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Interaction Error

An *interaction error* occurs when a product fails to interact appropriately with a user. One key goal of designing is to eliminate interaction errors.

What is an interaction error?

An *interaction error* (IE) is what happens when a product:

- cannot cope with inputs produced by external [systems](#) (including human users), or
- produces outputs with which external systems (including human users) cannot cope.

In both cases, we take the position that the fault lies with the product, and not with the users or external systems.

- If a human cannot pull a lever safely, then the problem is that the lever is too stiff; the problem is *not* that the human is too weak.
- If an appliance cannot work with the electric power available, then the problem is that the appliance needs too much power; the problem is *not* that the electric power is too little.

Fig. 1: IEs only occur at red interfaces. 

IEs are errors that occur when specific [Personas](#) use a product in specific [situated use cases](#). There can be thousands of different IEs when one considers multiple Personas and SUCs.

We distinguish between *product failures* and *interaction errors*. A product failure occurs when a product's function or behaviour fails; an interaction error occurs at the interface between product and human, when there is a mismatch between the product's side and the user's side of the interface.

- That is, in a [HMIL](#) (see [figure 1](#)), an interaction error occurs *only* at the interface between the machine and the user and the other systems that interact with the machine.
- The differences between IEs and product failures are highlighted in the table below.

Table 1: Examples of product failures and interaction errors.

Interaction Error	Product Failure
A user pushes an elevator call button, but can't tell if the request was successful.	The light in the elevator's call button burns out.
A user pushes the wrong speed button on a blender.	The blender speed button pushed by the user breaks due to poor manufacturing.
A user overfills a container because they cannot see the current level of liquid in it.	A pot boils over on a stove because the stove applies too much heat.
A user changes the station on a portable radio instead of lowering the volume because they cannot distinguish between the two controls.	The rheostat that controls the station setting on a portable radio wears out due to atmospheric contaminants and no longer functions.

Product failures and interaction errors are often coupled: an IE can lead to a product failure, and a

product failure can result in IEs. It's important to distinguish between the two because the two kinds of problems are addressed in very different ways. Product failures are addressed through more careful engineering; interaction errors are addressed through more careful *design*.

How are interaction errors specified?

In this course, an IE is specified with two pieces of information:

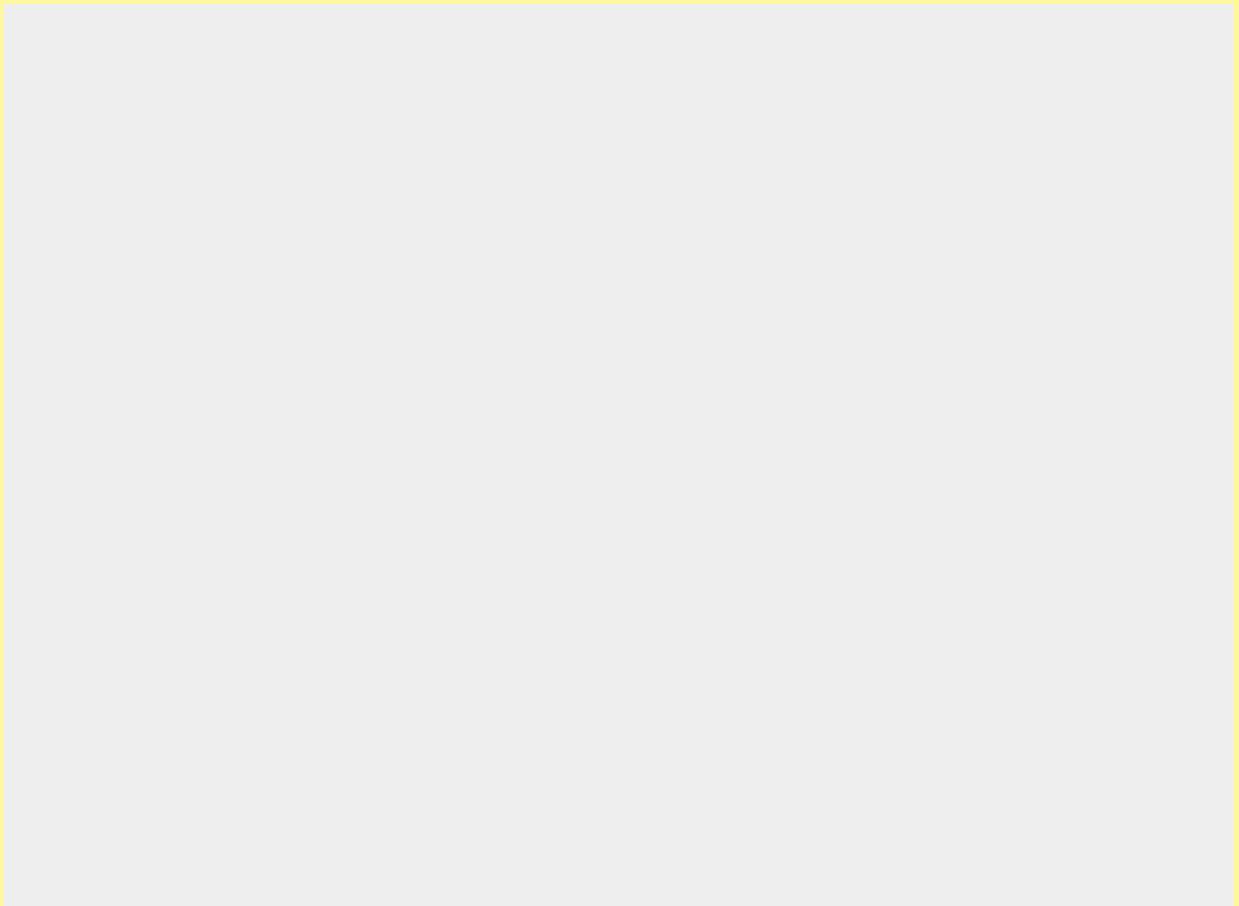
1. **The usage step** where the IE occurs.
2. **The nature of the mismatch** between the product and the user that leads to the IE.

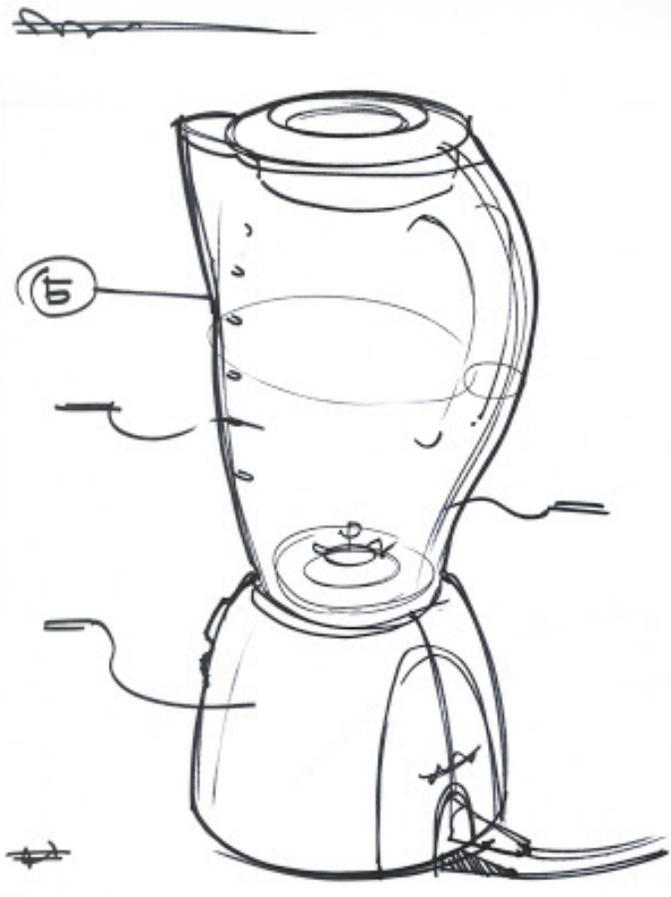
The mismatch is particularly important and must be described in some detail.

IEs are described with respect to a *specific Persona and SUC*.

Example: a way to blend foods

A particular team member has developed a concept as shown to the right. The team member's Persona is *Zoya*, and their SUC is *Making smoothies for the kids*. Zoya is known to be elderly, and thus likely the grandparent of "the kids". One possible interaction error is described below.





A “blender” concept sketch. ([source](#))

STEP: Zoya tries to grip the product when it's sitting on an upper kitchen cabinet.

MISMATCH: The product's shape does not afford Zoya an appropriate grip.

- Given the smoothness and shape of the exterior of the product, and its position on a high shelf, Zoya's arthritis prevents her from:
 1. gripping the product for maximum strength, and
 2. exerting sufficient force via possible grips to lift the product.
- A suitable product must allow Zoya to grip it so she can:
 1. lift the product off the shelf,
 2. lower the product to the counter, and
 3. prevent the product from slipping out of her grasp during the movement.

Notice how the details of the mismatch may well drive the need for further research. For instance:

- What is the best grip for Zoya in particular, given her circumstances?
- What are the reasonable limits of shelf height, based on Zoya's expected height and reach?

The results of this kind of research must be documented in the [situation scan](#).

Example: a way to move quickly and safely in cities

A particular team member has developed an “urban vehicle” concept as shown to the right. The team member's Persona is *François*, and their SUC is *Going to work on a rainy day*. François is known to be an intern at a corporate law firm in Montreal, and lives in a townhouse about 10km from work. The main entrance of the townhouse has 6 steps down from the front door to the walkway. One possible interaction error is described below.



“Intelligent” bike by Chris Boardman. ([source](#))

STEP: François has to carry his vehicle down the porch steps to go to work.

MISMATCH: The product's size, shape, and weight do not afford François an easy and safe way to carry the vehicle down the steps.

- Heavy for who?
 - Who else besides François might be in similar situations?
 - Is anyone of those Personas *less* able than François to carry the vehicle down the steps?
- Where does the vehicle allow/afford gripping?
 - What's the best grip for this case?
- Does holding the vehicle in the afforded way facilitate good carrying posture while going down steps?
- What contribution does the rain have on the way François would descend the steps?
- Does the porch itself facilitate good posture and letting François see where he's going?
 - How tall and deep are the steps?
 - Is the area overhead above the steps covered?

Again, notice how the questions drive the need for research. Be sure to include such research in your [situation scan](#).

Also note, the questions themselves are listed above *only to stimulate your thinking*. In your actual reporting of interaction errors, you would write down the *answers* to those questions.

Deliverables

For each interaction error, the **step** and **mismatch** must be documented as described above. Ensure that each interaction error is documented with respect to a specific [Persona](#) and [SUC](#).

However

TODO Describe consequences and counter-indications.

[analysis](#), [tool](#)

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Last update: **2021.06.25 09:12**