FORCE Technology

Derisking Tomorrow

Human Factors in technology, products, environments and services

Enhance user experiences and create better flows and processes by designing solutions that people can use with confidence.



Introduction

For more than 30 years, Force Technology's Human Factors team has supported clients' design and development projects, helping them improve usability and user experience (UX) to create better products, reduce useerrors and enhance users' comfort and wellbeing.

- → From physical products to digital solutions
- → From professional equipment to consumer products
- → From tangible equipment and technologies to services and processes
- → From small handheld devices used in the field to large-scale physical environments such as control rooms, production facilities, buildings and infrastructure

Based on our combined user-centric and human-centric approaches, along with our Human Factors expertise, we utilise psychological methods, empirical data and knowledge to deliver insights and recommendations.

We provide input on design and implementation and help our clients meet criteria and requirements through testing and validation. From small deliveries and spot checks, such as conducting initial user research for a project or a usability test, to full-scale projects encompassing the entire project life cycle.

This brochure explains our methods, approach, philosophy and work process. Please contact us if you would like us to elaborate on how we can support your project and help ou integrate Human Factors into your activities.

The purpose

With Human & User Centred Design, technology, products, physical environments and services become safer, more efficient and easier to adopt.

Value

Combining the user-centric and human-centric approaches to create technology that fits humans

The user-centric approach, or user-centred design (UCD), is a popular approach to optimising usability and user experience. The idea is that insights about the user and the use context feed into the design process. These insights are collected through, for example, observations, interviews and experiments with representative users, and they help us tailor the technology to the user, rather than forcing the user to adapt to the technology.

We combine the user-centric approach with the human-centric approach, also known as human-centred design (HCD). Here, the point is that we already have extensive knowledge from psychological research about humans in general, e.g., their perception, cognitive processes, memory, emotions, personality traits, behaviour, earning and decision-making. This knowledge, which is the core of our psychological expertise, can be utilised in design and development processes to create technology which fits humans.

Combining context and user-specific insights with general knowledge about humans gives us several advantages. Our recommendations are evidence-based, i.e., not only based on a few observations or experiments with representative users but also on the vast amount of established psychological knowledge. We also include psychological explanations behind the observable behaviours, thereby digging deeper and understanding the underlying explanations and root causes, which gives us the opportunity to treat symptoms and address underlying mechanisms.

The value

Applying Human Factors and UX when designing technology, products, environments and services can create value in many ways.

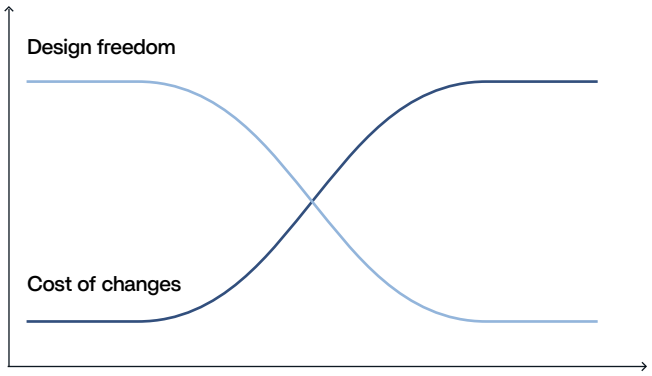
Some examples are:

- Improved safety through equipment and products which are easier to use
- More efficient work processes through better integration of people, technology, workflows and organisation
- Better user interfaces that support user needs and set people up for success
- Engaging and more meaningful interaction with technology
- Enhanced user satisfaction and ease of use
- Better and faster learning when new technology is introduced
- Improved accessibility through intuitive and inclusive design
- Empowerment of users through influence on technology, processes and organisations
- Increased user engagement and loyalty for sustainable growth and long-term satisfaction

Collaborate with the Human Factors team

Involving Human Factors from the beginning enables long-term, sustainable solutions.

We advocate for long-term and sustainable solutions over temporary fixes. To achieve long-term viability, early Human Factors involvement is critical because it allows for better influence on the design in the early stages, where design freedom is highest, and prevents costly redesigns at later stages. This reduces overall development costs and improves the efficiency of the design process.



Integrating Human Factors into technology and design processes
We can support product development or design projects in many ways. We can be involved throughout the entire process, from early ideation and concept development to validation and post-market surveillance, or we can step in for specific interventions along the way. This includes solving issues and managing barriers, and by extension, optimising or improving existing designs and systems to create a better user experience, better workflows and a reduced risk of use errors.

How we work with you
We collaborate closely with project teams, management and frontline workers, contributing with our Human Factors expertise in data collection, analysis, evaluation and validation. With more than 30 years of combined psychology-based experience, we draw on a broad toolbox of methods, always choosing the least invasive and most efficient approaches that still ensure robust, high-quality results. We adapt our involvement to each project: either working as part of your team or delivering independent packages.

Deliverables and outcomes
Our work results in clear findings and actionable recommendations. We take pride in delivering the results needed for the process and transferring knowledge and qualifications to the client's team.

Our preferred methods of conveying the results include presentations, coaching, training, workshops and learning materials, which can be tailored to fit the client's preferred formats and supported by reports and written documentation.

We also provide support during product development and implementation, ensuring smooth handovers and clear communication across the project lifecycle. By focusing on root causes rather than symptoms, we help create long-term, effective solutions.

Knowledge transfer and coaching
Beyond delivering project results, we build capability within client organisations through tailored learning and coaching. These activities can be integrated into ongoing projects or offered as stand-alone workshops on specific methods and concepts.

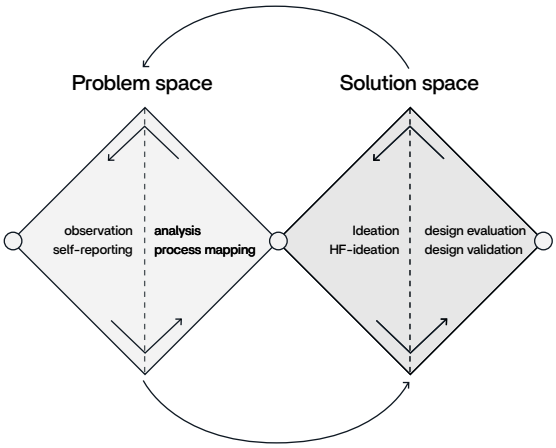
Examples of previous topics for learning and coaching activities:

- → How to make ethnographic observations in the field
- → How to use eye-tracking in formative and summative usability studies
- → How to investigate mental models using sketch drawing
- → How to conduct retrospective think-aloud studies based on video recordings
- → The difference between user-centred and human-centred design – and how to combine them
- → The mental autopilot vs. reflection in action

Our frameworks

Our philosophy is inspired by The Double Diamond Model. We use it as a framework for our workflow and the way we plan and execute our projects.

The Double Diamond Model is a creative design framework that supports human-centred thinking through divergent and convergent approaches.



01. The first diamond explores the **problem space**, clarifying goals, benefits, user needs and issues. We apply an empathy-driven approach to truly understand the users' personal experiences, feelings and motivations.

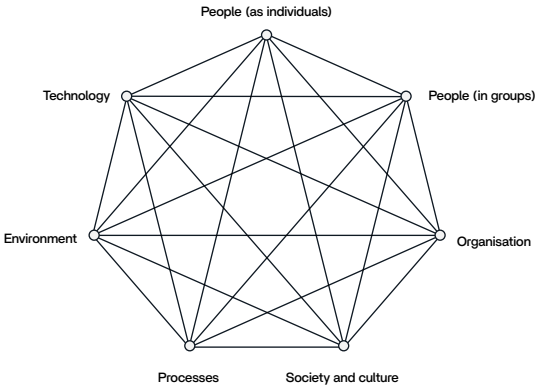
    Widening the scope helps uncover root causes and define "the real problem". As we begin to understand the scope of the problem, the focus narrows to the key issues. Gaining a fundamental understanding of the underlying explanations and root causes enables the design of the right solution.

02. The second diamond opens the **solution space**, generating and testing potential answers. By designing the solution correctly, we deliver, implement and validate outcomes through feedback and iteration.

→ The process is **iterative, not linear**. We regularly perform re-evaluations and iterations, which are crucial for ongoing development and improvement.

→ As we iterate, our understanding of the problem enhances, consequently elevating the solution. Loops within and between the two diamonds ensure learning from both successes and failures, deepening understanding and honing solutions. The activities in the framework can be carried out using a wide range of methods.

Our inputs to the design and implementation of technology, services and environments, guided by the Double Diamond Model, can include work processes, organisational and cultural aspects such as leadership, communication and learning. In these cases, we will also use another framework, the SEPTIGON framework.



This framework will serve as a guide for analysing and understanding complex systems, as well as planning interventions within organisations. The SEPTIGON framework focuses on the interaction between different elements within an organisation and on how to optimise these to create a resilient structure and stronger teams.

Our methods

We apply a wide range of refined methods, tailored to match each client's specific needs and goals.

— We employ diverse data collection techniques, ranging from field studies in the natural environment, such as ethnographic research, to self-reporting methods like interviews and think-aloud protocols, to capture insights about users, tasks and contexts. The data is then analysed and mapped using tools such as user journeys, task analysis, use error analysis and process mapping to identify key issues and affordances, as well as to visualise workflows.

— To explore the solution space, we employ creative ideation methods, including workshops and brainstorming sessions. We integrate Human Factors principles throughout project definition, design, development and evaluation to ensure compatibility with human physical, cognitive, social, emotional and cultural characteristics.

— Our design evaluations address potential use errors and improvements through two approaches: participatory user evaluation and expert evaluation against established Human Factors criteria and principles. Choosing the right method is critical and can be challenging, as selecting the wrong one can lead to invalid results, wasted resources and poor outcomes.

Our team values an iterative approach, continuously refining what works and improving what does not.

Selected tools

Our Human Factors team continually pushes the boundaries of new ways to measure interactions. For example, we utilise psychophysiological measurement techniques that are more comprehensive than traditional measurements.

Psychophysiological measurements

— Psychophysiological measurements can provide a deeper understanding of how people interact and react with technologies and products or how they engage in work, tasks and operational situations.

— The measurements go beyond and deeper than what people can report themselves through traditional methods such as surveys, questionnaires, interviews and focus groups.

— The insights from psychophysiological measurements can be used to improve the design of technologies, products, physical environments, work processes, software systems, manuals and instructional materials, etc.

— One of the most important measurement technologies we prefer to use is eye-tracking, which gives an overview of the visual attention of users when using technology and products, navigating in environments or performing a task.

— We have measured levels of stress, engagement and workload using other techniques, such as electrodermal activity (EDA)/galvanic skin response (GSR) and electroencephalography (EEG), which can be combined with facial expression tools to detect emotional responses.

Eye-tracking

Eye-tracking glasses can record and analyse what we look at, in what order, and for how long, when we are out in the field or moving around.

Another tool, Remote eye-tracking, can record and analyse what we look at, in what order, and for how long, when we specifically view displays or screens.



Examples from our previous use cases:

- → Understand how we operate devices and machines, and how we use equipment in the field
- → Understand how we read manuals or instructions
- → Understand wayfinding in an environment
- → Analyse what catches our eye when shopping
- → Analyse road and rail traffic safety situations

Electrodermal activity (EDA)/galvanic skin response (GSR)

Measuring the activation of sweat glands in the skin gives information about whether we perceive something as stressful or even frightening.



Examples from our previous use cases:

- → Determine stress levels while performing a job or task, or when using a technology or device
- → Analyse arousal and engagement while exposed to an experience, or while shopping or assessing different products
- → Measure the difference in how confident an experienced user is vs. an inexperienced user while carrying out a challenging task

Facial expression analysis (FEA)

Facial expression analysis can record and analyse six basic emotions in an individual seated in front of a computer, e.g., while engaged in a work process, web page navigation, online shopping or controlling operational tasks in a control room environment.



Examples from our previous use cases:

- → Analyse friction and difficulties when using computer software
- → Analyse emotional response in online shopping
- → Analyse emotional response

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Integrate Human Factors to enhance user experiences and create better flows and processes
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