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# Designing by numbers

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Dan Jenkins discusses how tools from the field of ergonomics can provide an evidence-based approach to design – not only to design better products, but also to help sell them



The concept of a numerical approach to design is likely to alarm many designers. After all, design is a highly creative process that should not be constrained, right? Notably prescriptive approaches have in the past been criticised for their poor fit within the creative industries. That being said, the additional focus and structure that can come from a numerical evidence-based approach has clear advantages and should not be dismissed too hastily. These days, pressures on financial resources are forcing designers to work in a more efficient, systematic way. Clearly, added structure and direction have obvious advantages in terms of cost and reducing the time to design. Furthermore, applied correctly, a numerical approach does not have to quash creativity; in fact, it can serve as a source of inspiration.

Say the word 'ergonomic' to most people and they will think of a specially adapted mouse, keyboard, or chair. For most, the usability of a product is only ever thought about when it's considered to be a problem.

Accordingly, it is now fairly universally understood that a poor user experience,

be it through inferior product usability or ergonomics, will have a negative impact on consumer perception and ultimately on sales. But is the obverse true? Can good ergonomics and usability be used to sell a product – and if so, how?

A knee-jerk answer might be 'yes'. A range of products are marketed as having ergonomic features (think OXO Good Grips utensils) or as providing intuitive controls (think Nest, which produces thermostats and smoke alarms). That said, the days of being able to surprise consumers with usable products are largely over. Great user experience has moved from being a unique selling point to a basic expectation, and the definition of what is 'great' is often set by experiences with completely different products and services.

Simply put, being best in class is often no longer enough. Experiences with smartphones force expectations in other categories. Quite reasonable arguments about differing budgets don't come into it. Users have come to expect intuitive and engaging product experiences and are becoming increasingly intolerant if they don't get them.

One approach to improving user experience

is to engage in an iterative development process. Essentially this involves users interacting with products and providing a description of the features or functions they find confusing, annoying or uncomfortable. This may involve the use of representative users and prototypes in an experimental setting; alternatively, it may involve real users and real products and rely on voice-of-the-consumer surveys or online reviews. Typically though, multiple iterations are required before a suitable product is achieved.

For the development of websites, with their rich datasets that describe user behaviour, the iterative approach has proved very effective. For physical products, however, the approach is frequently impractical or undesirable. It often takes longer to generate prototypes, as well as capture and analyse data that relates to behaviour.

The iterative approach is by far the most broadly adopted, but it has its limitations. Iterative development can catch obvious negatives and eliminate error, but this falls short on two counts: it neither eliminates rare or unforeseeable errors, nor creates compelling and delightful experiences



*Intuitive controls are a selling point of Nest's smoke alarms*

that move beyond the absence of discomfort and annoyance. It can also lead to the optimisation of the system on one dimension, such as efficiency, to the detriment of other aspects, such as safety.

One alternative is to turn for inspiration to systems ergonomics, which involves thinking about the product as part of a wider system and considering the impact the product should have. This impact can be summarised as an overall purpose and a range of performance metrics. The generic set may typically include efficacy, efficiency, intuitiveness, safety and resilience. These metrics can then be used throughout the project to focus and unite the wider design team to ensure the project meets its objectives.

More at home in high-hazard industries such as power stations and nuclear submarines, systems ergonomics approaches were developed to cope with the complexity of large, uncertain systems and are often used to identify low-probability, high-consequence errors. Given the scale of these systems, a holistic approach is needed to ensure that positive changes to one component do not have adverse effects on the safety and efficiency

of a quite different component in the system.

A simple example would be a redesign of a car's engine to reduce weight, while maintaining power output and increasing fuel efficiency. Assessed independently, a new concept may appear to meet all requirements. However, without further changes to the suspension and chassis, this reduction in engine weight may have a negative impact on the vehicle's driving dynamics.

Despite being developed for large industrial systems, the underlying philosophy of systems ergonomics is largely transferable to all products. By thinking systemically, and considering the wider impact that products have, overall usability can be increased and unmet latent needs identified. As such, approaches that go beyond a limited set of use cases have clear value.

The relationship between changes to products and the ways they are used is often much harder to model. These emergent behaviours can be hard to predict, but not impossible to design for.

This systemic approach has the distinct advantage that the same metrics used to develop a product can be used to market it. The product

can effectively be designed to fulfil its marketing claims, which can be defined at the earliest stages of the project. The strongest brands, of course, will not have to announce these credentials, but will invite their users to discover them.

Good marketing relies on clear metrics, and so does good design. Just as relevant marketing metrics are an inevitable blend of generic and industry-specific measures, the same applies for performance indicators for designed products. Unlike more physical measures such as power consumption and weight, metrics can be adopted that directly relate to the lives of users and stakeholders who typically want products that make them more productive, lead to fewer adverse consequences and are flexible enough to react to changing tasks, conditions and contexts of use.

We have found that the additional focus and structure that come from a numerical evidence-based approach lead to clearer direction, shorter development times and ultimately a reduction in cost. Financial considerations aside, a systemic approach can also lead to better products that resonate with their users' needs.