of conventional thinking, as it has no major commitments to expendable rocket projects. However, its world-class aerospace industry has access to all the technologies required to produce an entry-level spaceplane. Of all aeroplanes that have actually flown, the best technology demonstrator for an entry-level sub-orbital spaceplane is arguably the Saunders Roe SR.53 rocket fighter (Figure 3), which first flew in 1957.

When it was cancelled in 1958, Saunders Roe proposed a space research variant. The Ministry showed some interest, but not enough to make it happen. What might have been? My own company’s entry-level spaceplane project Ascender (Figure 4), is in effect a simplified and updated SR.53.

Ascender would be useful for carrying science experiments, high-level photography, meteorological research, astronaut training, and carrying passengers on brief space experience flights. Perhaps, more importantly, it would pave the way for the first orbital spaceplane. Our Spacecab (Figure 5) has been designed specifically to be the most competitive candidate for the first orbital spaceplane. It is in effect an updated version of the 1960s European Aerospace Transporter project designed to minimise development cost by using existing technology. The difficult part of Spacecab design was avoiding anything difficult!

Spacecab has a payload in the one tonne class. This could be a satellite or supplies or crew for a space station. As soon as the first orbital spaceplane enters service, it will be able to undercut any expendable launcher of comparable payload. This will encourage higher traffic levels, which will in turn reduce investment to mature the design. This will lead to even lower costs and higher traffic levels, and so on down a virtuous cost spiral.

The second paradigm is about saving our planet, an unavoidable rule, but are the devices and rules intuitive? Are the things around us a pleasure or a nightmare? HCD is more than just a trend or a catchphrase. In many ways the second paradigm is even more focused than the first, and, basically, is about us. Human Centred Design is about looking at the world through the eyes of people. Sometimes referred to as People Centred Design or User Centred Design, it is a multidisciplinary field which is at the point of contact between the business, design, manufacturing and scientific communities. In fact, HCD is more about how we engage and deploy knowledge about humans from the Arts, Humanities and Sciences.

HCD combines knowledge and technologies from many fields to achieve products and services which are physically, perceptually, cognitively and emotionally intuitive to their users, with intuitive designs that meet the user’s needs and can be deployed with skill it achieves products and services which improve our quality-of-life at work and in the home. Simple, right?

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Human Centred Design Institute (HCDI)

The Human Centred Design Institute (HCDI) was established in 2006 to bring together a group of internationally recognised academics and researchers in areas of augmented cognition, branding, design management, ergonomics, human factors, human centred design process, inclusive design, information architecture, perception, philosophy, usability and trust.

The objectives of the HCDI are to carry out both fundamental and applied research into Human Centred Design, to identify the key challenges of Human Centred Design in the 21st century, to deliver postgraduate programmes in Human Centred Design and to promote Human Centred Design to industry and to the general public.

The HCDI has developed an in-house framework and methodology which puts the human at the heart of the design process. The aim is to develop usable, desirable, useful and sustainable solutions to meet the various human needs. The HCDI team believes that Human Centred Design can only be achieved by working closely with the ultimate users of the design, collaborating with all the stakeholders by means of a multidisciplinary approach.

The HCDI works in close collaboration with a number of designers, manufacturers and service providers, with several professional organisations and with numerous educational, academic, governmental and charitable organisations.

Branding – Busayawan Arijayut

To many experts a brand is a promise. When people come into contact with a particular brand they know what to expect from it. As battles over customers’ hearts and wallets become more intensive, brands seek innovative ways to create and convey promises that go beyond commercial norms, such as reliability. Design, especially Human Centred Design, is highly regarded as a means to find out people’s dreams and desires, as well as to deliver promises that inspire and capture people’s imaginations.

Over the past seven years, research projects at Masters and Doctorate levels at Brunel University have covered almost every aspect of brand and branding. The studies range from Spiritual Branding to Sustainable & Ethical Fashion Branding. Despite the differences, all projects start and end with design. Design thinking is employed to identify and clarify problems, plan research methodology, create research tools, analyse results and propose practical solutions.

The same approach is applied in academic and industrial research projects, such as the user experience study conducted for a leading Taiwanese company, AverMedia. A combination of qualitative and quantitative research, including participatory research, was employed to identify the strengths and weaknesses of the current product portfolio at both the physical and emotional levels. The research identified strengths that the company did not realise, such as the fact that their visualisers promoted flexibility in terms of preparing teaching materials. It also revealed that inconsistent interface designs could be a barrier to brand. As a result, a number of design and strategic planning tools were recommended as a means to enhance the user and brand experience.

Perception – Marco Ajovalasit

The perceptual experiences which occur at a product or service interface are fundamental towards cognitive and emotional engagement. Brand recognition, usability and inclusivity can all depend on the nature and intensity of the perceptual experience. An example of design research performed to optimise the perceptual characteristics of a product was an activity performed for Shell Research Ltd, which developed a test method for quantifying driver response to engine idle vibration and sound. By understanding how a driver’s feelings of engine roughness or power change with changes in the chemical properties of the fuel, it is possible to choose chemical compounds which meet and exceed customer expectations. In this case, knowledge of the human perceptual characteristics was deployed to design a fuel which considered the driver as much as it did the car.

Cognition – Mark Young

As technology becomes ever more prevalent in our lives, so our interactions with the world involve more mental activity than physical work. Instead of pulling levers or hauling loads, we now read interfaces and push buttons, or even just watch as an automated system does it for us. But where technology tries to make things easier, sometimes the job is actually harder, as we try to cope with information overload. And sometimes it becomes too easy, with underload being just as bad as overload.

Understanding how humans think, interpret and respond to information, and then translating this into an interface design, is key to optimising system performance in the digital world. A good example is the Focus-LITE project where the HCDI is working with partners such as MIRA, TRW and the Institute of Advanced Motorists, to design in-car interface to encourage safe and eco-friendly driving, without overloading or distracting the driver. A such a balance can only be achieved through Human Centred Design.

Trust – Stephane Lo Presti

Nowadays, technology plays a central role in our life and the digital medium continues to change the world, but not without problems such as safety, security, usability, and legality. Each problem traditionally warrants a particular treatment depending on the product or service. The concept of trust brings about a new, holistic viewpoint on these issues, such that designers and customers can understand them better.

Trust is a complex notion that we studied in collaboration with QinetiQ in the context of e-Healthcare and in relation to using pervasive SIAE (SMIL Player and Authoring Environment) computing devices (eg, smart phones). For example, PDAs (Personal Digital Assistants) were used by pupils to write homework stories. The system was made more trustworthy by considering how it was built and studying how users performed tasks. The system complexity involved behind trust is complemented by how intuitive the concept is for people to grasp, as can be seen from the social networks and virtual worlds phenomenon.
**Information Architecture – Olinkha Gustafson-Pearce**

With the advent of more and more ‘information’ which is available to us, internet technology and ‘usability’ has advanced at an exponential rate. The web is possibly the most active repository of human knowledge and information. We are currently in the Web 3 manifestation of this medium and a large part of this is Web 3D.

The Web 3D engagement has meant that we must develop and employ new HCD methods of navigation, interaction and usability. Many corporations and education establishments now have an active presence in the Web 3D medium and are finding it highly beneficial for the delivery of training, conferences, promotion and public engagement.

A human centred approach is vital in this ‘social medium’ and at Brunel University we are currently exploring the many possibilities and potentials that it may offer us. We are actively building our presence in this new domain by focussing on public engagement with our student body and research groups, through a number of highly interactive exhibitions and through spaces such as ‘virtual Brunel’. We are also setting up student services ‘inworld’ to facilitate access for students who may not be able to access these services regularly on campus due to disability, professional commitments or other reasons.

**Usability – Steve Love**

There is no doubt that mobile technology has changed and continues to change and shape our lives from both a social and economic perspective. Every day, as we travel through our streets, we see numerous examples of people using various types of mobile technology and applications.

As this area continues to develop there is a concomitant need for designers and researchers working in this area to fully understand what the future requirements of mobile technology applications and devices will be for users. Also, how to effectively evaluate these products, services and applications when they are developed or at the prototype stage of development.

An example of work on methodologies and measurement undertaken by the HCDI is a project that was undertaken with the mobile phone company H3G. This work involved the development of an evaluation methodology for a new customer service system. This methodology was based on a Human Centred Design approach which ensured that both the organisation’s and users’ requirements were taken into consideration.

This included observation to identify how customers and staff used the current version of the service and interviewing to gain an understanding of what they liked and disliked about the current service, and their ideas for improving the usability of the service. The result of the activity was the successful implementation and validation of a new improved customer service.

**Innovation Management – John Boult, Ellis McNulty, Jea Hoo Na**

Design, as a driver of user-centred innovation, is currently receiving considerable attention within the European Union. The role of User Centred Design, to further stimulate innovation capability, is being strongly advocated and has just been the subject of a wide ranging consultation and comprehensive working document. The expectation is that initiatives will be developed which use design as a catalyst for increased innovation performance, and that these initiatives will be given a high priority. The consequence is that Europe’s designers and consultancies will be at the forefront of dissemination and activity.

However, research undertaken within Brunel, studying the capabilities and strategies of Design Consultancies in the UK and Ireland and, to a lesser extent, other European countries, has identified an industry where complacency and lack of knowledge about user centred innovation are prevalent. This and the seemingly poor overall understanding of the strategic value of design places us potentially behind other countries, notably the US, the Asian and the South East Asian countries, where evidence suggests that there is a greater appetite to engage with the topic.

**Dissemination and Networking – Stephen Green**

It’s widely acknowledged within numerous Government backed reports that the UK is well placed to use innovation and the creative industries as an engine for economic development and to address significant global challenges such as the ageing population or climate change.

Within the London region, and related to this potential, there is a considerable asset represented by 26 Design Schools and over 18,500 design students within higher education. The London Development Agency has a remit to develop and promote the London economy and has been working with members of the HCDI team on the London Design Map (www.londondesignmap.org), taking a human centred approach to clarify and communicate what London Design Schools can offer.

Increasingly Design Schools are making more effective connections with industry and forming interdisciplinary networks to maximise the impact of their courses and research. Considering the diverse audiences for the information, the London geography at the core of the map provides a universally understood basis for interaction. The London Design Map is a world first in collecting and clarifying information relating to design disciplines, research, courses, business collaborations and networks.

**Inclusivity – Hua Dong**

Design is experiencing paradigm changes, one being moving from deliberate exclusion to deliberate inclusion. This requires a comprehensive understanding of the user range; their capabilities, characteristics, needs and aspirations.

As the research partner of the design company PearsonLloyd and the manufacturing company Kirtton Healthcare, the HCDI team conducted design research into reducing healthcare-associated infections through engaging doctors, nurses, patients, cleaners, infection control specialists in the process, which led to the successful launch of two novel prototypes of hospital equipment: a patient chair and a commode.

The new designs, informed by human-centred design research, have been received favourably by patients and healthcare staff in its hospital trials, and have been selected for exhibition in the Design Museum in London.

**Human Centred Design**

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www.londondesignmap.org