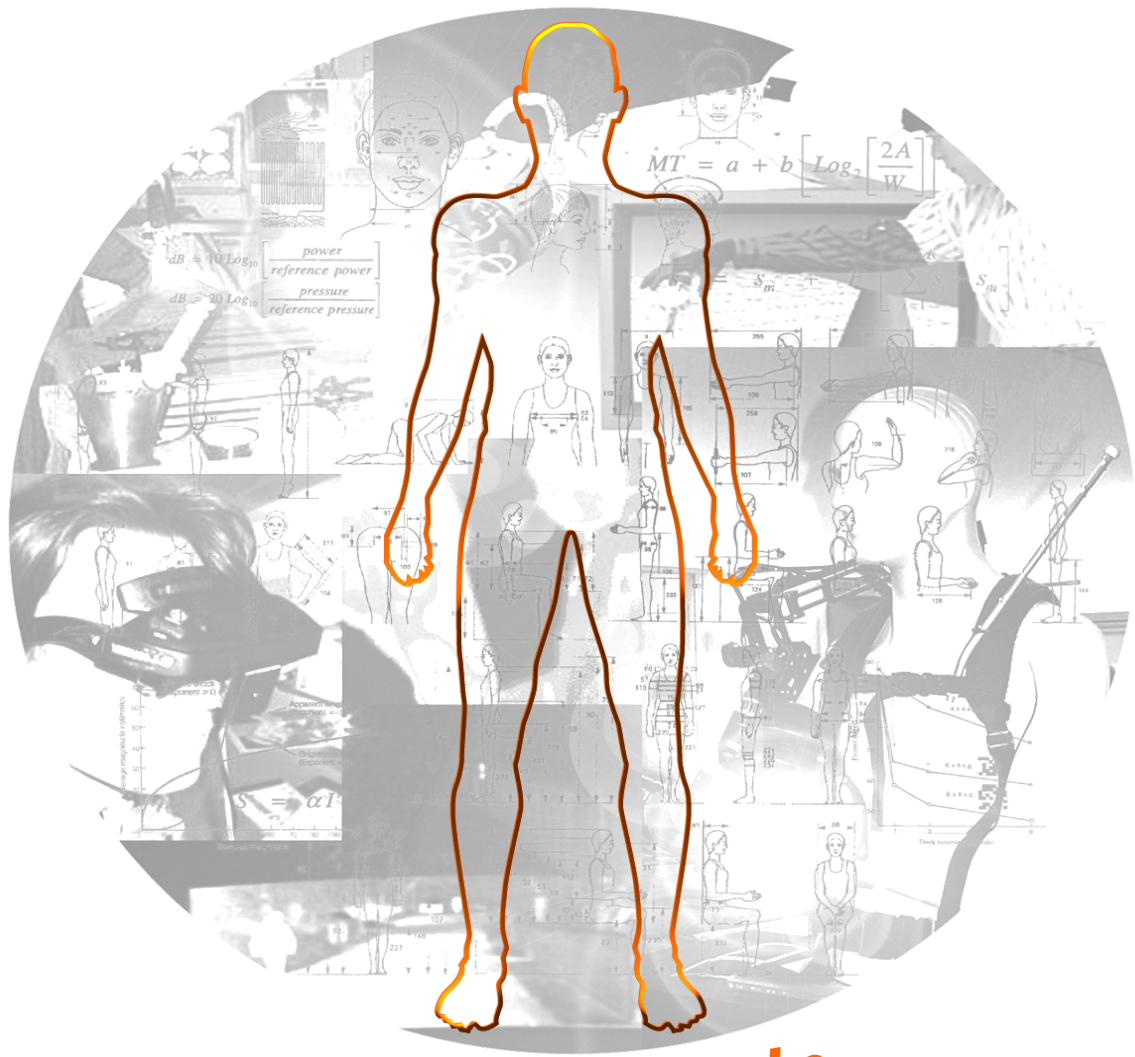


Human Centred Design of Energy Systems



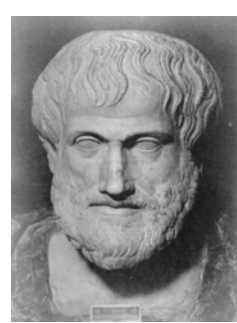
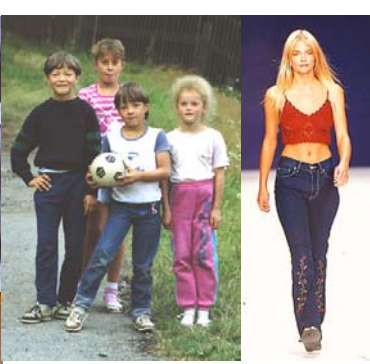
Prof. Joseph Giacomini

Brunel University
October 29th 2008



What are product and service design about ?

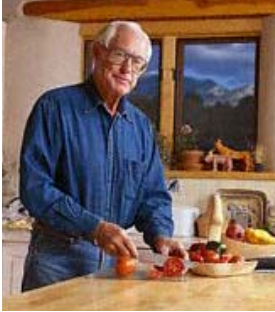
... people.



Aristotle

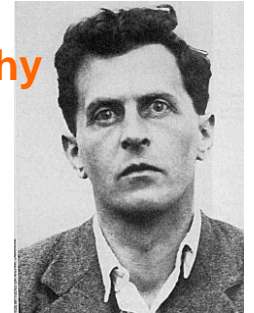


Descartes



Human physical, perceptual, cognitive and emotional abilities

Philosophy



Wittgenstein



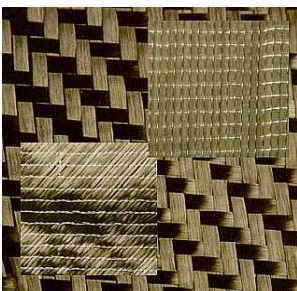
Technology



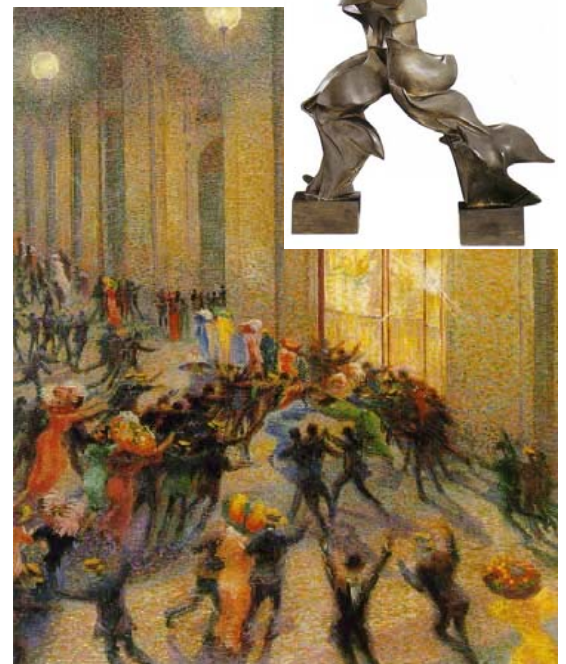
Product and Service Design



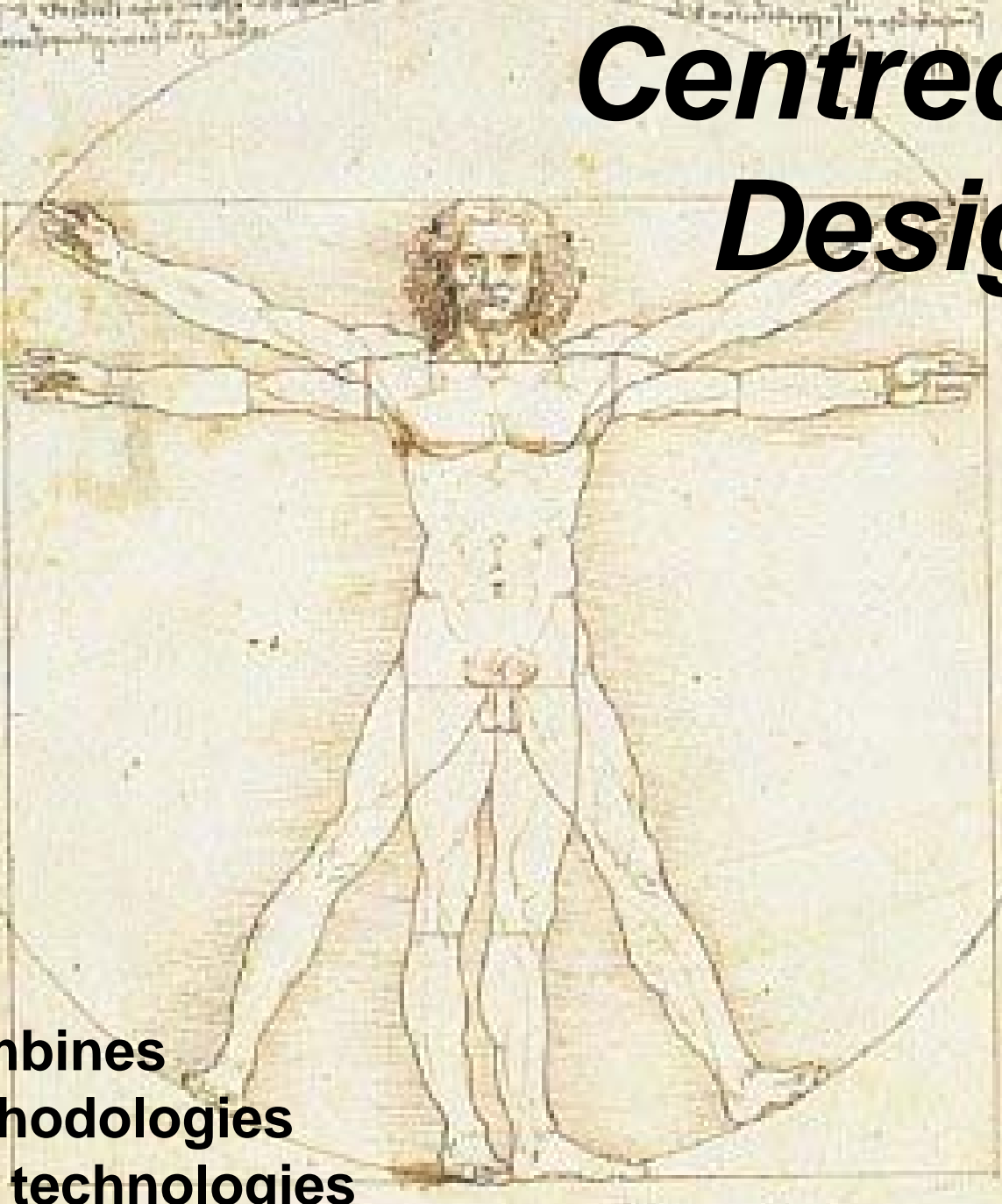
Art and Aesthetics



Materials science



Human Centred Design



Combines methodologies and technologies from design, engineering, computer science, artificial intelligence and philosophy. It leads to products, systems and services which are physically, cognitively and emotionally intuitive to users.



Dr. Marco Ajovalasit
Dr. Busayawan Ariyaturn
Mr. John Boulton
Lady Chisholm
Dr. Hua Dong
Prof. Joseph Giacomini
Mr. Stephen Green
Dr. Olinkha Gustafson-Pearce
Dr. Ray Holland
Mr. Chris Holt
Dr. Steve Love
Mr. Paul Turnock
Prof. Neville Stanton
Dr. Mark Young



Augmented Cognition Systems

Design and Branding Strategy

Design Strategy and Innovation

Ergonomics and Human Factors

Human Centred Design Process

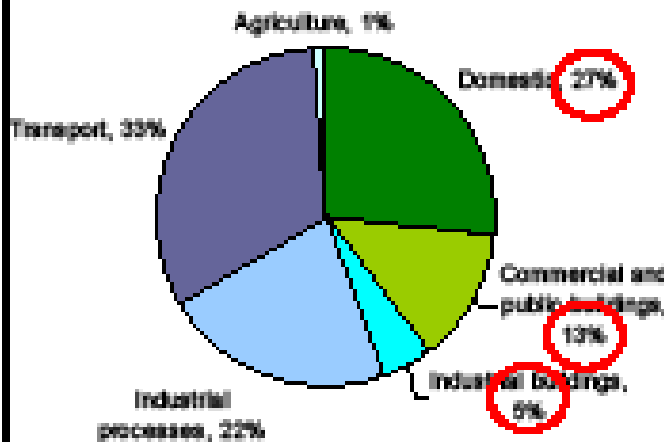
Inclusive Design

Information Architecture

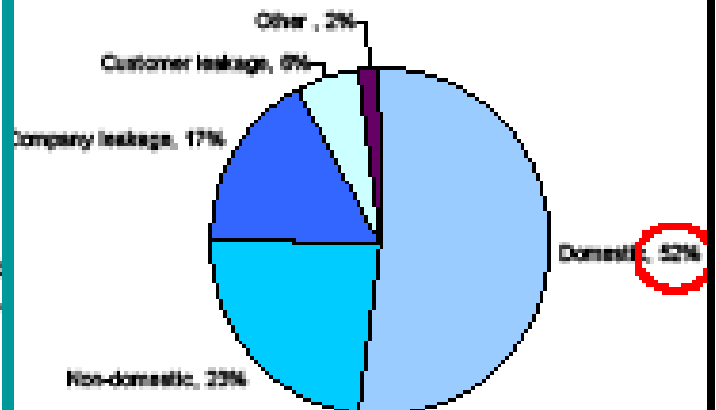
Perception Enhancement Systems

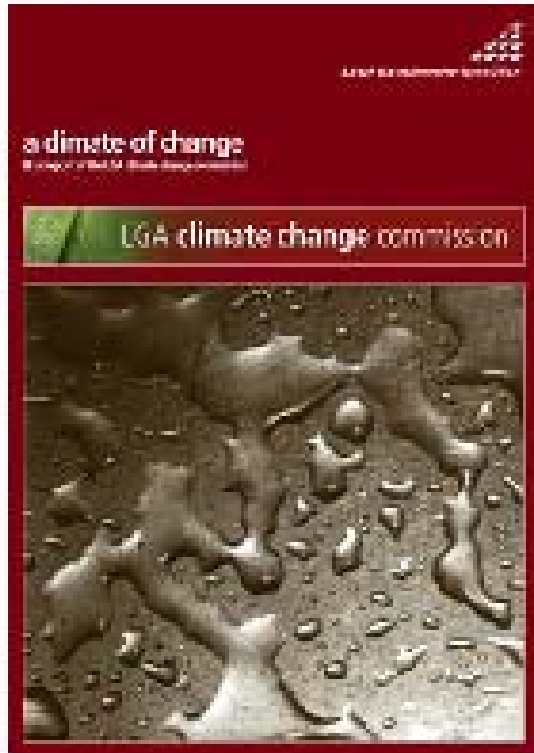
The built environment has a significant impact on emissions and water consumption

Carbon emissions from energy use in buildings account for 45% of UK emissions; our homes 27%



Water use in homes accounts for over half of public water consumption in England and Wales





Greener homes
for the future



There are only two ways to reduce carbon emissions from existing buildings:

- (1) Changes in personal behaviour and
- (2) Re-engineering the fabric and energy sources

Policy must be aimed at either of these.

GENERAL OBSERVATION

Too many small players?

The Existing Homes Alliance – launched yesterday – sets out action required to put UK housing stock on road to deep cuts in emissions and energy bills.

Energy for Sustainable Development
Sustainable Energy Academy
Environmental Change Institute
Energy Efficiency Partnership for Homes
Association for the Conservation of Energy
The Housing Corporation
Sustainable Development Commission
WWF

Places for People
Energy Savings Trust
UK Green Building Council
AECB
PRP Architects
Green Alliance
UCL: The Bartlett School
Chartered Institute for Housing

Up to half a million homes must be refurbished every year starting now, if we are to cut UK carbon emissions by the necessary 80 per cent by 2050.

Designing a Home of the Future

Stephen S. Intille

MIT School of Architecture and Planning

EEE Pervasive Computing, Vol 1 , Issue 2, 2002, pp 76 - 82

At MIT, a multidisciplinary team of researchers from the Changing Places/House_n MIT Home of the Future Consortium is studying how to create pervasive computing environments for the home. They are developing technologies and design strategies that use context-aware sensing to empower people with information by presenting it at precisely the right time and place. **Contrary to many visions of future home environments in the literature, they advocate an approach that uses technology to teach as opposed to using technology primarily for automated control.** They have designed a "living laboratory" that will provide a unique, flexible infrastructure for scientifically studying the power of pervasive computing for motivating learning and behavior change in the home.

Two theories of home heat control

Willett Kempton

Michigan State University, USA

Cognitive Science, Volume 10, Issue 1, January-March 1986, pp 75-90

People routinely develop their own theories to explain the world around them. These theories can be useful even when they contradict conventional technical wisdom. **Based on in-depth interviews about home heating and thermostat setting behavior, the present study presents two theories people use to understand and adjust their thermostats. The two theories are here called the feedback theory and the valve theory. The valve theory is inconsistent with engineering knowledge, but is estimated to be held by 25% to 50% of Americans.** Predictions of each of the theories are compared with the operations normally performed in home heat control. This comparison suggests that the valve theory may be highly functional in normal day-to-day use. Further data is needed on the ways this theory guides behavior in natural environments.

Dynamic energy-consumption indicators for domestic appliances: environment, behaviour and design

G. Wood and M. Newborough

School of Engineering and Physical Sciences
Heriot-Watt University, Edinburgh, Scotland EH14 4AS, UK

Energy and Buildings, Volume 35, Issue 8, September 2003, pp 821-841

The literature concerning the application of information-feedback methods for saving energy in the home is reviewed. **Particular attention is given to electronic feedback via smart meters and displays, or “energy-consumption indicators” (ECI).** Previous studies have not focused on individual appliances, but this paper presents the findings of a UK field study involving 44 households which considered domestic cooking: it compares the effectiveness of providing paper-based energy-use/saving information with electronic feedback of energy-consumption via ECIs designed specifically for this investigation. Twelve Control Group households were monitored for a period of at least 12 months and this revealed an average daily consumption for electric cooking of 1.30 kWh. Subsequently across a minimum monitoring period of 2 months, 14 out of 31 households achieved energy savings of greater than 10% and six of these achieved savings of greater than 20%. **The average reduction for households employing an ECI was 15%, whereas those given antecedent information alone reduced their electricity consumption, on average, by only 3%.** The associated behavioural changes and the importance of providing regular feedback during use are identified. It is recommended that further attention be given to optimising the design and assessing the use of energy-consumption indicators in the home, in order to maximise the associated energy-saving potential.

The SusHouse Methodology. Design Orienting Scenarios for Sustainable Solutions

Philip Vergragt and Ken Green

Faculty of Design, Engineering and Production
Delft University of Technology Delft The Netherlands

Manchester School of Management
UMIST Manchester UK ' kgreen161@aol.com

J. of Design Research 2001 - Vol. 1, No.2

This paper describes the conclusions of the SusHouse (Strategies towards the Sustainable Household) project that has been exploring possible socially and technologically innovative strategies for sustainable households. The Project has covered 3 household functions: Clothing Care, Shelter (Heating, Cooling and Lighting) and Food (Shopping, Cooking and Eating). These have been studied in 5 European countries (Germany, Hungary, Italy, Netherlands, and UK). The methodology of the Project has involved stakeholder workshops, the construction of design-orienting scenarios, environmental, economic and consumer assessment of the scenarios and strategy formulation. The paper describes the methodology for devising Design-Orienting Scenarios, with examples from the three functions, the results of environmental, economic and consumer acceptability assessments of these scenarios, comments on how the methodology can be developed and applied. The methodology is specifically applicable by designers who are leading multi-stakeholder sustainable innovation processes aimed at large shifts in technology and use.

Design, lifestyles and sustainability. Aesthetic consumption in a world of abundance

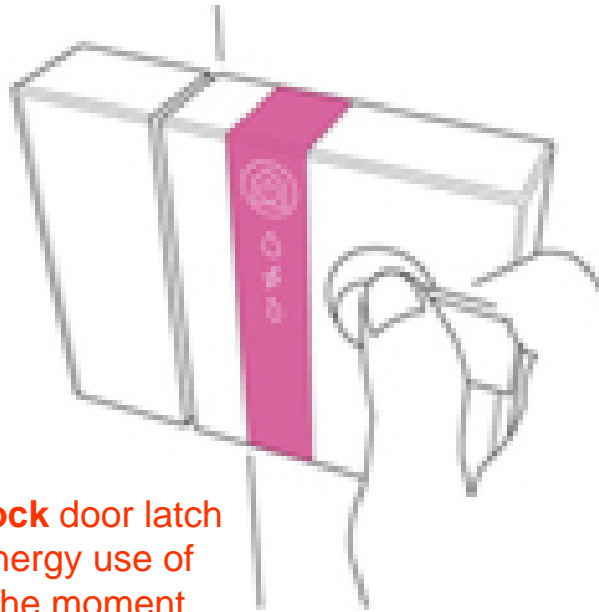
Peter Dobers 1 and Lars Strannegård 2

1 Business Studies in Sustainable Development, School of Business, Mälardalen University, Sweden

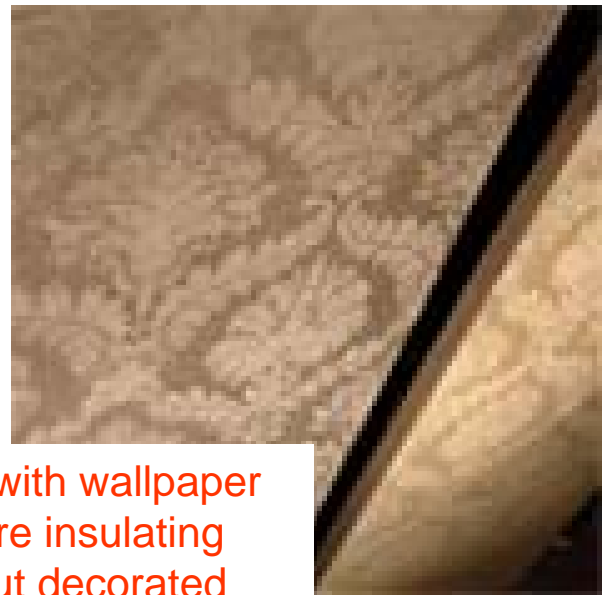
2 Centre for Advanced Studies in Leadership, Stockholm School of Economics, Sweden

Business Strategy and the Environment, Vol. 14, 2005, pp 324–336

This paper strives for a conceptualization of sustainability, design and contemporary consumption. By sketching out how effective production systems have created an abundance of products, the paper links this development to the aestheticization of society and an increased interest in design. **In market economies characterized by profusion, corporations engage in activities filling their offerings with aura, aesthetics, symbols and meaning. In such lands of plenty, conspicuous consumption becomes a thoroughly expressive activity and highly problematic for actors with ambitions to design a sustainable future. Our conclusion is that sustainability must ultimately be seen as intertwined with social processes such as fashion, identity and identity construction.**



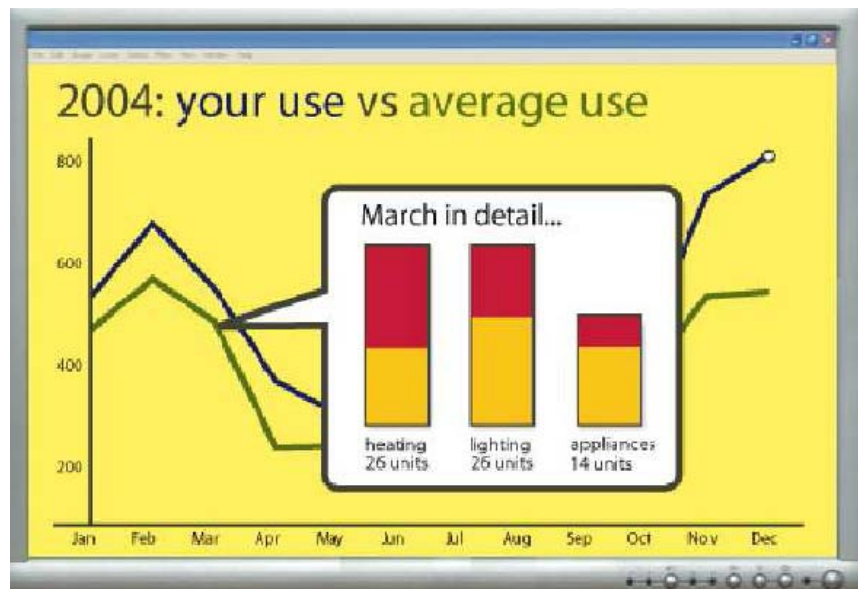
The **EnergyLock** door latch displays the energy use of your home at the moment you exit and provides a single, simple switch to turn off all unnecessary devices.



Concrete Blond came up with wallpaper made of concrete. These are insulating panels made of concrete but decorated with traditional wallpaper patterns which could be fitted inside the home on exterior-facing walls. The cavity behind the panels can be filled with insulating foam to reduce heat loss. It's ideal for older homes.



The **Energy Report** is an independent energy statement that collates information from all your current suppliers and gives you the lowdown on cost and environmental impact. You can see what contribution you have made to slowing climate change.



Track your energy use and check your bills on your home PC with **Energy Tracker**. Find out why you're using more than other people living in identical houses. Set a budget for next month and track your progress.



What's the job?
loft insulation ▼

Enter your postcode
SE1

Search

Take the hassle out of making energy efficiency improvements to your home with **JobDone**. Join online or at your local DIY superstore. JobDone will find others in your area who are having similar work done and cut the cost by bringing you together. Jobgroups with five or more people are assigned a local JobDone project manager to oversee the work.

For a much brighter future.



It's not just money you'll save.

Invest your energy savings in a **Power Pension** and it'll pay out in heat and light - making for a more comfortable retirement and a healthier planet.

Collect savings wherever you see the CO₂ savings logo - on loft insulation, home wind turbines or even low energy light bulbs.

Power Pension lets you invest in your own and the planet's future at the same time. For every energy saving improvement you make to your home, credits are added to your Power Pension account. You don't have to stay in the same house to continue to make contributions. Estimate now how much energy you will want to receive upon retirement and your Power Pension will pay out in heat, light and power when it matures.



OneMillionRoofs is a campaign to have more than one million London householders sign up their roofs for renewable energy. Have a wind turbine installed for free and in return receive a rebate on your electricity. A market of one million households would bring down the cost of developing, manufacturing and installing wind turbines or their equivalent. OneMillionRoofs offers you the opportunity to be part of the world's first distributed power station.

Innovative

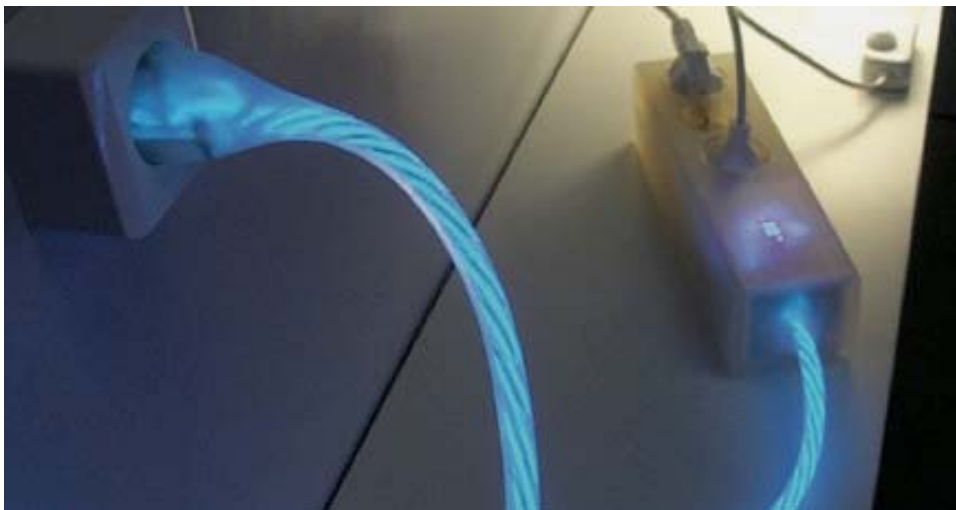
Power Products

Energy conservation and visualization solutions

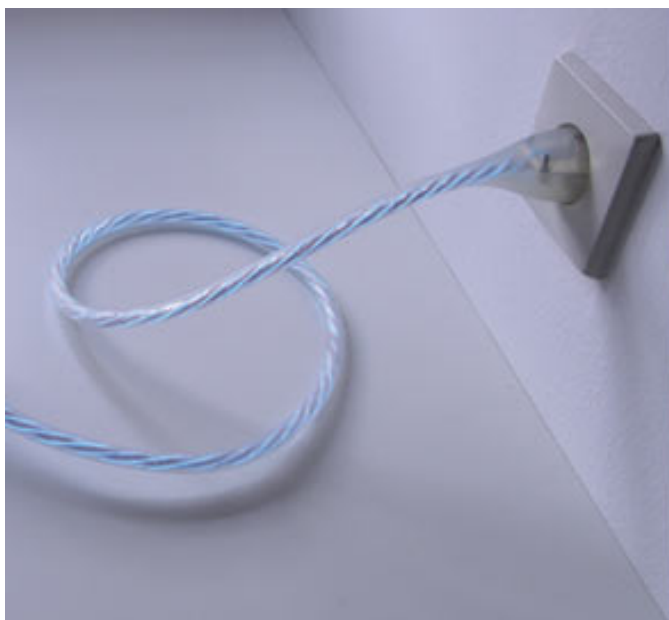


Described in a product review as “glowing guilt” the **Power Aware Cord** glows and pulses in proportion to the power which flows through it.

It was developed by Anton Gustafsson and Magnus Gyllenswärd of Static!, a research project funded by the Swedish Energy Agency.



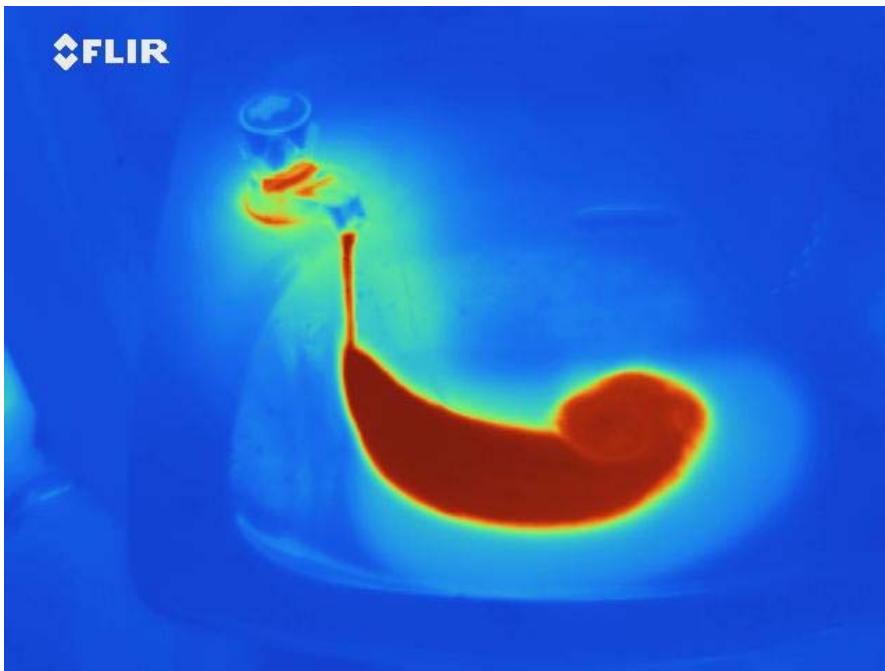
Static! investigates interaction design as a means for increasing energy awareness and for changing behaviour.



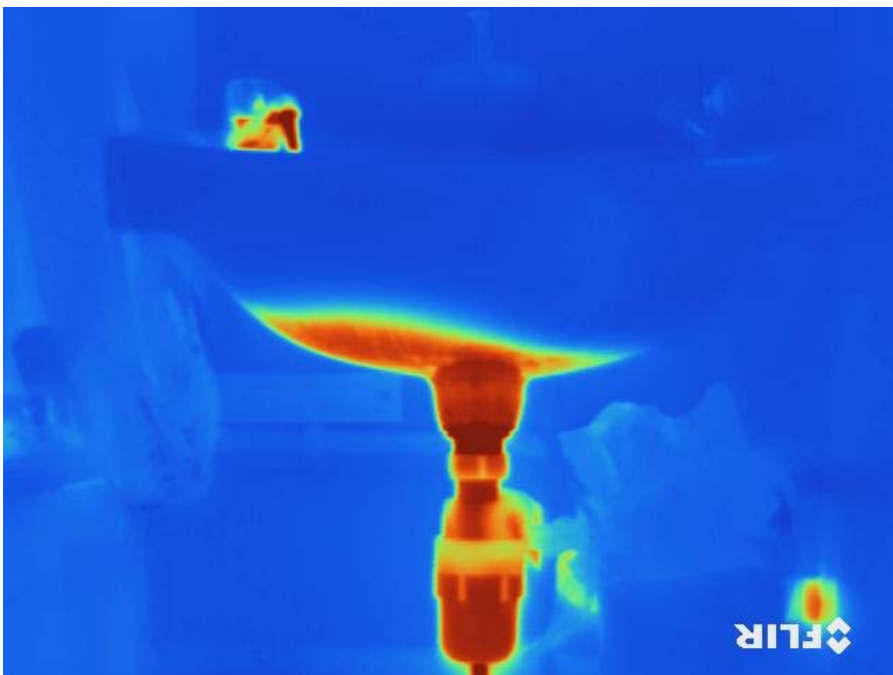


The 2007 Brunel Design graduate Harry Ward designed the **Orb Energy Monitor** which consists of an inductor clipped to a power cable, a wireless transmission system and a hand-held orb which glows in colours which are proportional to the power. The device displays power, energy, electricity cost or CO2 emissions.

TM **HCDI**
Human Centred
Design Institute



The perception enhancement systems team is researching the impact of technologies which expand our sensory abilities, providing us information which is not traditional to our biological constitution.



Energy usage research is required in the areas of:

Branding and Design Management : 21st century products and services must not just respect a brand identify which brings meaning and emotion, they must determine the organisational structure of the company.



Persuasive Design : 21st century products and services must provide more than the traditional concepts of safety, comfort, and usability. They must also provide persuasiveness, motivating users by facilitating decisions and actions.



Categories ▾ Motors Stores
Buy Sell My eBay Community Help
Home > Community > **Feedback Forum**

Feedback Forum

Design with Intent : 21st century products and services must include specific physical, cognitive and emotional characteristics which lead directly to desired user behaviours.



We look forward to
working with you...

