Beyond box ticking:

The role of human factors in design
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This is an annotated version of presentation given at the Institute of Ergonomics and Human factors conference in April 2014.

The accompanying paper provides more detail.

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Why do we need human factors in product design?

So let's start with a question then, why do we need human factors in product design?

Perhaps the question is particularly pertinent because its not always universally accepted that we do.
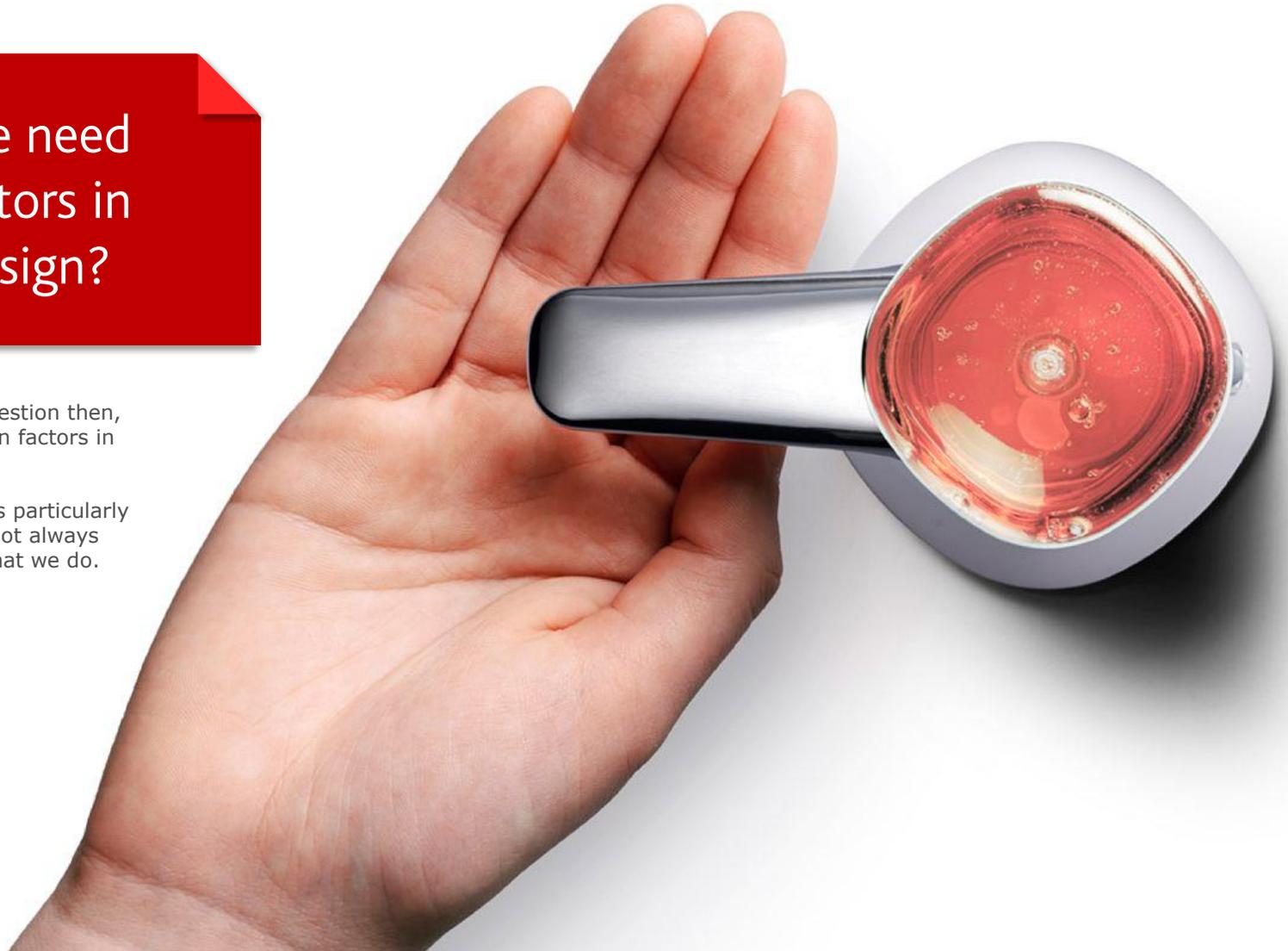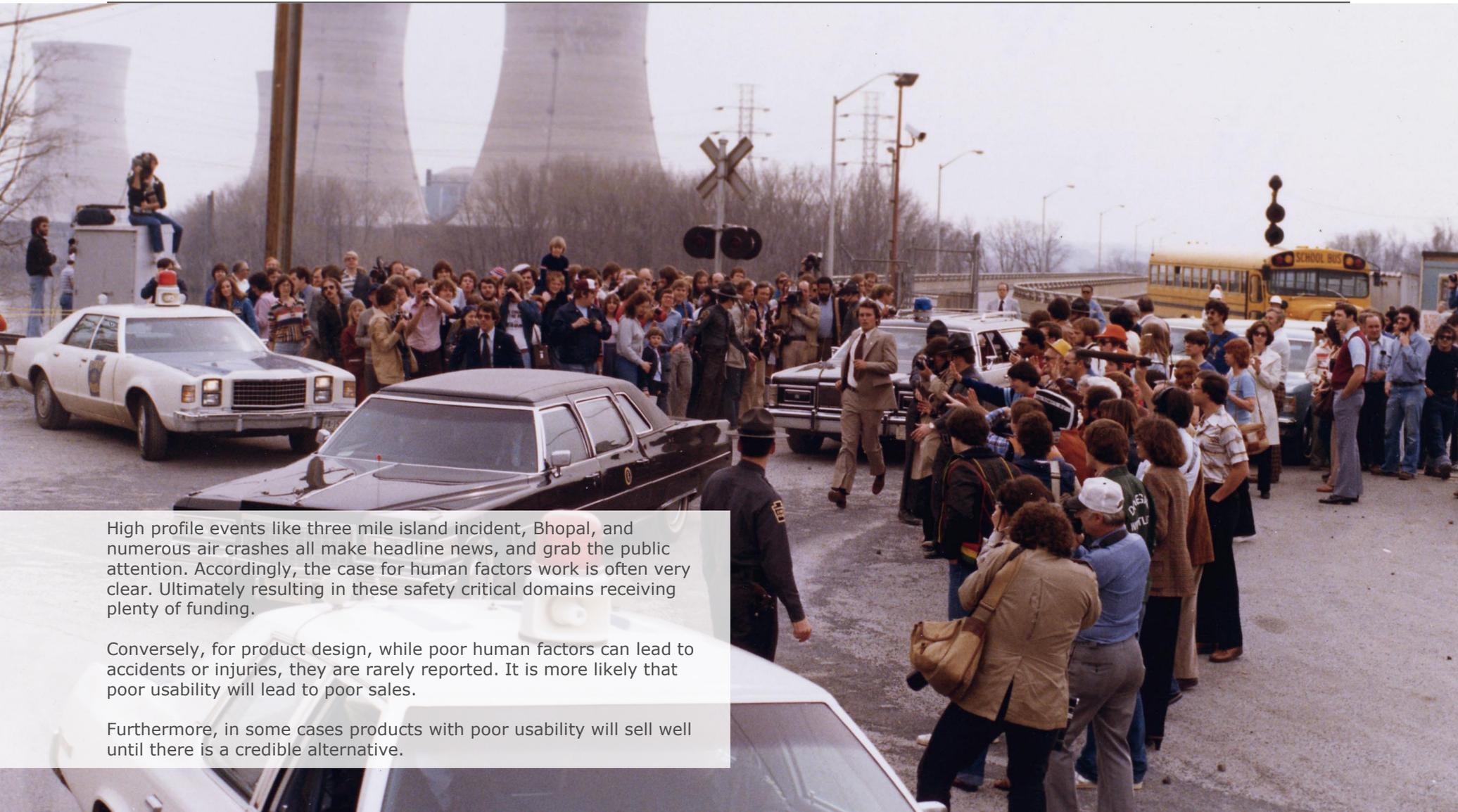
High profile events like three mile island incident, Bhopal, and numerous air crashes all make headline news, and grab the public attention. Accordingly, the case for human factors work is often very clear. Ultimately resulting in these safety critical domains receiving plenty of funding.

Conversely, for product design, while poor human factors can lead to accidents or injuries, they are rarely reported. It is more likely that poor usability will lead to poor sales.

Furthermore, in some cases products with poor usability will sell well until there is a credible alternative.

verses.

So let's take an example then of the humble heating controls. It's an area that was ticking along with, in many cases confusing, products. Then, seemingly out of nowhere, a new entry to the market redefines the category – primarily by placing usability at the heart of the product.

For me this is a great example, albeit a bit of cliché, but it really shows how usability can not only redefine a product but also the expectations of a category. Introducing usability as a market differentiator, getting users to pay for it, and making a lot of money!

But of course moneys not everything, right! It sounds cheesy, but I am a firm believer that great product design is also about making people's lives better, often in very subtle but important ways.

There was a presentation a couple of years ago at the IEHF early careers day, that concluded with the statement "so you can waste your time designing the next the consumer product, or you can come and work for us, and have a positive impact on the world".

Now this was probably a flippant comment, but I think it represents a common perception, that I think we need to challenge. For a medical device, the positive impacts care often very clear. With consumer goods, we may need to think a little more, but I am a firm believer, that we can make a big difference by designing all products better. It's incredible to see products or prototypes in users hands and hear them talk about how even the most mundane objects have given them back a small piece of independence, and how this has changed their lives.

This is clearly how many of us working in human factors in product design see our role in the design process, the knight in shining armour. The users' champion, come to do battle with the confusing and hard to use!

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What do engineers and designers think the role of HF is?

Which begs the obvious question, do our colleagues in design and engineering share this view?
What is their stereotypical view of those working in HF?
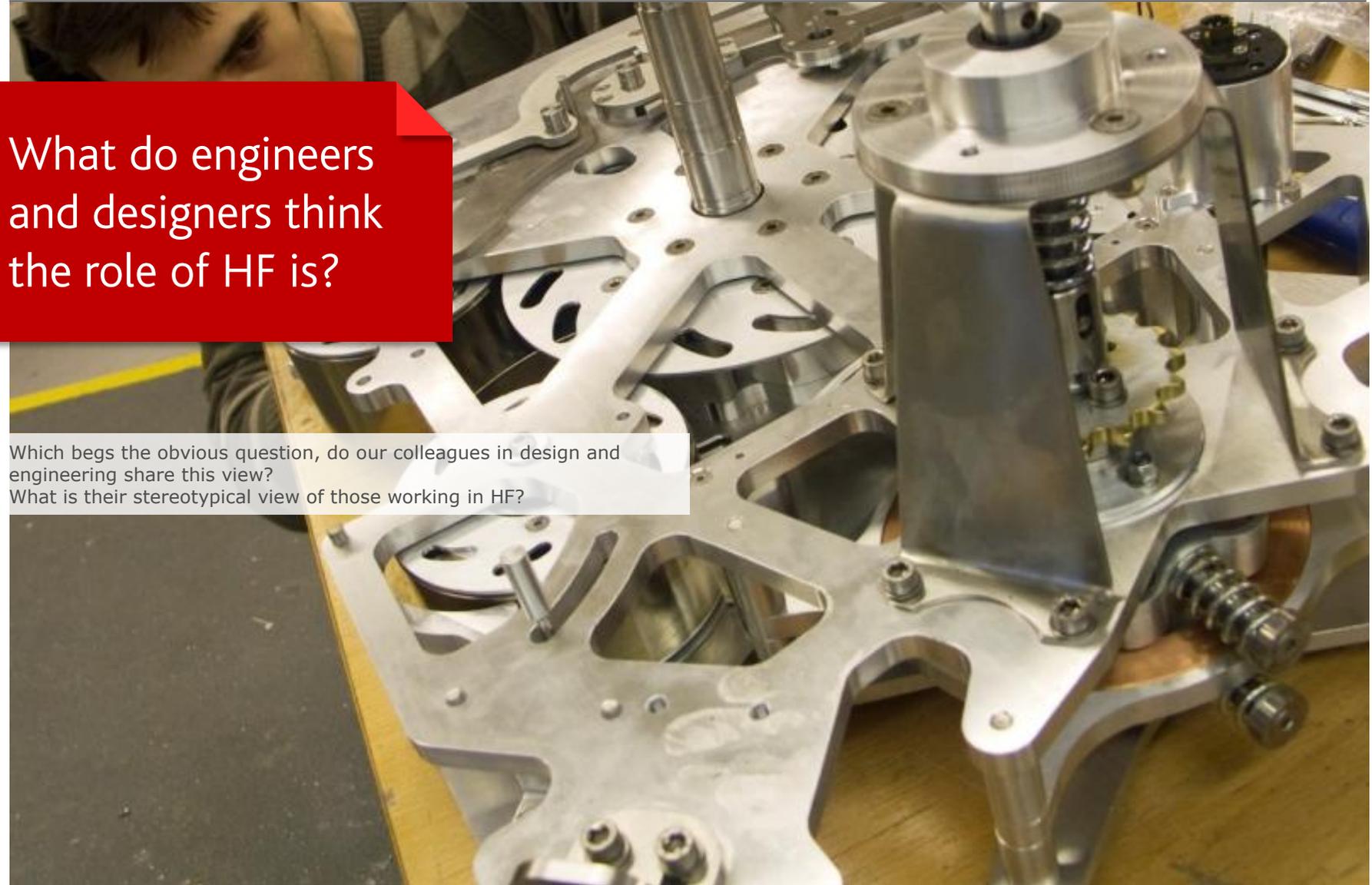
Well some engineers and designers simply see us as walking anthropometric databases.

Typical questions are how high should this be, how much force should this button take to push

"How much force should this button take to press?"
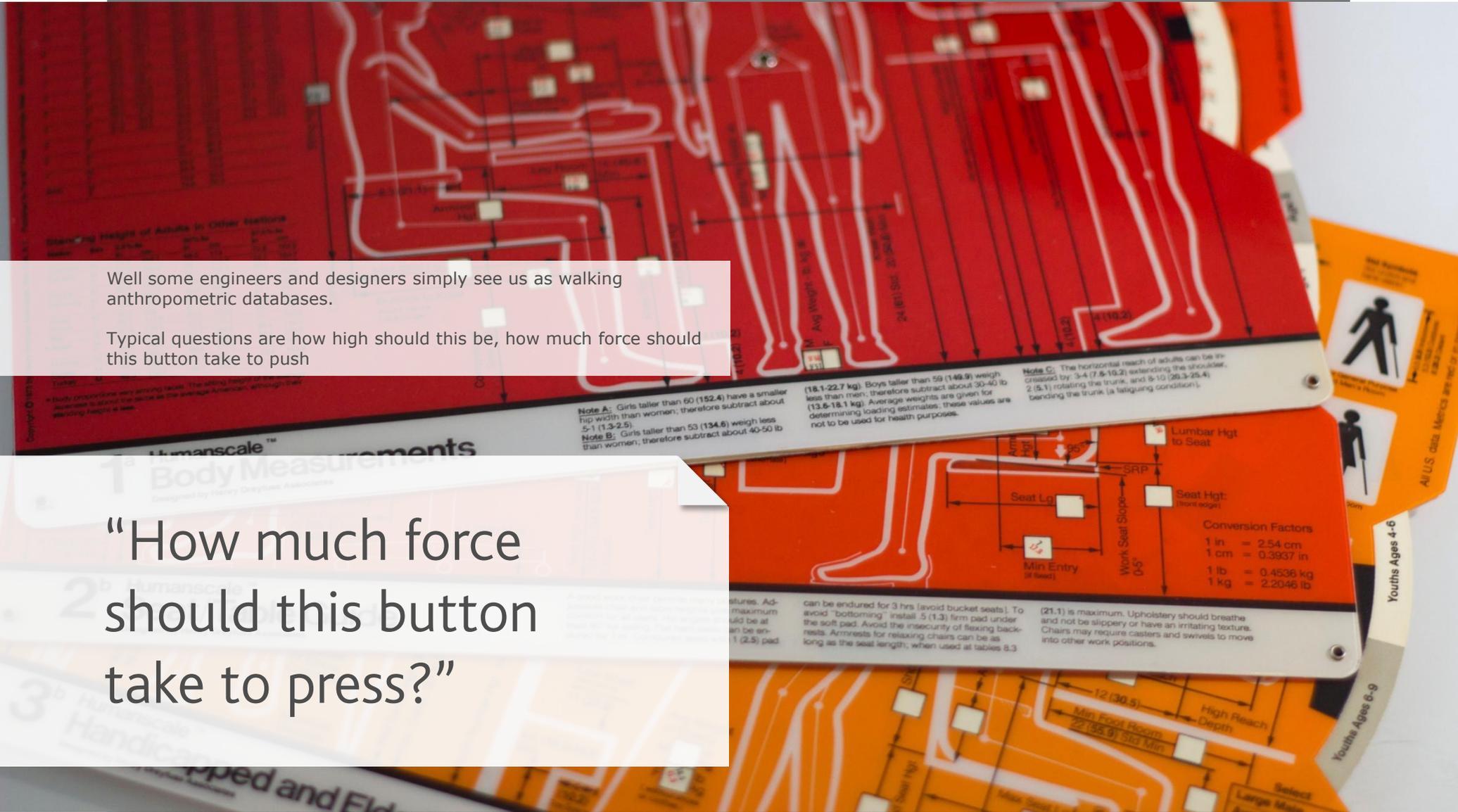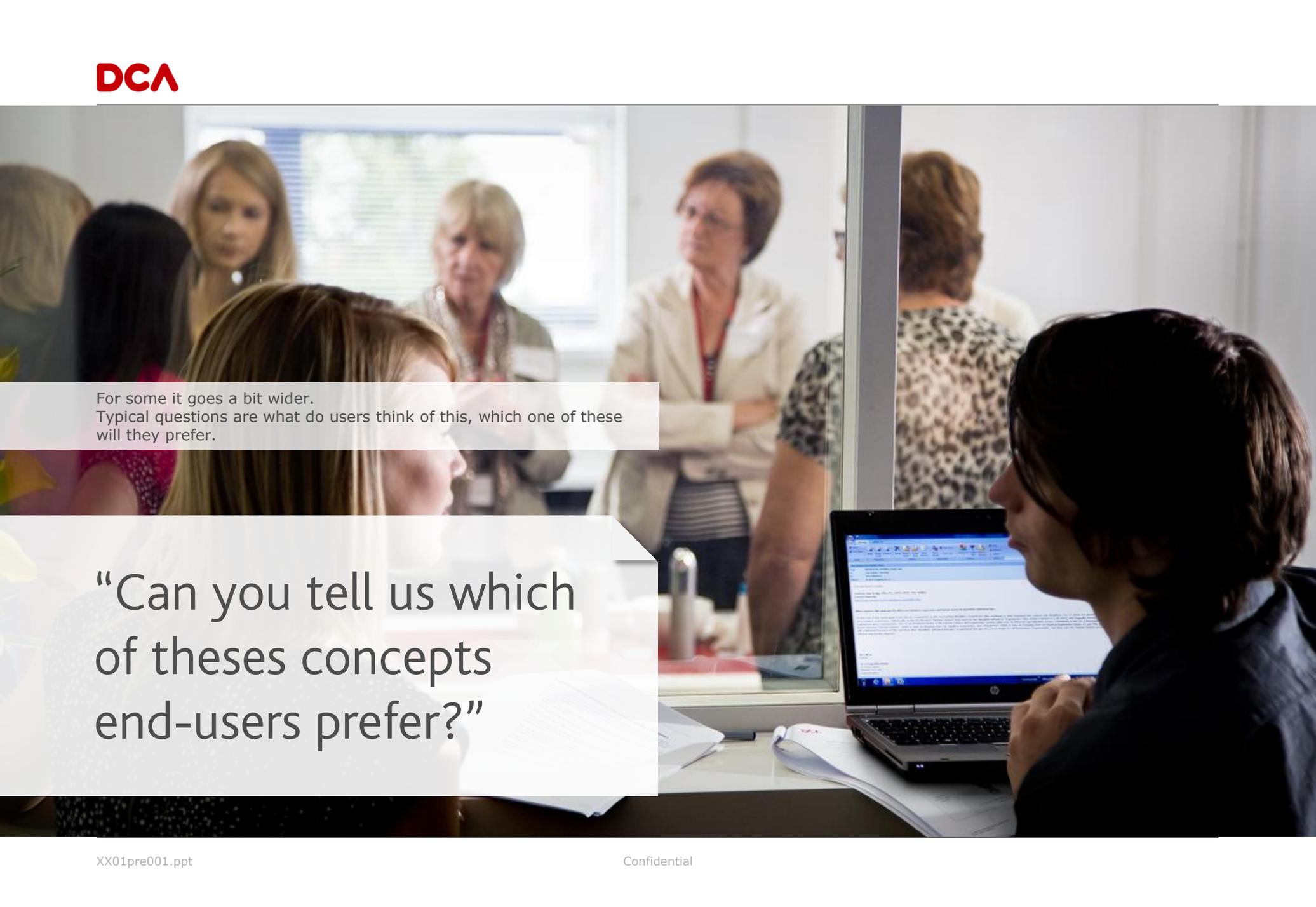
For some it goes a bit wider.
Typical questions are what do users think of this, which one of these will they prefer.

"Can you tell us which of theses concepts end-users prefer?"

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Sometimes it's a bit more depressing

Typical questions are will you sign this off if I put this button here?

"Will you sign this off if I put this button here?"
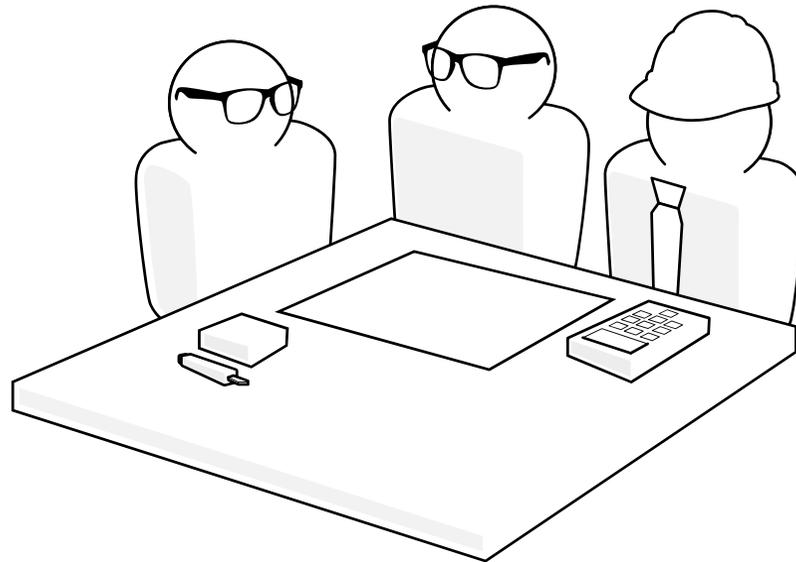
Regardless of what others think of us, what is the reality of our involvement?

In a rather bleak, but non-untypical, world, the designers and engineers sit together and come up with new product concepts, without any input from HF.
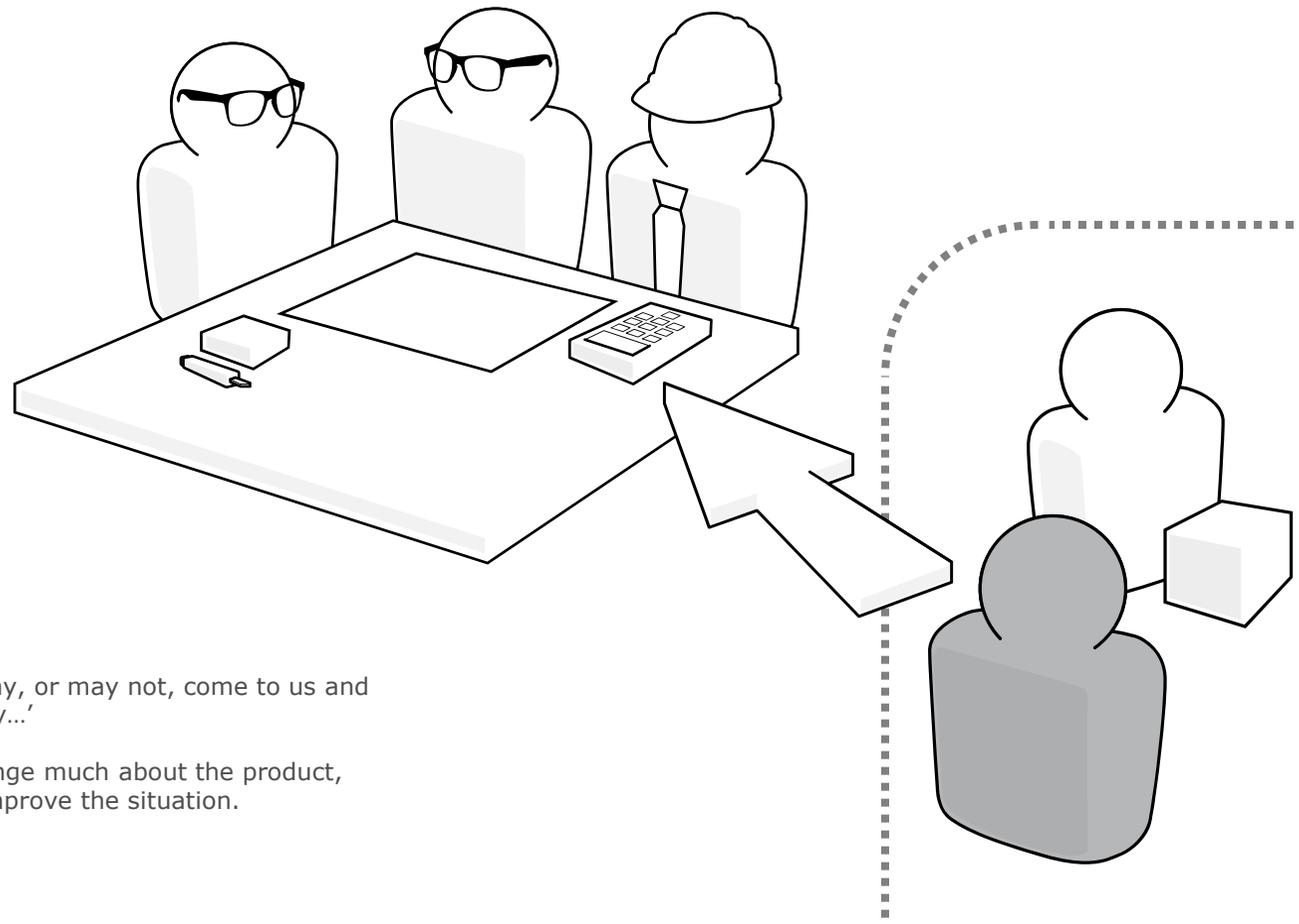
Towards the end of the project they may, or may not, come to us and ask 'can you just check that this is okay…'

More often that not, it's too late to change much about the product, and we are down to minor tweaks to improve the situation.

In a slightly less depressing scenario, the design team approaches the HF specialists much earlier in the project and asks to talk to end users, or simply look at anthropometric data sets and help them write a specification.

While, again towards then end they have their concept or concepts they may ask us to go out to end users or stakeholder and give them some feedback. At least here we have a fighting chance of influencing the design, however, the part in the middle is often where all the tradeoffs are made…
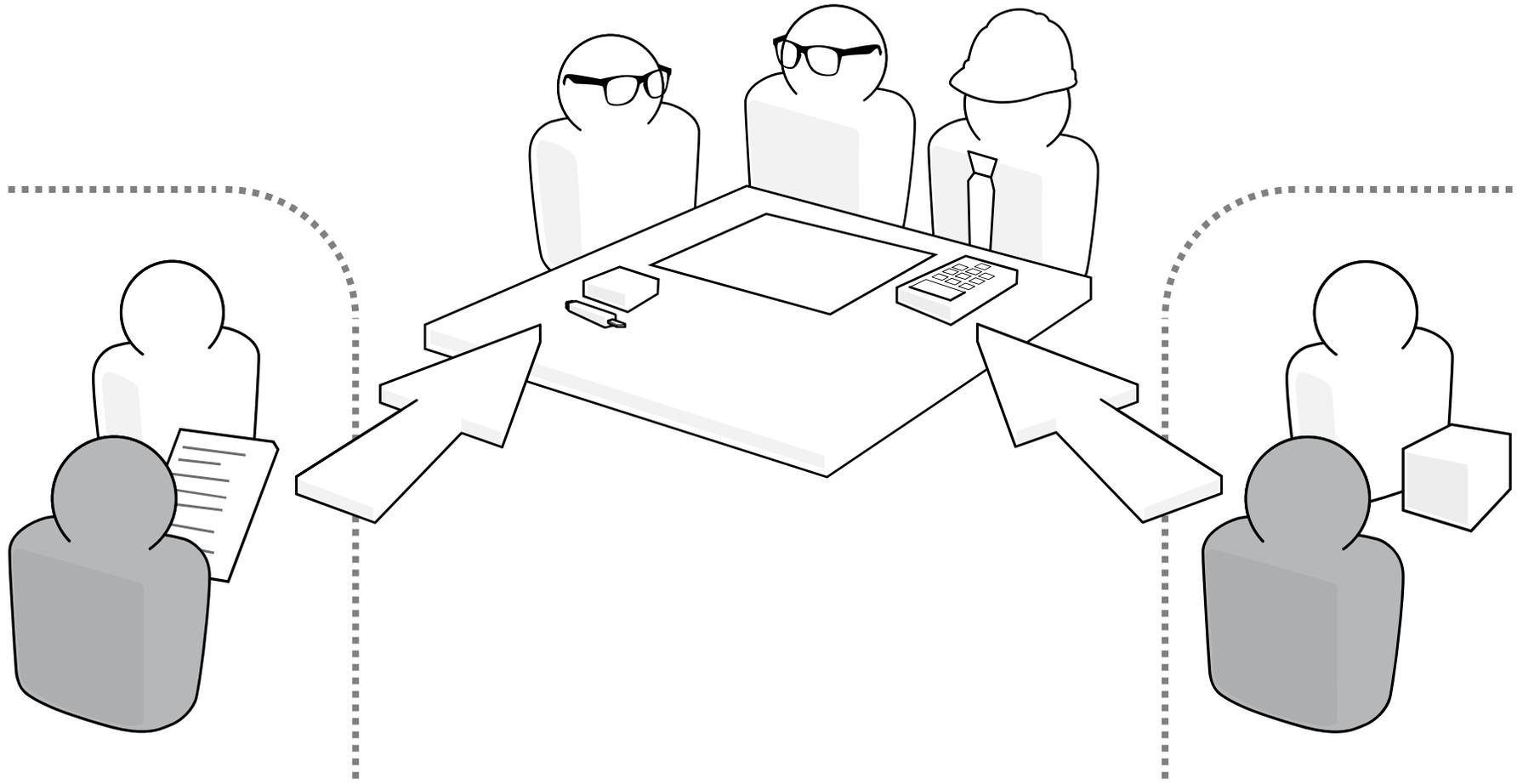
A far better solution, looks very similar but involves the HF person taking a seat at the decision making table throughout the process
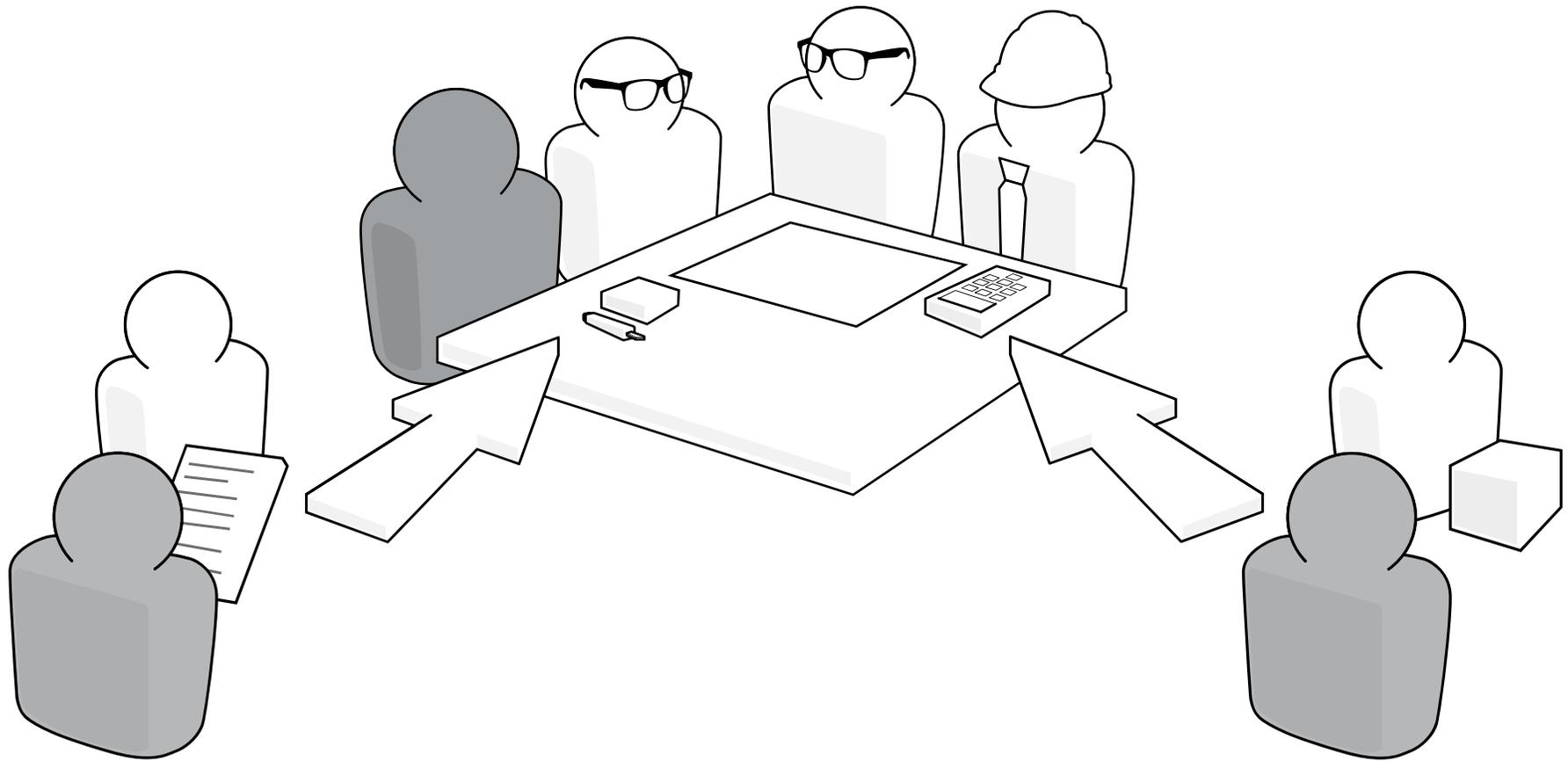
How do we make a difference?

So, for the majority of you, this will all sound very familiar – and beg the obvious question what do we do about it then?

How do we get ourselves into a position in a company or project team so that we can influence the design and help develop products that not only sell but make the users lives better.

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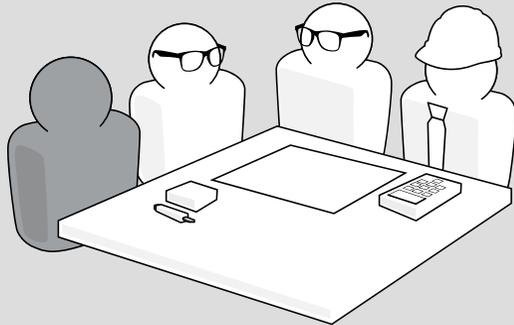
A place on the team

At the risk of oversimplifying things, I think that there are three challenges to overcome before we can reach our goal of making a difference in the product design process.

As we have seen, we clearly need a seat at the decision making table throughout the design process.

2

An understanding of how to improve the system

However the seat is just the first part, there is no point having a place on the team, if we don't have anything fitting to say. So we also need a clear understanding of how to improve the system.

3

Influence over the design team

Finally, we also need the ability to influence the team, again we can be invited to the right meetings have the best ideas in the world, but if no one listens, we might as well not be there.

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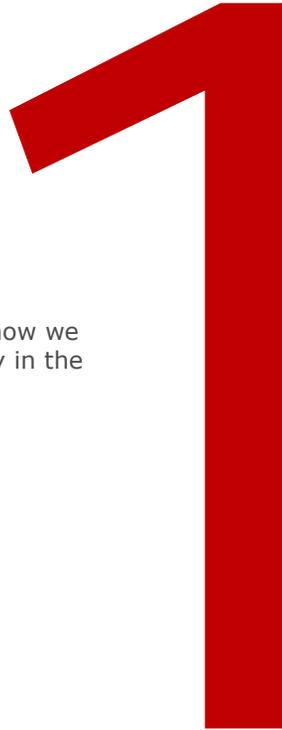
So let's look again at how we get invited to the party in the first place

A place on the team

In may industries, regulations give us a free ticket on to the team. Irrespective of whether this is a legal requirement or a contractual one, in many of the industries that I work in, we don't have to fight for a place on the team, for consumer products this is different.

Regulations

?

In many ways, however, the lack of regulation may be seen as a real advantage, for consumer products, we need to sell HF to the client from the outset. This means meeting with them at the very start of the project or in the quoting stage and defining very clearly what we might do and why we should do it and how it adds value.

It also allows us the remit to set the acceptability criteria, and avoids the project team disregarding improvements not covered by the regulations.

![DCA]

2

Once we are on the team we need to understand how to improve the system

An understanding of how to improve the system

Visions & Concepts

Technical input

Research & design input

Modelling & assessment

Prototype & user testing

Innovation types

Insights and themes

Interviews

Observations

Workshops

Self reporting

Heuristic analysis

Workflow analysis

Hierarchical task analysis

Human error identification

VBL / SDA

Sensory profiling

Persona profiling

User experience / journey mapping

Workload analysis

Link analysis

Manual handling & postural assessments

Human reliability analysis

Critical path analysis

Competitor category

User testing

Document analysis

Internet searches

Parallel worlds / category analysis

Abstraction hierarchy

Contextual activity templates

Values hierarchy

Trade shows

Data matrices

Decision matrices

Decision ladders

We have a lot of methods, we are always hearing about the need for a new one but, for design I am not sure the answer always lies in new methods.

In a fast moving environment of often short time lines, it is important to be able to quickly take cut down versions of methods to focus on exactly what is needed.

Ethnographic work, and interview are often the first point of call, followed by task analysis, link analysis, manual handling assessments, error modelling and system modelling

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3

So if we take the
assumption that there
is not so much that
average person
working in design can
do about changing
regulations – certainly
not within a project
timeframe.
And we also assume
that we should make
do with the methods
we have – refining
them to fit the case,
Then we are left with
influence…

Influence over the
design team

Something that I have found useful in gaining influence is to think of the challenge in terms of gaining hearts and minds.

Lets take a simple example of a hospital couch. For some people, telling that they are excluding 20% of the market and key regions like china by making the couch too high, will be enough to sway them to make a change. For others, a video of a real person struggling to use their product may be far more powerful.

Storytelling is very popular in the design world at the moment and lots of companies place a huge emphasis on winning hearts through stories and videos. Ultimately though, some people respond better to hard facts and figures, while others respond better to stories. In most cases a combination of the two can work very well

Winning ❤️'s

As we have discussed putting a product in context and describing the user journey an be a powerful way of highlighting the strengths and weakness of different concepts.

I never cease to be amazed by the amount of engineers and designers working in companies that have no idea of how the products that they are working on or have develops will be used.
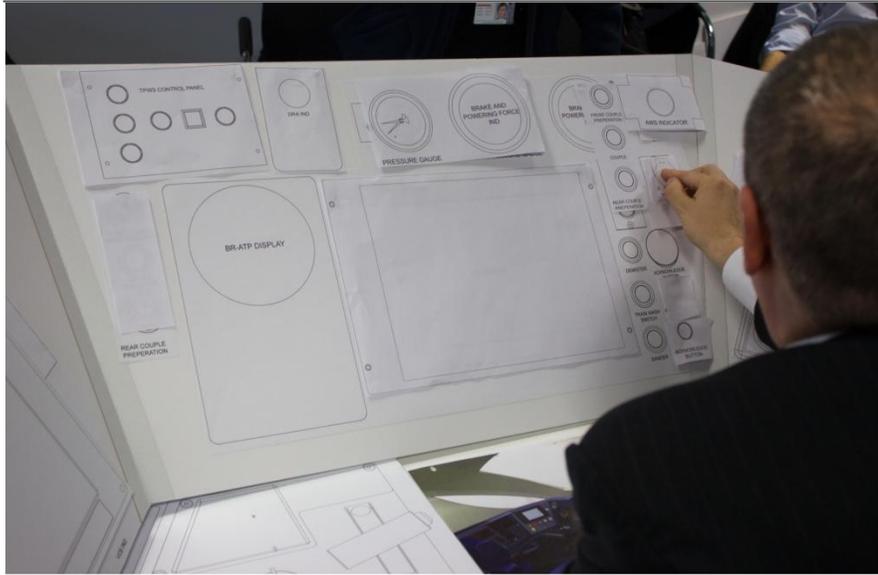
Along side videos, one of the most powerful things we can do is prototype, to create embodiments of ideas that allow the project team and potentially end users to experience the product and promote discussion.

This can be incredibly low resolution concepts such as sketches on white boards or pieces of paper on boards. Similarly, it can be spatial envelops that allow us to try out a range of tasks and explore how the product supports them.

Right the way through to full high resolution concepts.

Winning 🧠 's
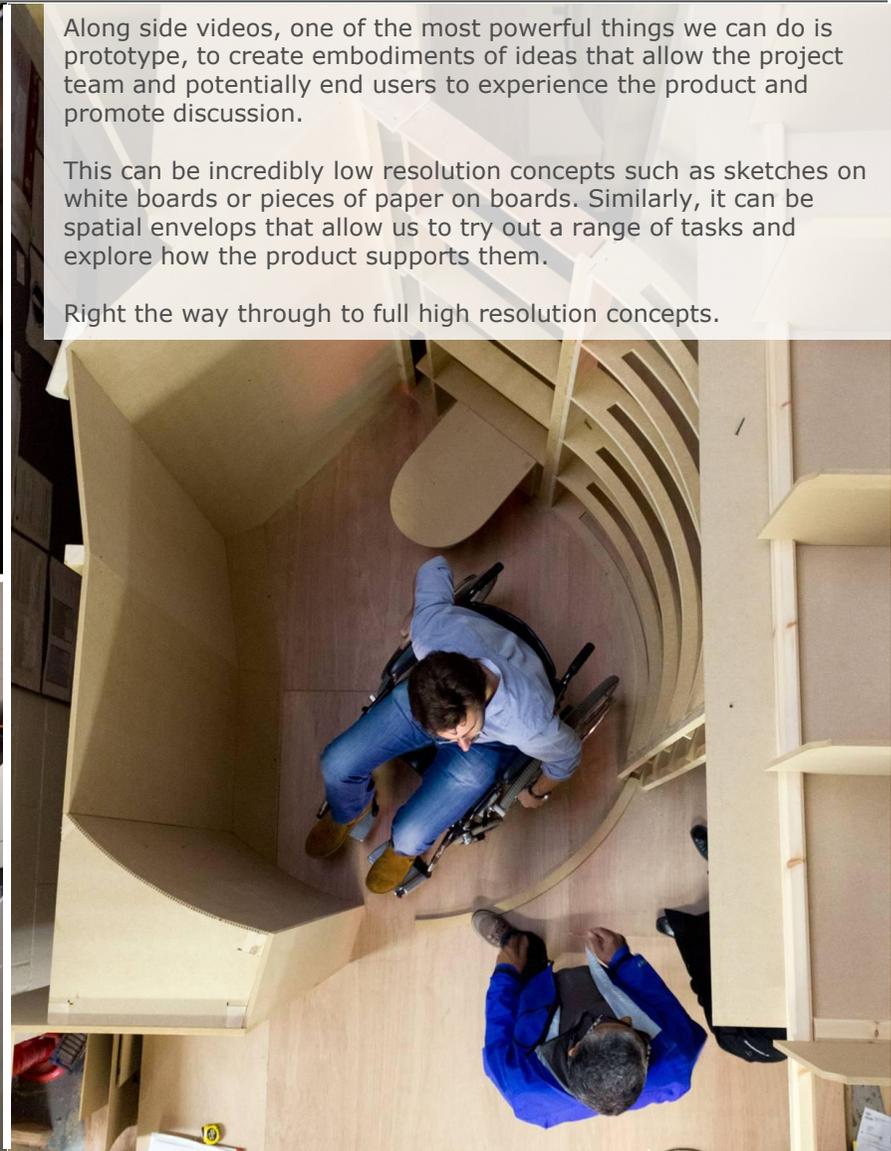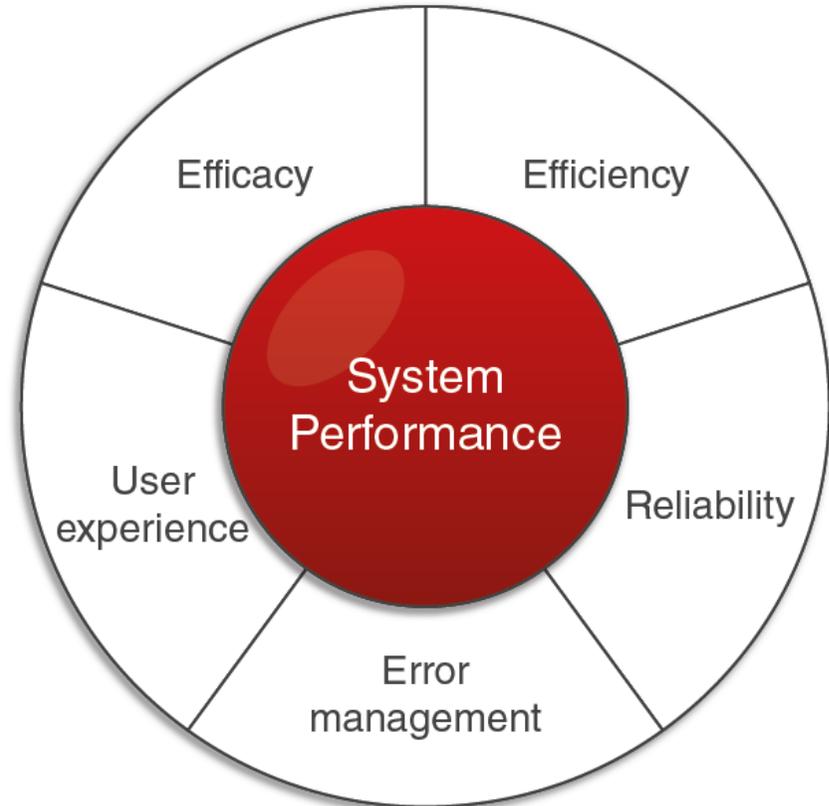
In terms of numbers, we have many tools to help quantify performance at a system level. In many cases we can get overly hung up on the validity of the numbers we are collecting.

However if we are simply comparing two concepts, and we and mindful of the limitations I would argue that we don't need to get too hung up on this

Efficacy

Efficiency

System Performance

Reliability

Error management

User experience
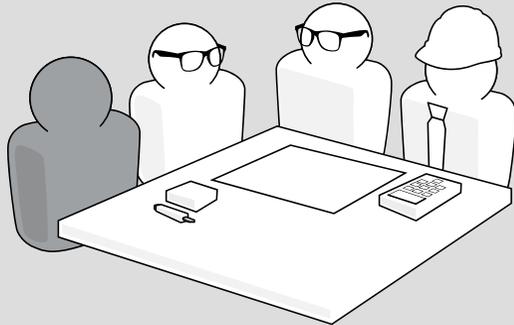
1 — A place on the team

2 — An understanding of how to improve the system

3 — Influence over the design team

So to conclude then, I think its really important that we continue to embed ourselves in design teams and ensure that we are creating products that not only have a increased chance of commercial success but also have a very positive impact on those that interact with them.

Ultimately, as an institute, I think we have got very good at point 2 at creating new methods, we are also getting much better point 1, at spreading the word about what HF is and why it is important and getting invited to the party.

I think we are less developed at really getting out there and making an impact, embedding ourselves deep into the design process. There are others doing a much better job of it under the title of user experience or interaction design and I think it is important that we share the skills we have.

Many of those graduating from human factors courses have a solid understanding of methods, but they often lack the ability to translate analysis into design recommendations.

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