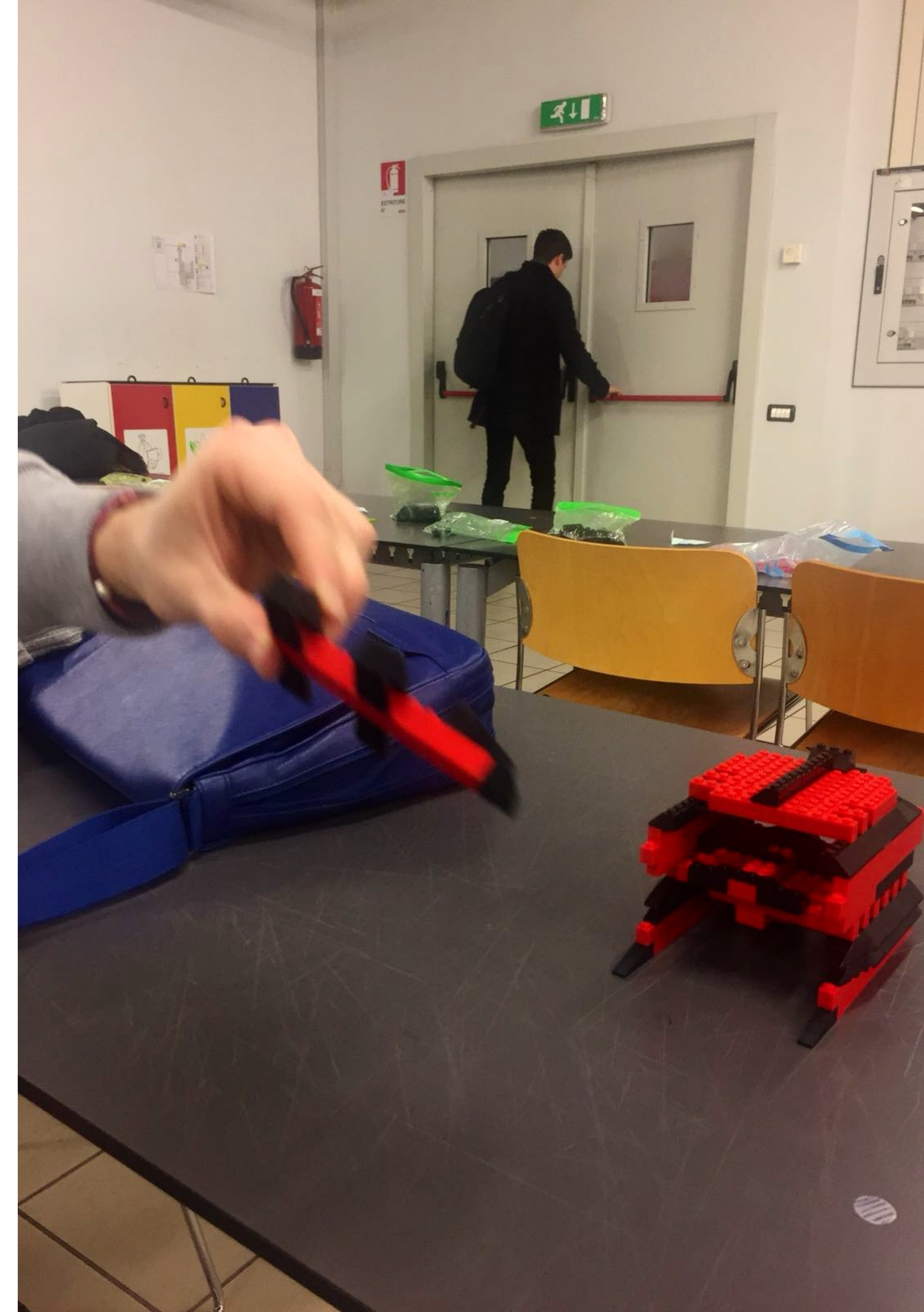
- WE HAD SOME ISSUES IN BALANCING THE COCKPITS WITH THE REST OF THE AIRPLANE
- IN ONE OF THE OPTIONS PROPOSED, WE HAVEN'T CONSIDERED PROPERLY THE CUSTOMER'S REQUIREMENTS BOUNDARIES



Q_4 WERE YOU **SUCCESSFUL**? WHY?

SUCCESS

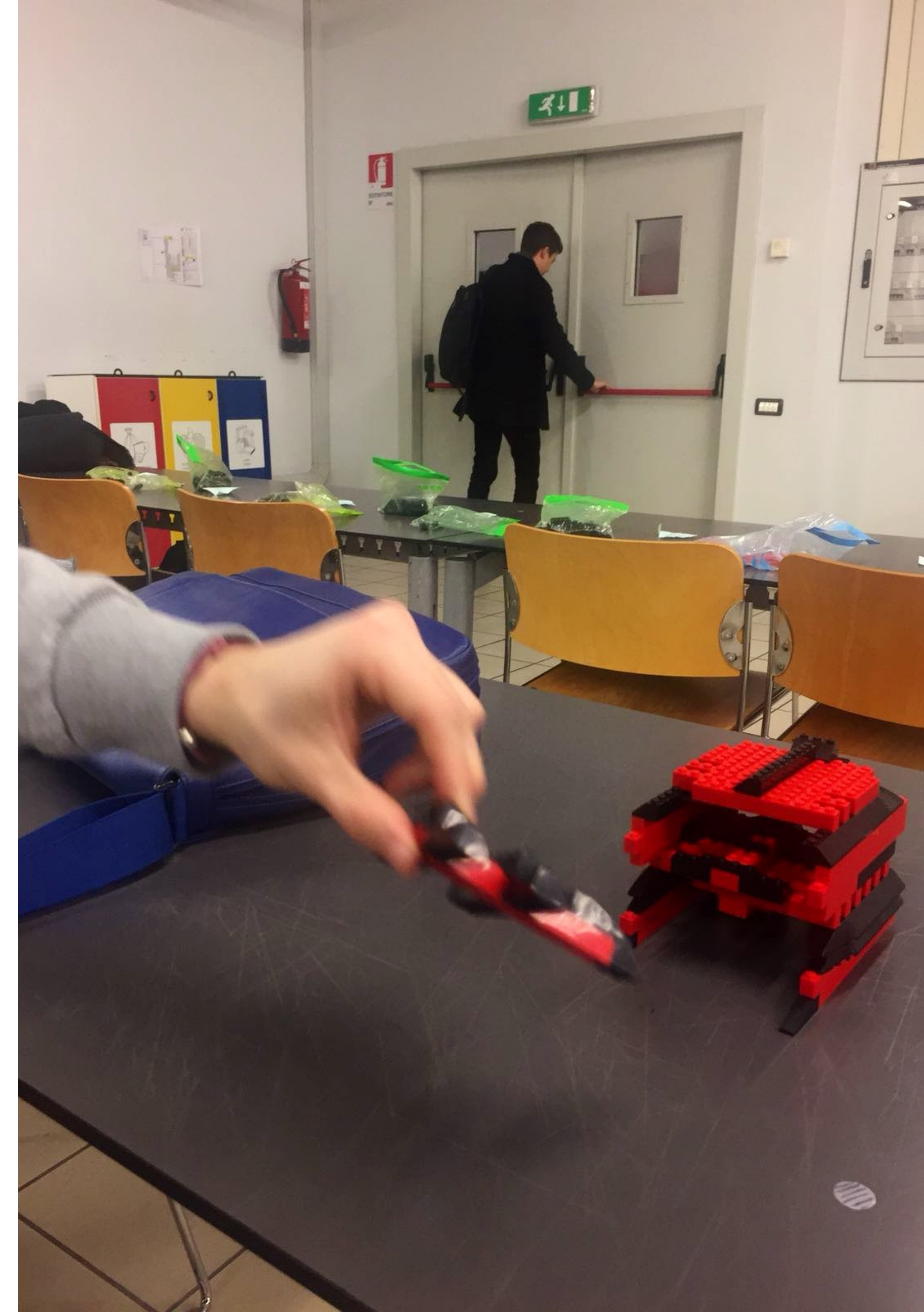
- — YES, WE ACHIEVED THE THIRD PLACE
- — (THE TWO-FLOOR HANGAR HELPED)
- — WE WERE ABLE TO CHANGE FAST OUR PROPOSAL AS WE ALREADY CONSIDERED ANOTHER ALTERNATIVE



Q_5 DO YOU KNOW **HOW MANY OPTIONS** YOU HAVE, IF ANY?

OPTIONS

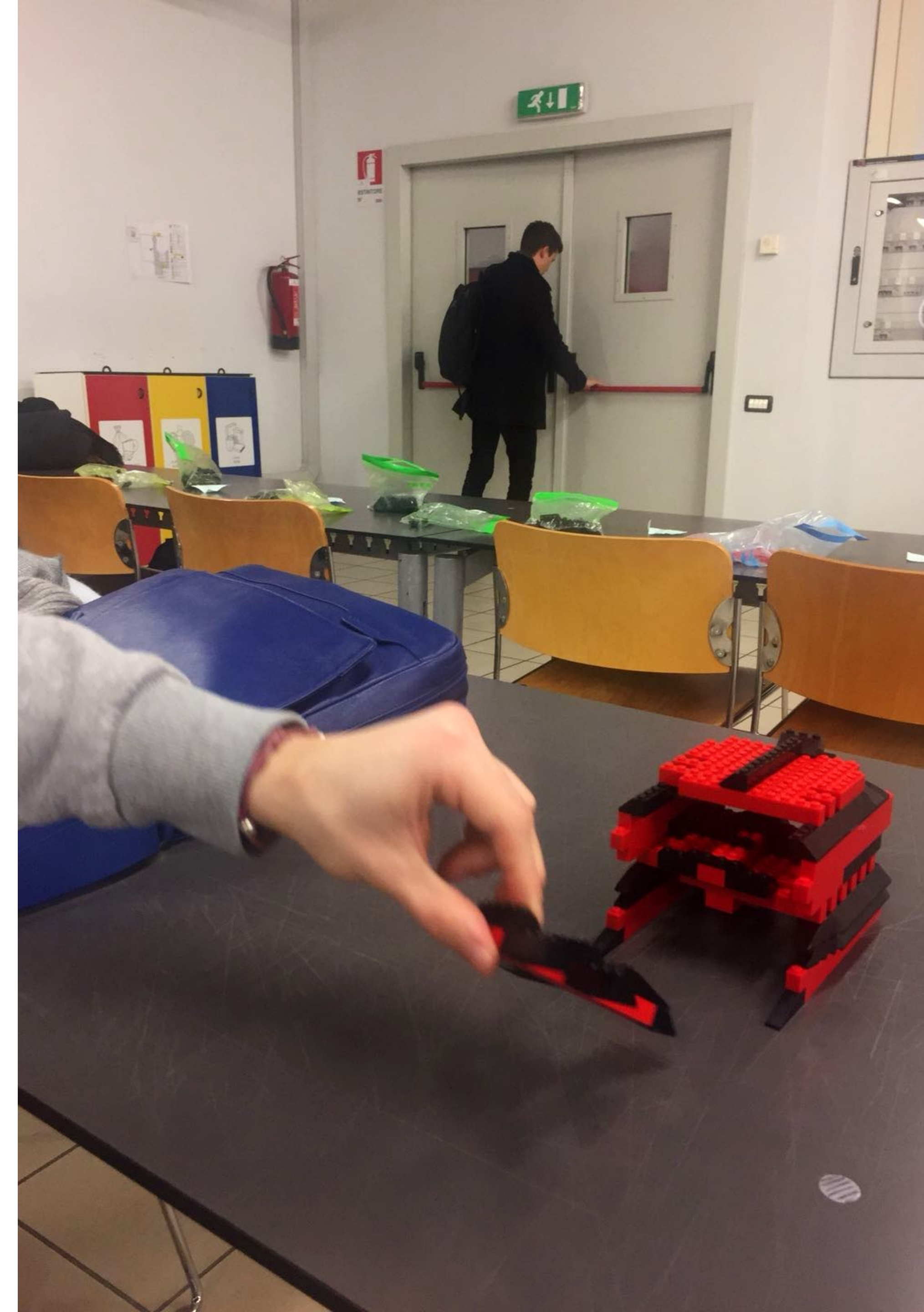
- WE TESTED FOUR DIFFERENT SOLUTIONS IN TWO ROUNDS
- FIRST ROUND: OUR FIRST PROPOSAL HAD COCKPIT PROBLEMS, THE SECOND ONE HAD BOTH COCKPIT AND WINGS LENGTH ISSUES
- SECOND ROUND: WE FOCUSED ON OUR FIRST PROPOSAL FIXING THE COCKPIT BY REDUCING ITS LENGTH



Q_6 WAS IT DIFFICULT? WHY?

DIFFICULTIES

- THE MAIN DIFFICULTY WAS RELATED TO THE CREATION OF FURTHER SOLUTIONS THROUGH TRIAL AND ERROR
- THE TECHNICAL SPECIFICATIONS WERE NOT CLEAR AS WE JUST KNEW THAT OUR PROPOSALS HAD SOME MISTAKES WITHOUT A SPECIFIC GUIDELINE TO SOLVE THE ISSUES



Q_7 HOW WOULD SUCH A BEHAVIOR **IMPACT PRODUCT DEVELOPMENT?** (TIME, COST...)

PRODUCT DEVELOPMENTNT

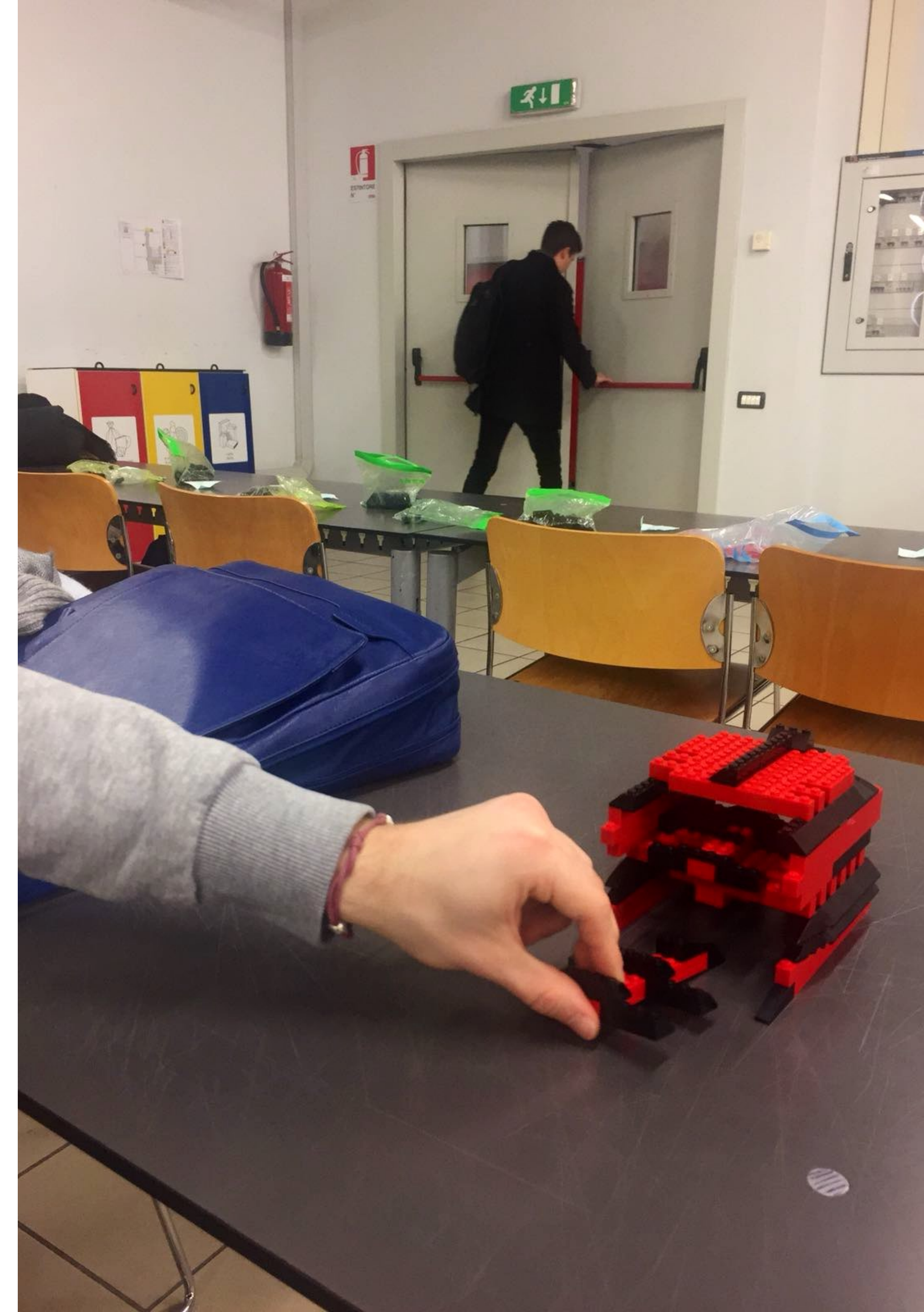
- — HAVING PROCEEDED BY TRIALS IN FIXING OUR SOLUTION, WE WASTED TIME AND RESOURCES
- — IN FACT, THE CONSTRUCTION OF SEVERAL AIRPLANE MODELS TOOK US LONGER TIME AND MORE PIECES



Q_8 FURTHER COMMENTS...

COMMENTS

- WE HAD FUN AS A GROUP BECAUSE EVERYONE COULD EXPRESS HIS PERSONALITY AND IDEAS
- DOING SO, EACH OF US FOUND HIS ROLE IN THE GROUP IN A FRICTIONLESS WAY



PHASE TWO

OF THE WALL

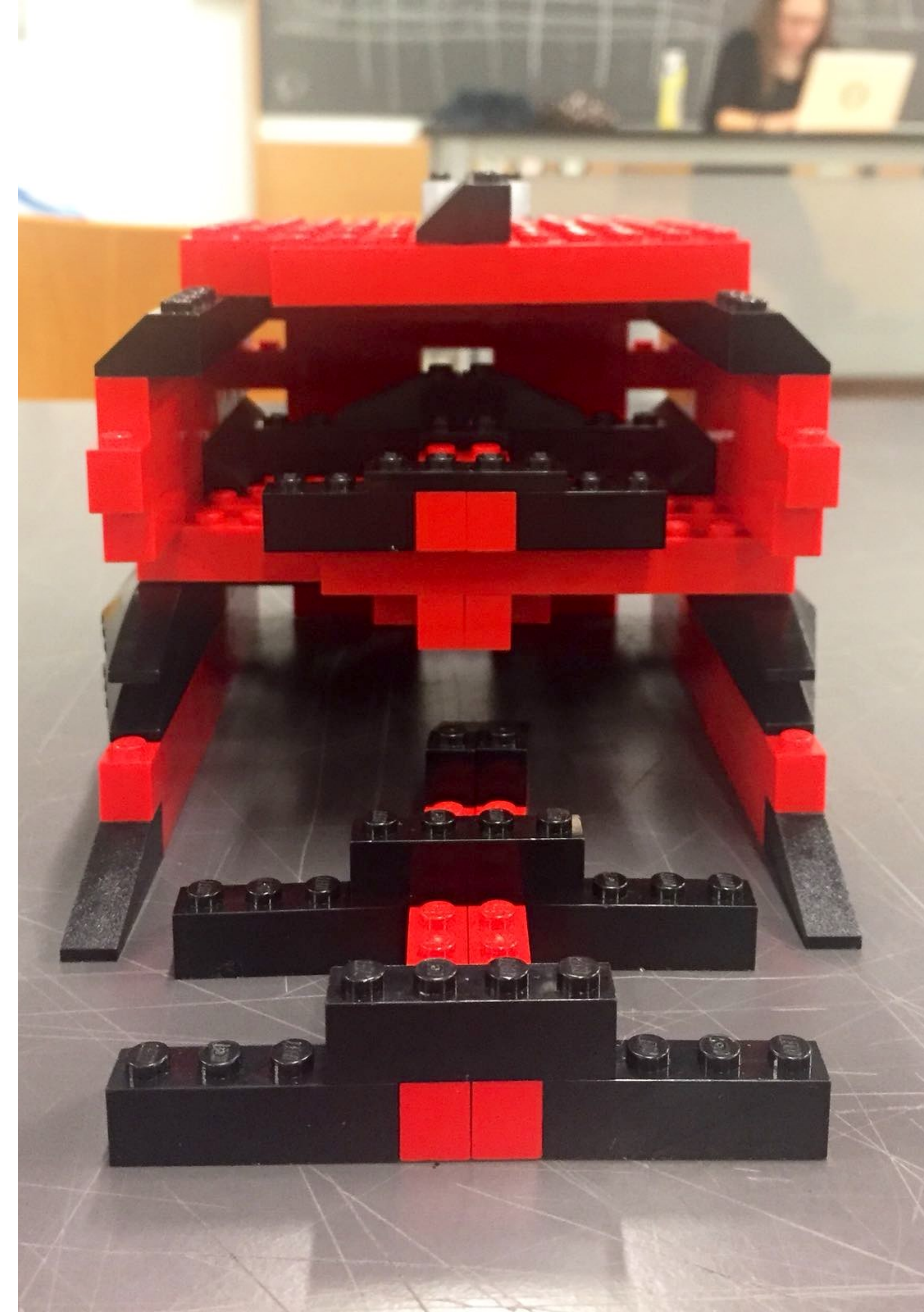
Customer 2



Q_1 DO YOU KNOW **HOW MANY OPTIONS** YOU HAVE, IF ANY?

OPTIONS

- WE HAD 6 OPTIONS
- 4 OF THEM HAD BODY WIDTH OF 2
2 OF THEM WITH A BODY WIDTH OF 3
- OF THESE SOLUTIONS, ONLY ONE WAS FEASIBLE (THE ONE FOUND IN PHASE 1)



Q_2 WAS IT MORE DIFFICULT/EASY? WHY?

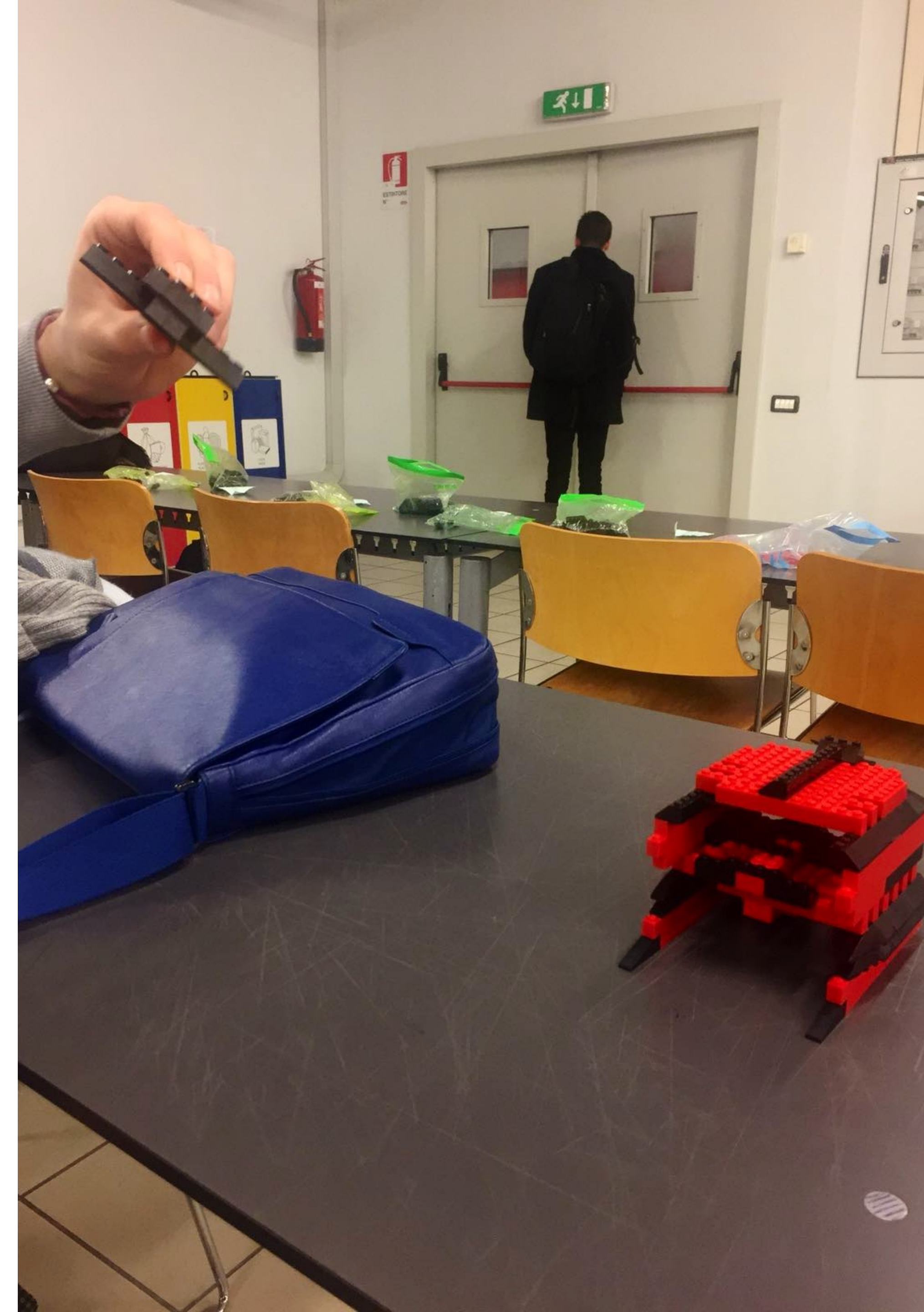
COMPARISON



IT WAS EASIER SINCE WE FOLLOWED A STRUCTURED APPROACH WHICH GAVE US A WIDER RANGE OF OPTIONS COMPARED TO THE PHASE 1



IT WAS A MORE EFFICIENT APPROACH COMPARED TO THE PHASE 1 IN TERMS OF THE FEASIBILITY OF THE SOLUTIONS



Q_3 WHICH ARE THE MAIN DIFFERENCES WITH PHASE 1?

MAIN DIFFERENCES

- THE FIRST DIFFERENCE IS THAT IN PHASE 2 WE RECEIVED PAPERS ILLUSTRATING TECHNICAL SPECIFICATIONS
- THANKS TO THOSE PAPERS WE COULD TAKE NOTES OF OUR KNOWLEDGE ADVANCEMENTS AVOIDING TO REPEAT THE SAME MISTAKES, AS WE DID IN PHASE ONE

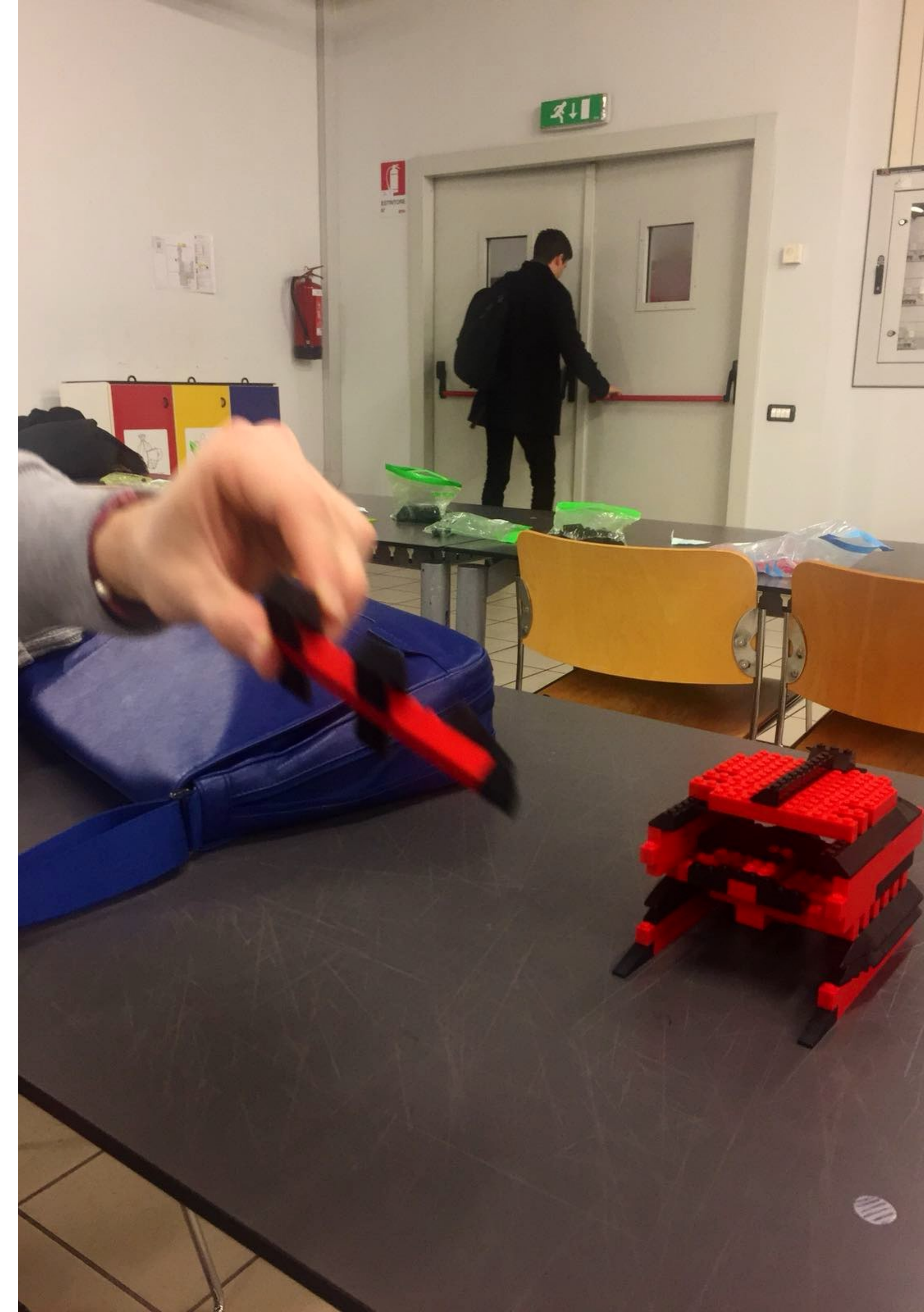


Q_4 HOW WOULD SUCH A BEHAVIOR **IMPACT PRODUCT DEVELOPMENT?** (TIME, COST...)

PRODUCT DEVELOPMENT



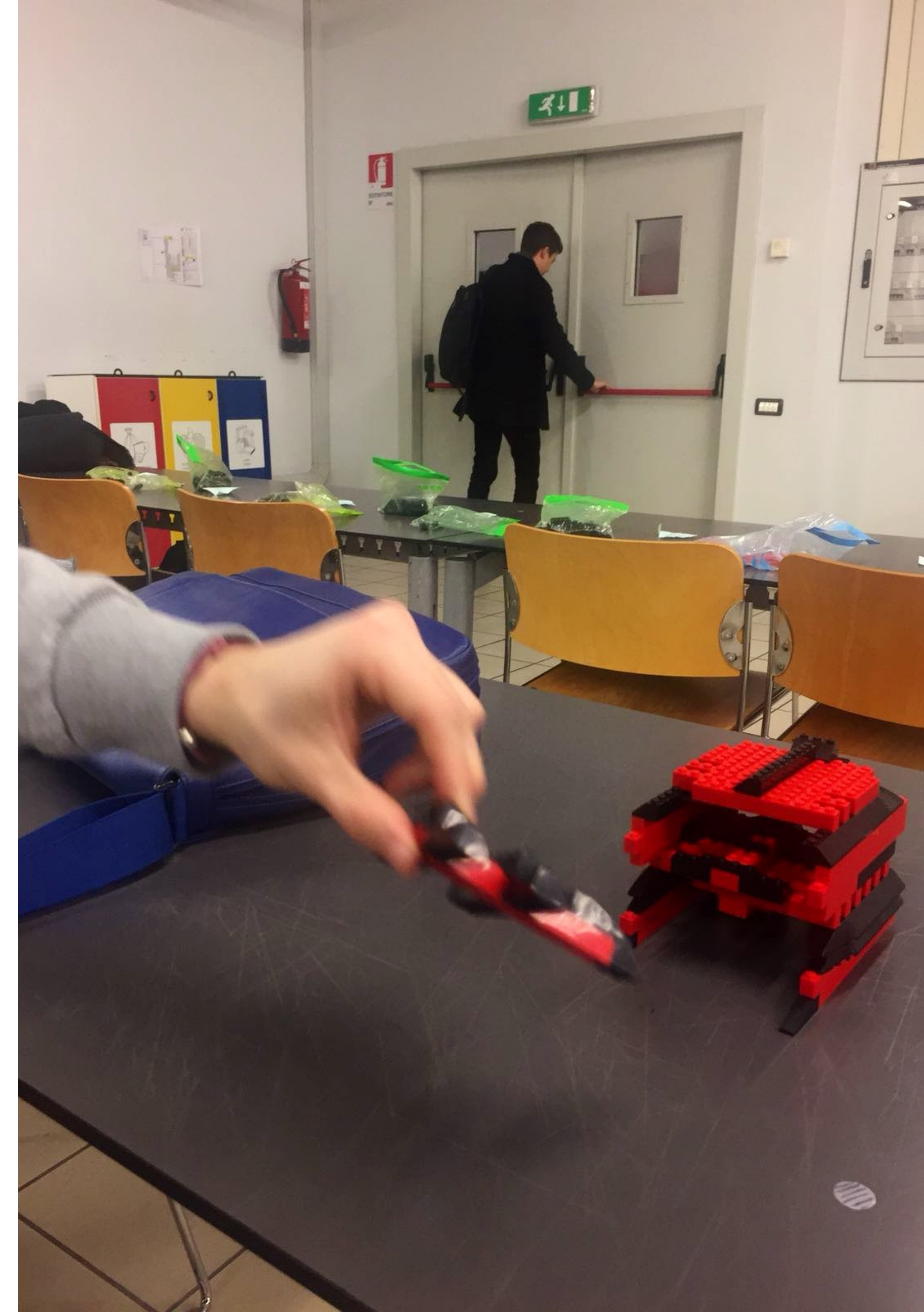
IT ALLOWS TO REDUCE TIME AND COSTS BY PROTOTYPING JUST THOSE SOLUTIONS WHICH ARE THEORETICALLY FEASIBLE



Q_5 WHAT IF YOU HAVE TO SATISFY A DIFFERENT CUSTOMER?

DIFFERENT CUSTOMERS

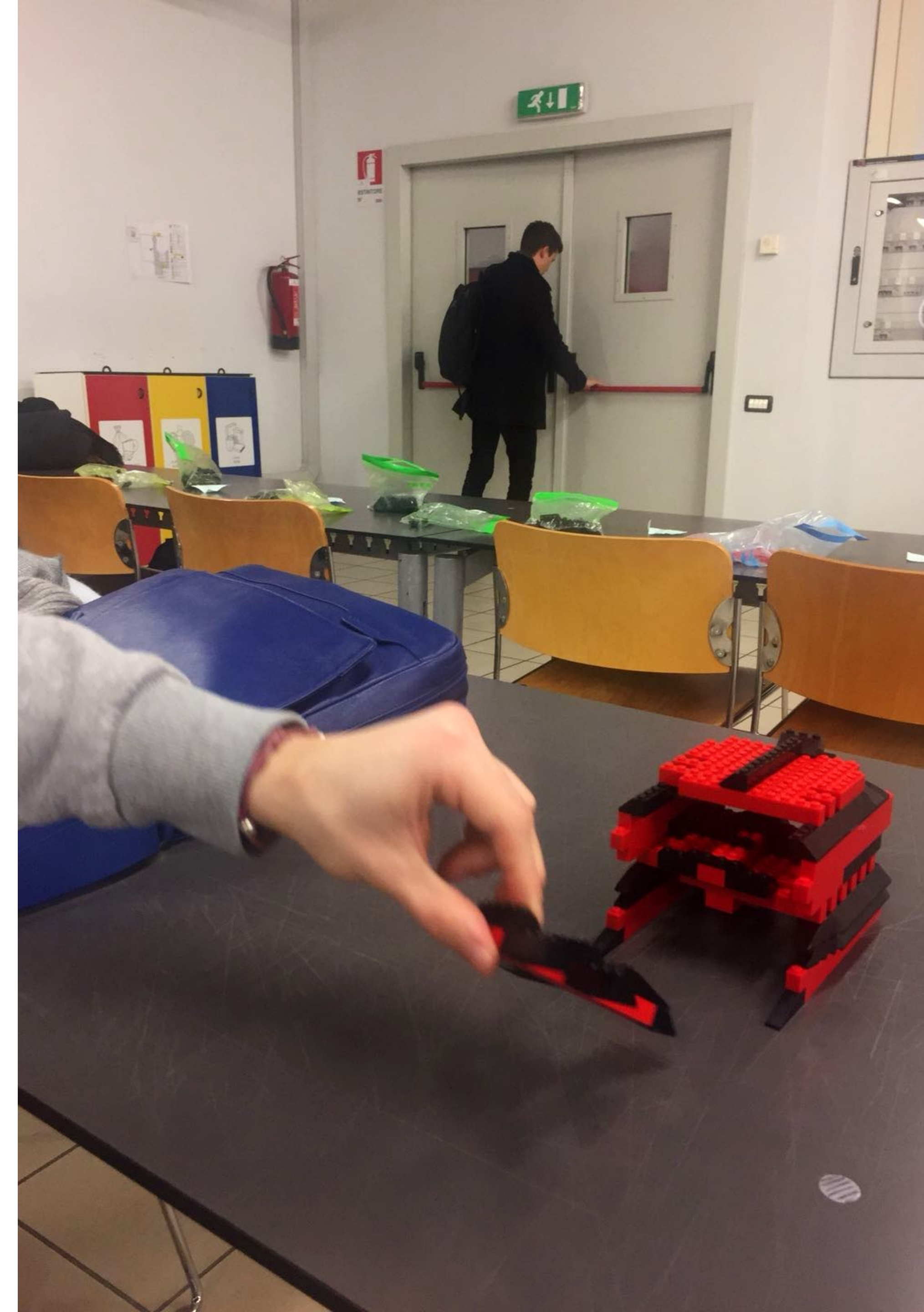
- IF WE HAD TO SATISFY A DIFFERENT CUSTOMER WE COULD USE THE SAME METHOD WITH SAME TABLES AND TOOLS
- MOST IMPORTANT, WE WOULD BE ABLE TO APPLY THE KNOWLEDGE BUILT FOR CUSTOMER TWO



Q_6 WHY DO YOU THINK IS IMPORTANT TO HAVE/USE/REUSE FORMAL KNOWLEDGE?

FORMAL KNOWLEDGE

- — FORMAL KNOWLEDGE ALLOWS THE TEAM TO CREATE DIFFERENT PROJECTS ANSWERING TO DIFFERENT CUSTOMERS' NEEDS WITHOUT STARTING FROM SCRATCH
- — THIS WOULD ALLOW TO REDUCE TIME AND COSTS

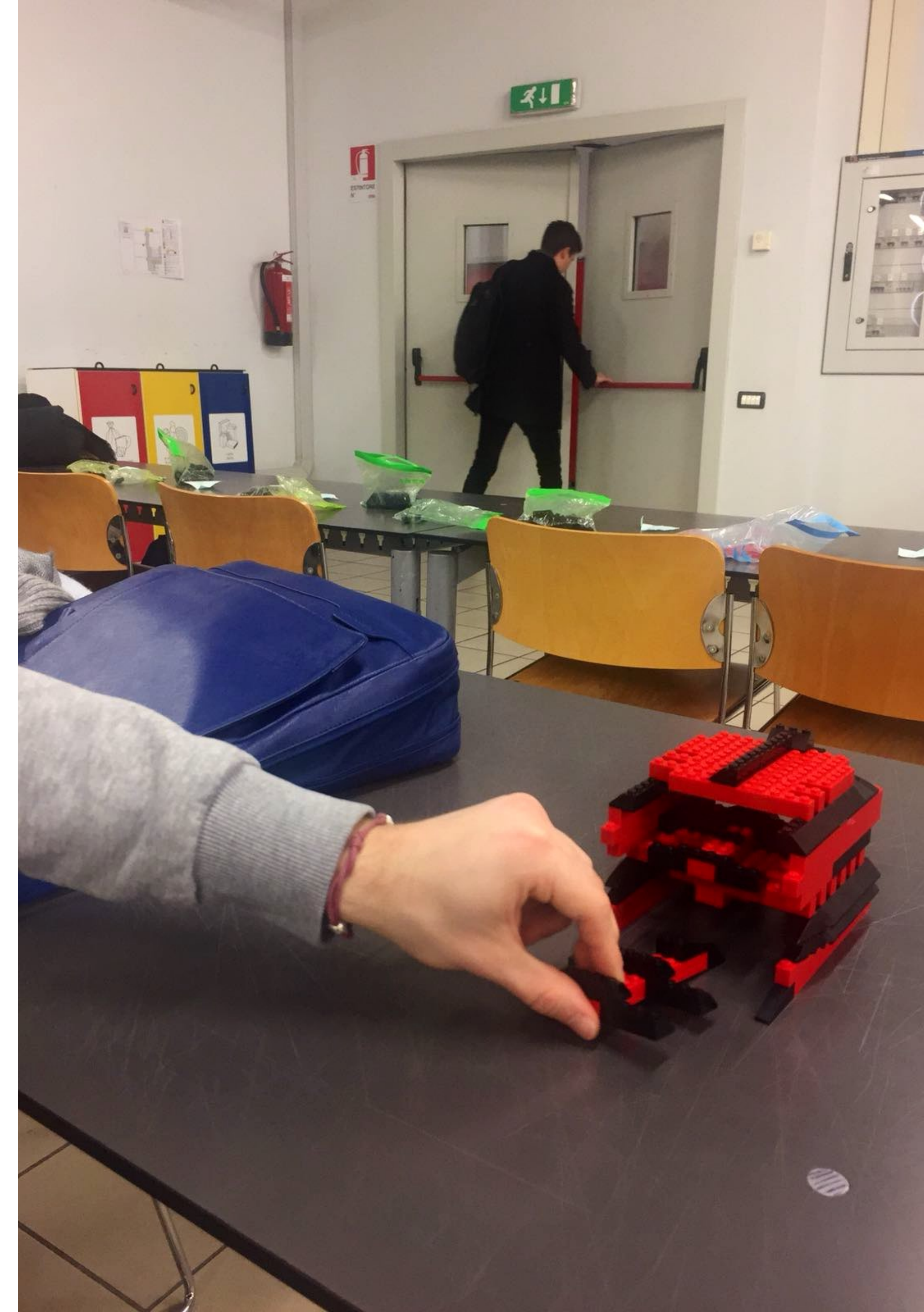


Q_7 FURTHER COMMENTS...

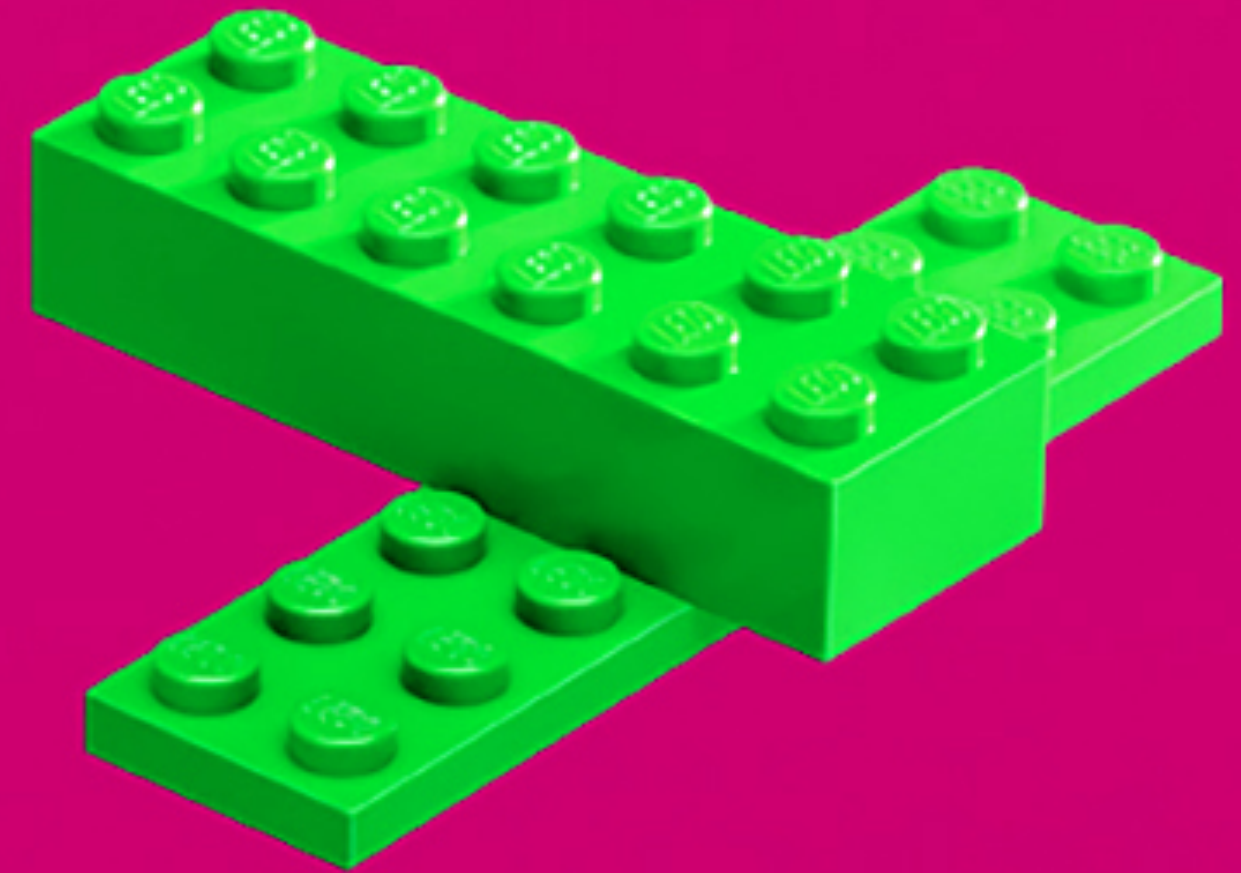
COMMENTS

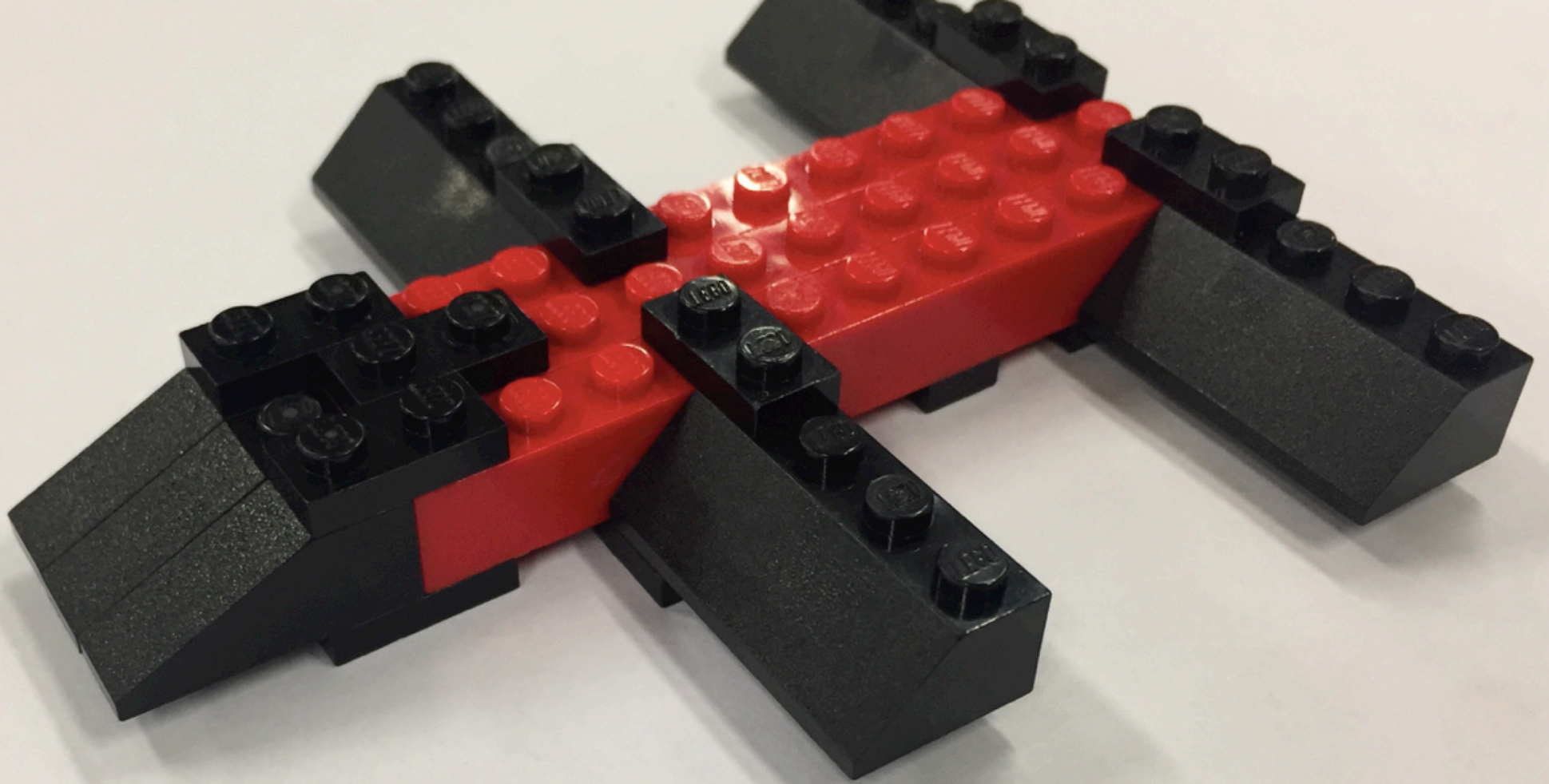


DISCOVERING THAT THE FEASIBLE SOLUTION WAS JUST ONE, WE COULD USE THE ONE-FLOOR HANGAR AVOIDING THE WASTE OF RESOURCES USED TO BUILD THE SECOND FLOOR



**THANK
YOU**





6 WINGS

WHICH STRATEGY DO YOU FOLLOW?

- ✓ We didn't split the group, we decided to work together
- ✓ Step by step approach, starting from the body
- ✓ Firstly all the length and width constraints and then the weight one.
- ✓ We didn't consider how the plane look like 😊

WHICH WAS THE MAIN CHALLENGE YOU FACED?

- ✓ We didn't face any big challenge, our approach (step-by-step) resulted successful after few attempts



WHAT DID YOU DO WRONG?

- ✓ The first time the problem was related with a lack of knowledge about the design constraints
- ✓ The wrong elements in the first phase were the cockpit length, the ratio of weight and the wing span

AND WHERE YOU SUCCESSFUL? WHY?

- ✓ After few tries, our plane respected all the constraints of customers.
- ✓ We quickly fulfilled design problems
- ✓ The **second** trial was PERFECT! the airplane was ready to fly!
- ✓ The main problem that we faced was the unknown of the design department constraints.



DO YOU KNOW HOW MANY OPTIONS YOU HAVE, IF ANY?

- ✓ We didn't calculate the exact number of options because our approach was "trial and error", but we made a second alternative-design that works!

WAS IT DIFFICULT? WHY?

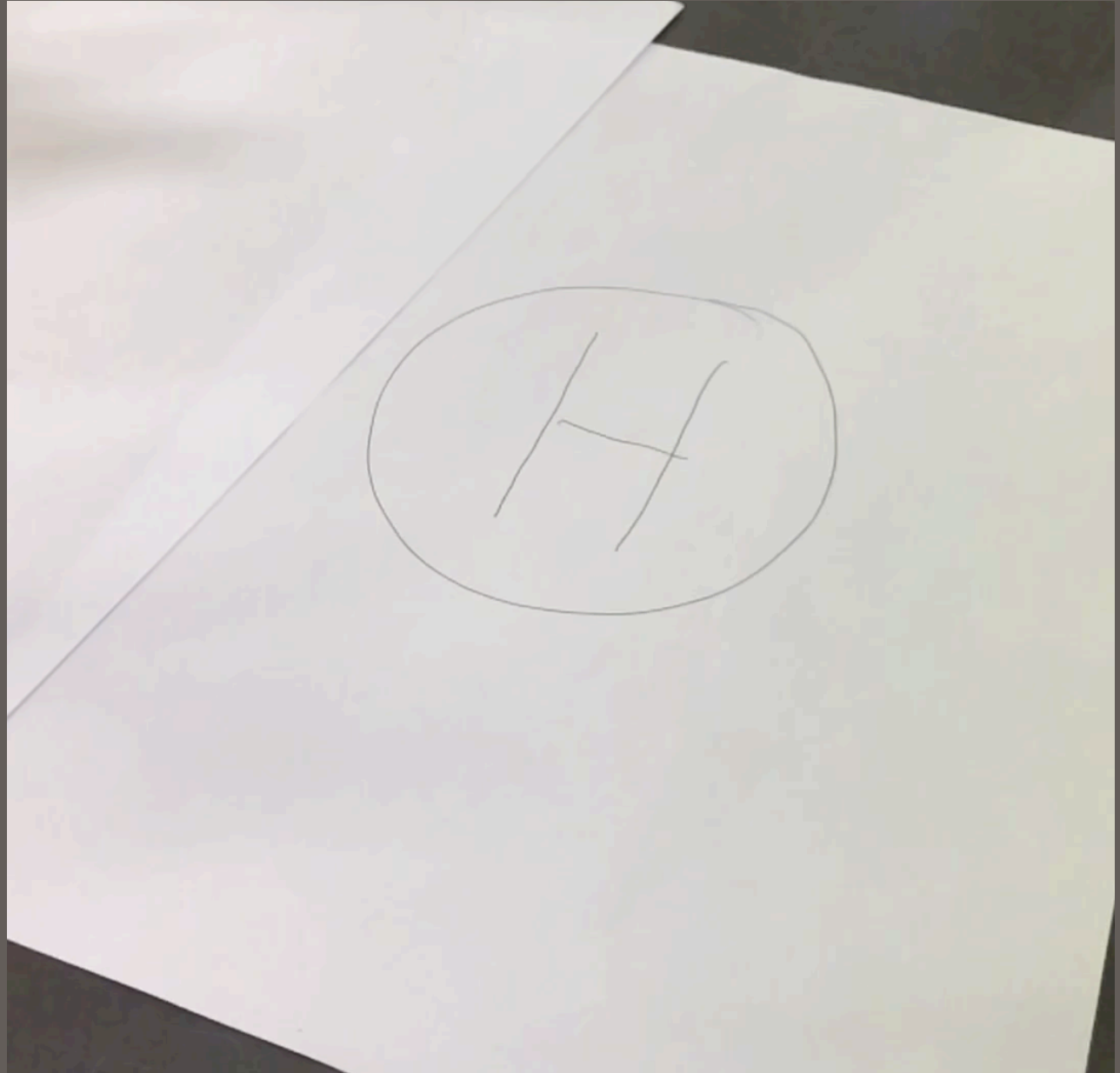
- ✓ No due to the fact that the model was highly simplified respect to the complexity of the reality

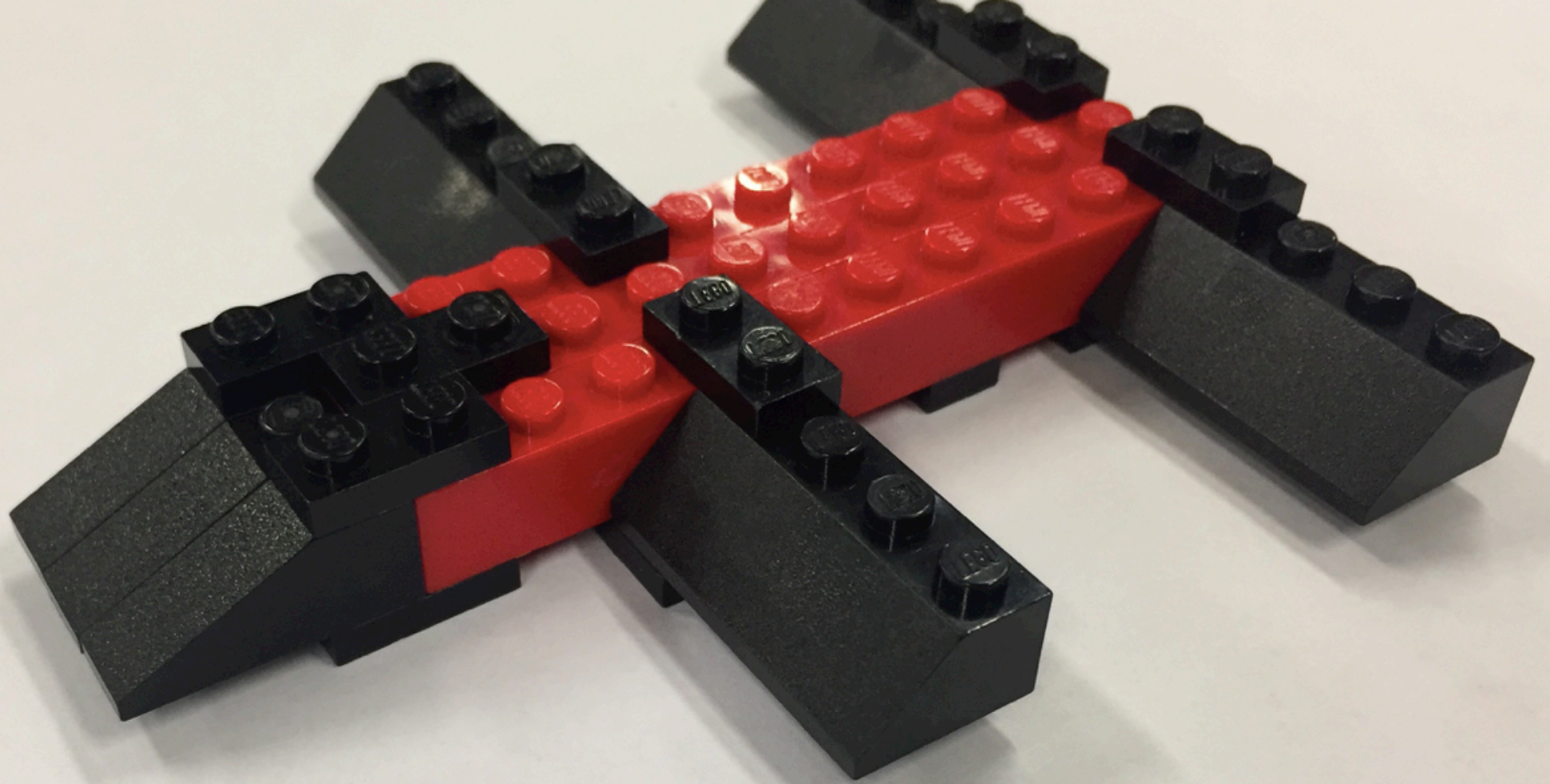
HOW WOULD SUCH A BEHAVIOR IMPACT PRODUCT DEVELOPMENT?

- ✓ Because of the high speed of the design phase, we reduce the **TTM**
- ✓ The design of the plane is very simple, but very functional
- ✓ We are not considering the **supply** side of network, so it's could be risky because we have no information on the prices



**LET'S
FLY!**





6 WINGS - Phase 2

DO YOU KNOW HOW MANY OPTIONS YOU HAVE, IF ANY?

- ✓ After the application of the second method, the team know that we have 3 possible options

WAS IT MORE DIFFICULT/EASY? WHY?

- ✓ The second approach was more difficult: meanwhile we have to consider the constraints of different parts and the combination of them. It required more time and effort.



WHICH ARE THE MAIN DIFFERENCES WITH PHASE 1?

- ✓ Deeply study of different parts
- ✓ Combination of possible solutions
- ✓ Immediately elimination of solutions that not fulfil the customer, supplier and design requests

HOW WOULD SUCH A BEHAVIOR IMPACT PRODUCT DEVELOPMENT?

- ✓ In relation to the phase one, the time of product development is longer, so we expected also higher costs due to delay in the development phase
- ✓ The advantages of having more options is that the team could embrace different customers and requests
- ✓ Flexibility is higher due to the higher number of option



WHAT IF YOU HAVE TO SATISFY A DIFFERENT CUSTOMER?

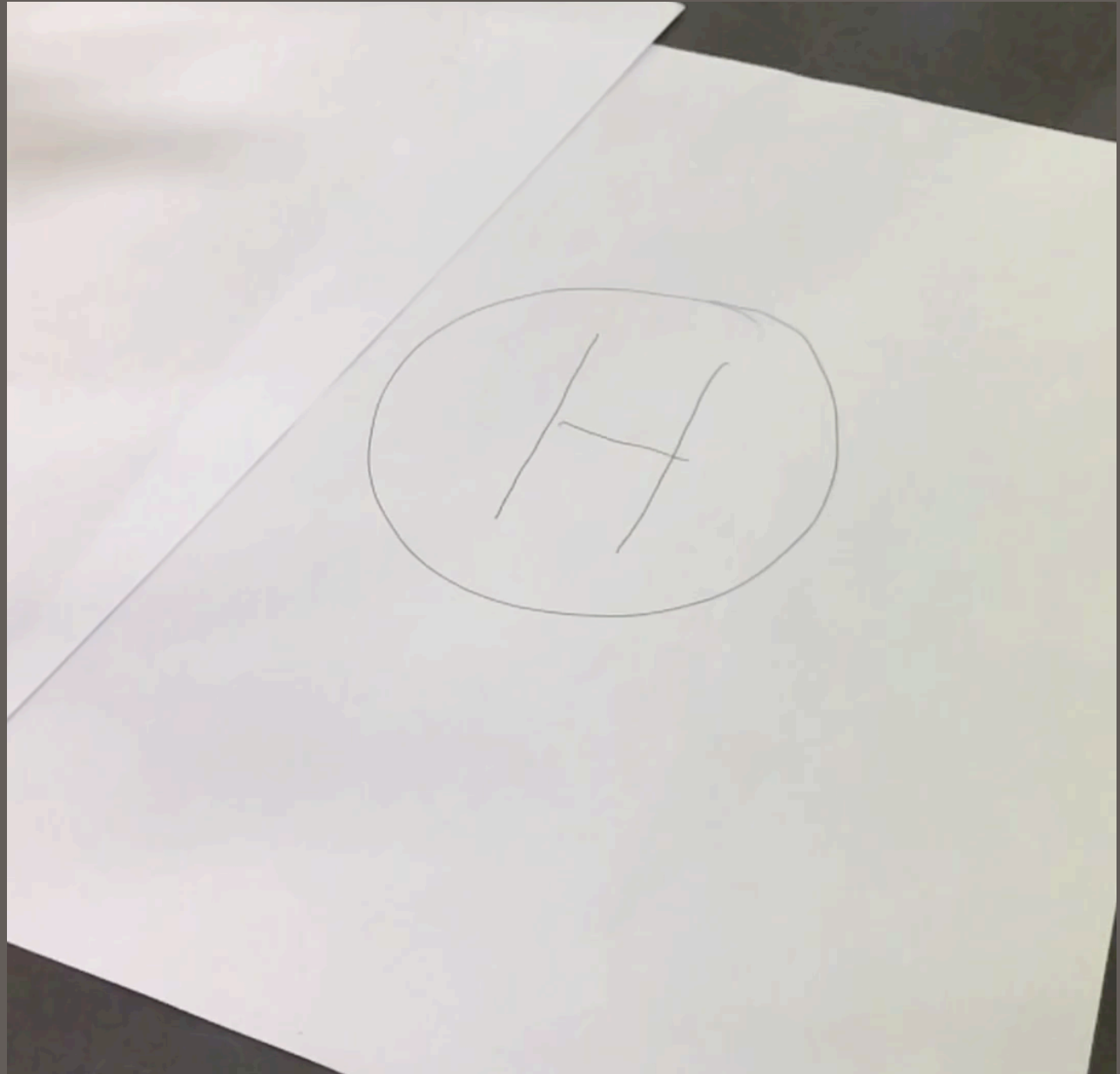
- ✓ In the case of different customer, we take advantages from the second method because we have more than one option

WHY DO YOU THINK IS IMPORTANT TO HAVE/USE/REUSE FORMAL KNOWLEDGE?

- ✓ Formal knowledge is useful for the re-design process: if I want to satisfy a customer with constraints that are not fulfilled by my options, I can re-design quickly the plane looking at the charts
- ✓ Formal knowledge can change during time due to innovation: a modification of the chart can show new possible solutions
- ✓ If we automatize the process of product development, it becomes easier to find the optimal options and with the update of charts, new feasible planes show up



**LET'S
FLY!**



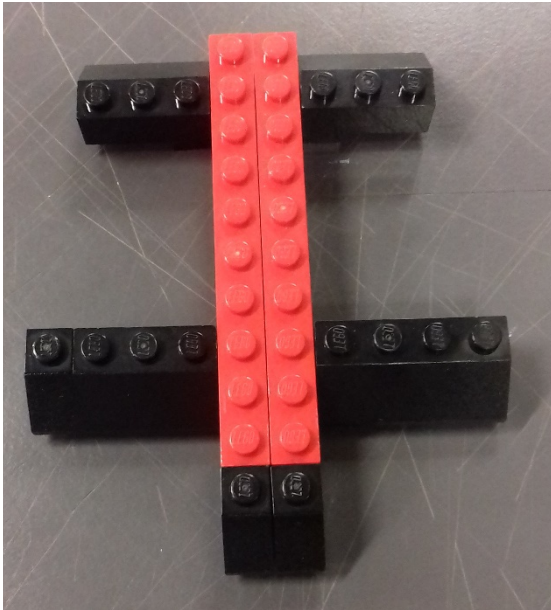


LEGO 707

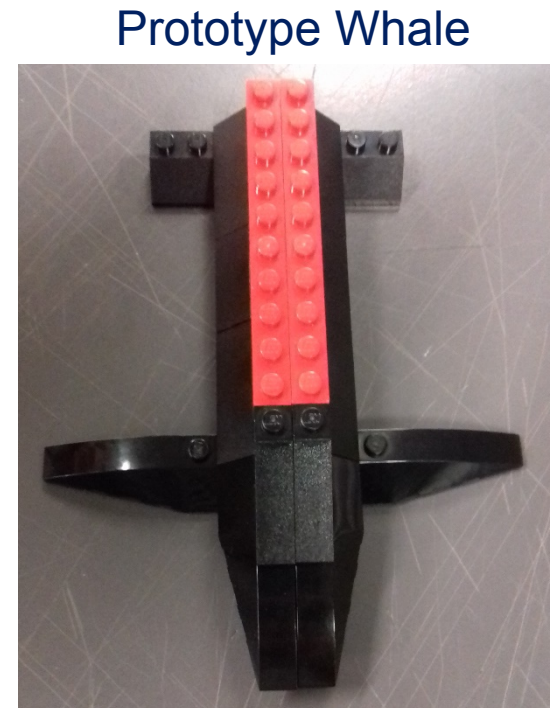
Phase 1

The strategy

- Divide into three different departments (cockpit+body; wings; tail)
- We calculate how many points we need
- First strategy was to do the simplest way as possible
- Second strategy more complex design



Prototype Turtle



Main challenge

- To be inside the constraints



What did we do wrong?

- Everything was respecting customer's requirement yet the wings were not entirely satisfying



Key points for success

- We pretested several times before presenting our project
- We worked in time
- We let our imagination guide us



How many options?

- A lot: we design two very different ones without need to really think to find them



Difficulties

- Not really difficult (easy requirements)
- To assemble pieces
- A little bit more in case of a more complex design to have a symmetric plane



Impacts

- We discussed a lot so we lose a bit time building the plane yet we just need to test two times the first plane and one the second one before validate them
- To divide into departments saved us time because we were working in parallel and we did not lose time by looking for other options



Phase 2

Do you know how much options do you have ?

- Yes, 4

Was it easier or more difficult?

- It was easier because we cancelled non feasible solutions with systematic approach
- We had the appropriate documents

Which are the main differences with phase 1 ?

- We didn't build the plane directly so we didn't build non feasible solutions
- We first determined what the correct dimensions were
- We considered the technical constraints as well

How would such behavior impact product development ?

- Making all the calculations takes time but at the end we gain time by avoiding mistakes. (and re doing design phase again and again)
- We avoid building and designing costs

What if you have to satisfy a different customer ?

- We build an algorithm that computes automatically all the options.
- We ask to the customers the same type of desired features (general and technical ones)

Why do you think it is important to have/use/reuse formal knowledge ?

- It enables to save time
- Less risk of failures (gain in quality)

EMBRAER

SOFIA TORRES

SOFIA HADDAD MARIANO

RODRIGO TROTTA YARYD

LUCA VENTURELLI

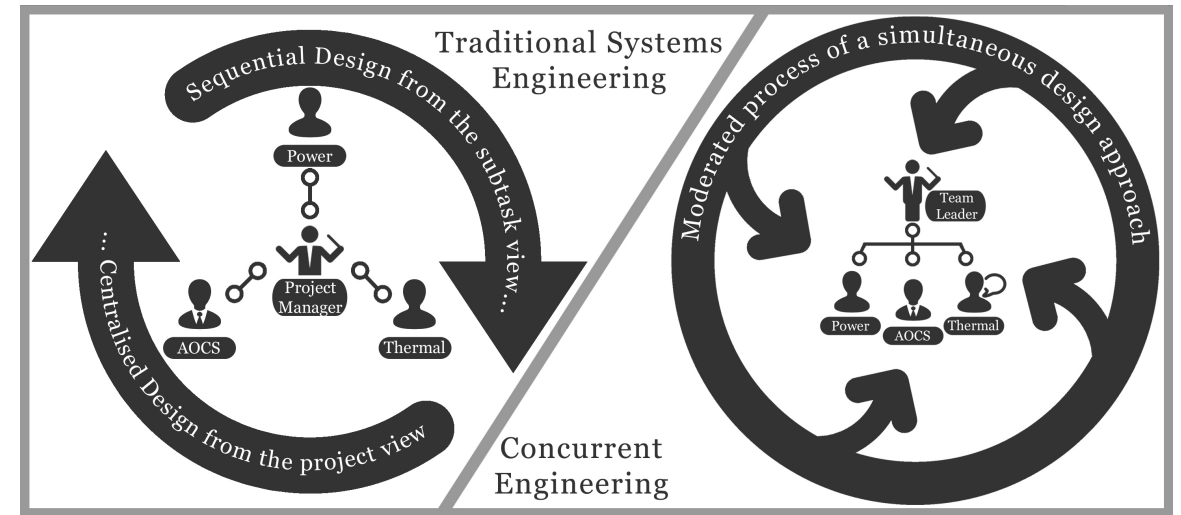
KONSTA KILPONEN

Phase 1



Which strategy did you follow?

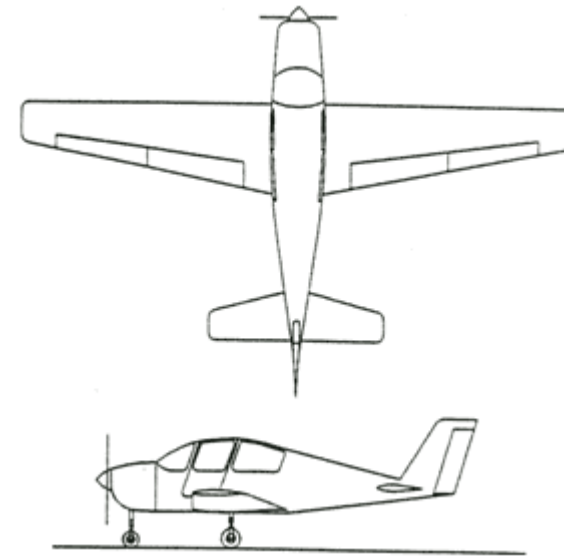
We tried to merge the different development phases by using a concurrent engineering strategy. This strategy was used to optimize time and attempt to fulfill all of the constraints at the same time, it is also called integrated product development



<http://www.dlr.de/irs/en/desktopdefault.aspx/tabid-11079/#gallery/29532>

Which was the main challenge you faced?

The main challenge we faced was to respect all of the constraints during the design and fulfill the parameters imposed by the client. If we changed one detail on the design it affects all of the other areas.



<https://it.mathworks.com/help/aeroblks/examples/lightweight-airplane-design.html?requestedDomain=true>

What did you do wrong?

We didn't gather all the information we needed at the beginning, that lead us to fail because we didn't compute all the possibilities. Also, during some trials we discovered that there were more constraints imposed by the client, that before we weren't aware of.



<https://www.istockphoto.com/it/vettoriale/suoneria-sveglia-sveglia-al-mattino-disegno-gm450988789-23705853>

Were we successful? Why?

Yes, once we gathered all the information needed (possibility to use more than a single lego part to build larger wings and tail) we were able to fulfill the project constraints and client requirements.



Do you know how many options do you have, if any?

No, we tried to develop a successful solution in a trial and error process. Improvements were made on top of the previous model based on the feedback received.

Was it difficult?

Yes, because there were many constraints to be followed and we build several prototypes until we reached one that was within the project specification. Also, relevant information was missing in the early stages of the process, which led us to make mistakes we were unaware of.

How would such behavior impact product development?

The lack of knowledge about the project's regulation reduces the flexibility during its development and could increase time and cost of the overall process.

Phase 2

Do you know how many options you have, if any?

Following this new strategy made it possible for the group to know the number of options for the project. However, due to the specific client's requirements, there were many combinations for this project, which made it unfeasible for the group to explore all of them and select the adequate ones through the proposed method in the given time.

Was it more difficult/easy? Why?

It was easier to figure out the possible combinations of the parameters for the project, however required a lot of time to evaluate all the possibilities due to the large number of resulting combinations.

Which are the main differences with phase 1?

The main difference is that in the first phase the project was developed on a trial and error basis, while the second phase involved the analysis of all possible combinations of parameters in order to reach the final solutions. This lead the development of the project to be more guided and faster, resulting in a more efficient process.

How would such a behavior impact product development?

Such a behavior would lead the project to be developed in a more organized and efficient way, avoiding unnecessary effort building prototypes that don't comply to all of the customer's requirements. This behavior allows the conformity of the proposition to be evaluated in earlier stages of the process, which saves time and avoids redundant and dispensable costs.

What if you have to satisfy a different customer?

If we have to satisfy a different consumer it would be easier with the approach applied in the second phase as it is faster and more efficient when exploring all the project possibilities that fulfill the imposed requirements.

Why do you think it is important to have/use/reuse formal knowledge?

It is important to have/use/reuse formal knowledge because it gives a head start in the project development, once information about previous trials and studies help guide the new trials, avoiding the repetition of mistakes and the retesting of ideas that might have already been proven as inadequate for the project. This speeds up the process, while still guaranteeing that the requirements and limitations are being followed and that all of the possibilities of the project are being explored. It allows the project to progress on top of the formal knowledge previously acquired, generating improvements instead of the employment of effort to reach the same results.



SCBE Game

Team Eagle

**Charlott Kapic, Andre Johansson Kucera, Angelique
Marey, Seyed Mehdi Ghaemi, Davide Carrer, Bijin Babu**

1. Which Strategy did you follow?

Initially studied the given information and the customer requirements. Starting from all the body compositions and then going into more detail, we eliminated the combinations that were not allowed.

2. Which was the main challenge you faced?

Combining the customer requirements with the technical constraints.

3. What did you do wrong?

Miss understood the value of the cockpit point which changed the whole technical requirement.

4. Why were you successful?

We met the customer requirements and the technical requirements in our first try itself.

5. Do you know how many options we have?

We just have 1, because all the other options we tried could not meet both the customer and the technical requirements.

6. Was it difficult?

No, it was just a matter of logic and team work.

7. How would such a behavior impact product development?

The customer and the technical requirements when provided in the beginning help us in finding the right combination.



PHASE 2

1. Do you know how many options you have?

We got 2 options.

2. Was it more difficult?

No, because we had a better way of investigating different options.

3. Which are the main differences with Phase 1?

The work was more organized and we did not have to do Trial and Error.

4. How would such behavior impact product development?

It would reduce the cost and time consumption.

5. What if you have to satisfy a different customer?

Since we have all the data, we would only have to repeat the process but with new customer requirements.

6. Why do you think it is important to have formal knowledge?

So you do not have to repeat the whole process in order to find a solution that meets both customer and technical requirements.

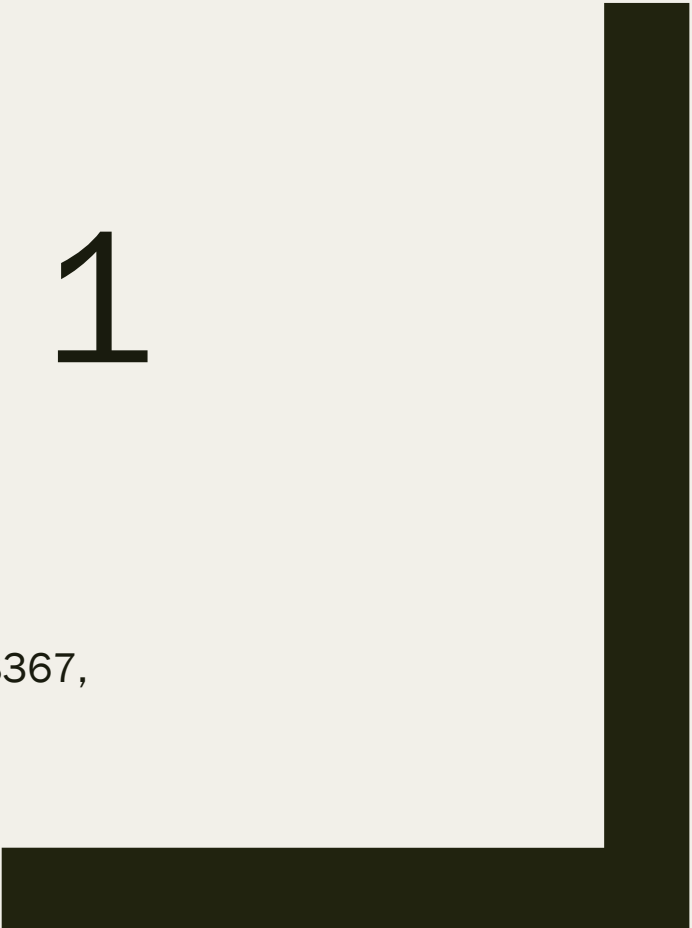


SBCE-STAGE 1

Avant-Garde group

Customer 8

G. Deluigi 883864, T. Sparvoli 875364, G. Rossi 878367,
G. Valente 876115, M. Ibrahim 883480



Questions

- Which strategy did you follow?
 - *First we considered the minimal and maximum number of passengers, in order to design the body of the aircraft. We selected a low-intermediate number of passengers in order to keep a contingency in terms of weight. Than we keep the same strategy for the other dimensions constraints (length, wing and tail span).*

Questions

- Which was the main challenge you faced?
 - *The main challenge was the lack of design constraints, so we were always satisfying the customer's requirements but we came short with the technical requirements*

Questions

- What did you do wrong?
 - *We were just worried about changing one dimension (wing span) without considering the relationship with other aircraft dimensions.*

Questions

- Were you successful? Why?
 - *Even attending the customer's needs, we weren't successful because we were too focus on solving one particular issue.*

Questions

- Do you know how many options you have, if any?
 - *No, we don't.*

Questions

- Was it difficult? Why?
 - Yes, *It was difficult to meet all the constraints.*

Questions

- How would such a behavior impact product development? (Time, cost,...)
 - *As we did a lot of tests, we would increase the time and the cost of the product development.*

Questions

- Further comments

- *We couldn't create the aircraft model because of small amount of pieces for the high number of groups. So we couldn't take advantage of the model to guess some design problems before going to test the product.*

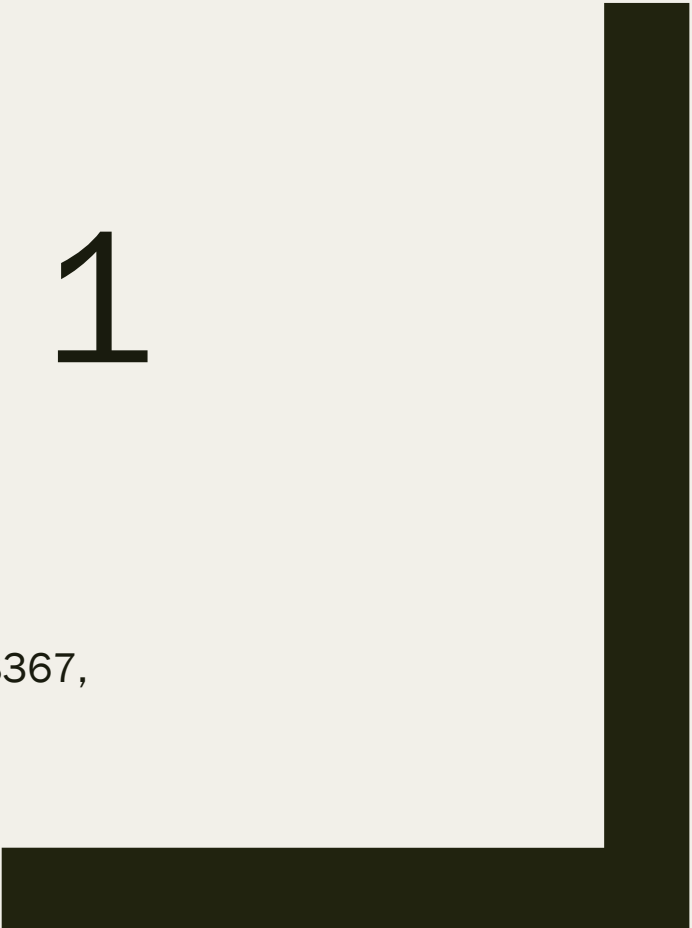


SBCE-STAGE 2

Avant-Garde group

Customer 8

G. Deluigi 883864, T. Sparvoli 875364, G. Rossi 878367,
G. Valente 876115, M. Ibrahim 883480



Questions

- Do you know how many options you have, if any?
 - *Using the method of trade off curves, we have found four possible options.*
Option A) $lw=12$, $lb=30$, $lt=11$, $wb=2$; Option B) $lw=13$, $lb=30$, $lt=10$, $wb=2$;
Option C) $lw=13$, $lb=30$, $lt=11$, $wb=2$; Option D) $lw=13$, $lb=32$, $lt=11$, $wb=2$.

Questions

- Was it more difficult/easy? Why?
 - *This case was easier comparing with the phase 1 because the process was more clear and logical.*

Questions

- Which are the main differences with Phase 1?
 - *Differences with the Phase 1 were mainly in terms of organization of the process (more schematic and clear), rules to follow (more calculations and fixed steps instead of qualitative reasonings) and time (thanks also to the support of Microsoft Excel).*

Questions

- How would such a behavior impact product development?
 - *Such a behavior would've impact in a consistent way R&D costs, in terms of time spent in order to find a suitable solution and costs of prototyping.*

Questions

- What if you have to satisfy a different customer?
 - *If we had to satisfy a different customer, since we should start from the new requirements, probably the possible solutions would change. But still, we have already a procedure and some data on which basing our work.*

Questions

- Why do you think is important to use/have/reuse formal knowledge?
 - *It is important in order to avoid a trial and error procedure, that is hugely time consuming and makes our costs of development increase in a consistent way.*