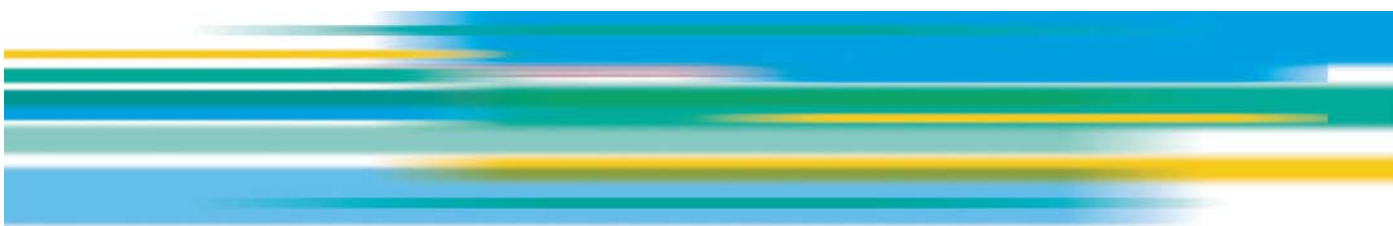


REPORT OF THE EPSRC HUMAN COMPUTER INTERACTION THEME DAY AND SURVEY

March 2012



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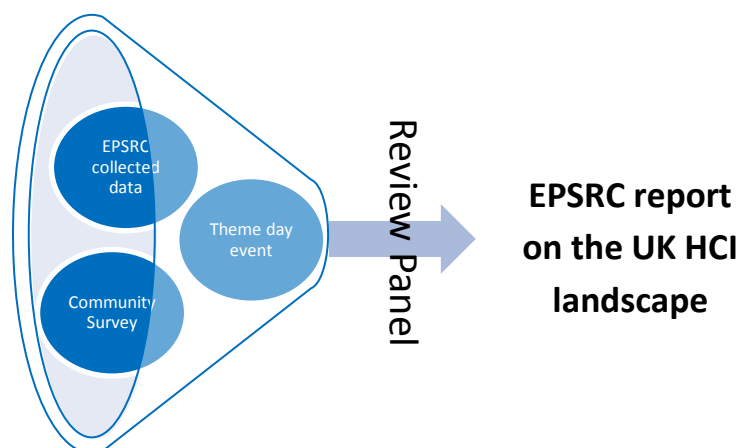
Background

In 2010 the EPSRC launched its [Strategic Plan](#) for the period 2011-2014, setting out 3 strategic goals: Shaping Capability; Developing Leaders and Delivering Impact. In order to shape the UK research landscape and achieve the first of these goals, throughout 2011 and into 2012, the EPSRC have been investigating the relative quality and importance of research areas from across the whole remit and judgements are being made on future funding trajectories for each area of research. This view of our portfolio is being published on the [EPSRC website](#) as is due to be completed by the end of March 2012. Discussions with the EPSRC ICT Strategic Advisory Team had raised questions over the breadth of research being funded in HCI and it was recognised that this area underpins a large part of the portfolio funded by the RCUK Digital Economy Programme. It was in this context that a Review of HCI research was started in September 2011 with the aim of better understanding the breadth, quality and importance of HCI research in the UK.

In order to steer the planning and lead the review the EPSRC convened a panel of experts:

Dave Robertson – chair (University of Edinburgh);
Anne Anderson (University of Glasgow);
Bob Anderson (University of Nottingham);
Mike Evans (BBC R&D);
Matt Jones (University of Swansea);
Youn-Kyung Lim (KAIST, South Korea);
Eamonn O’Neill (University of Bath);
Yvonne Rogers (University College London);
Abigail Sellen (Microsoft Research Cambridge);
Jason Williams (Orange);
Steve Whittaker (University of California Santa Cruz).

As part of this review process the EPSRC conducted a survey of UK researchers early in 2012 and ran a Theme Day in which approximately 50 researchers from the UK were invited to join the panel to discuss the strengths, weaknesses and opportunities for the UK HCI research community over the coming years. This report contains an analysis of the survey responses and the outputs of the Theme Day event. A separate [report of the EPSRC Review of Human Computer Interaction Research in the UK](#) is also available which presents the conclusions of the review panel based on the various inputs (including those summarised in this report).

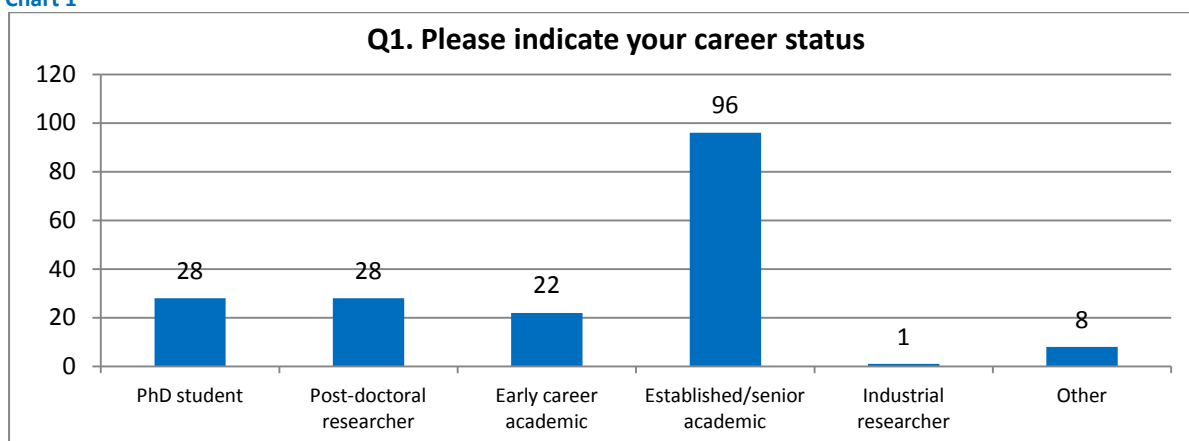


Survey results and analysis

The survey was prepared by the EPSRC in order to gather evidence for the HCI review panel and was launched on [Bristol Online Surveys](#) in January 2012. The survey closed on the 16th January 2012 and had 183 responses.

The majority of responders classed themselves as an “established/senior academic”, with a fairly even spread across earlier career stages (from PhD student through to early career academic). Only one industrial researcher completed the survey.

Chart 1



Almost a half of all established/senior academics and two thirds of all post doctoral researchers work in research groups which have received more than 6 international researchers in the past 3 years:

| 3. How many international researchers have visited your research group in the past 3 years? | PhD student | Post-doctoral researcher | Early career academic | Established /senior academic | Industrial researcher | Other | Totals |
|---|-------------|--------------------------|-----------------------|------------------------------|-----------------------|----------|------------|
| 0 | 2 | 2 | 2 | 7 | 0 | 2 | 15 |
| 1 | 5 | 2 | 4 | 2 | 0 | 0 | 13 |
| 2 | 5 | 0 | 2 | 11 | 0 | 2 | 20 |
| 3 | 0 | 3 | 3 | 15 | 1 | 0 | 22 |
| 4 | 2 | 1 | 2 | 8 | 0 | 0 | 13 |
| 5 | 0 | 1 | 0 | 6 | 0 | 0 | 7 |
| 6 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| More than 6 | 11 | 19 | 9 | 47 | 0 | 4 | 90 |
| Totals | 28 | 28 | 22 | 96 | 1 | 8 | 183 |

Where specified, the largest number of visitors was from the US with a significant number also coming from other European countries, China and Japan.

| | | | | | | | | | |
|-----------|----|-------------|----|-------------|---|--------------|---|-----------|---|
| USA | 74 | Japan | 16 | Norway | 7 | Belgium | 2 | Ethiopia | 1 |
| Germany | 39 | Sweden | 13 | Malaysia | 6 | Cyprus | 2 | Hungary | 1 |
| Australia | 28 | Netherlands | 12 | Switzerland | 6 | Greece | 2 | Malta | 1 |
| France | 26 | Denmark | 9 | Taiwan | 6 | Ireland | 2 | Singapore | 1 |
| Spain | 22 | Finland | 9 | Austria | 5 | Russia | 2 | Thailand | 1 |
| Canada | 21 | India | 9 | Portugal | 5 | South Africa | 2 | Turkey | 1 |
| China | 16 | New Zealand | 8 | South Korea | 5 | Chile | 1 | Ukraine | 1 |
| Italy | 16 | Brazil | 7 | Mexico | 3 | | | | |

The results of question 4 indicate a strong presence at all career stages on conference or journal committees in contrast to relatively few members of learned society committees and research advisory boards.

Table 1

| 4.a. Research advisory bodies | PhD student | Post-doctoral researcher | Early career academic | Established/senior academic | Industrial researcher | Other | Totals |
|-------------------------------|-------------|--------------------------|-----------------------|-----------------------------|-----------------------|-------|--------|
| 0 | 26 | 25 | 17 | 43 | 1 | 5 | 117 |
| 1 | 2 | 2 | 3 | 27 | 0 | 3 | 37 |
| 2 | 0 | 1 | 1 | 14 | 0 | 0 | 16 |
| 3 | 0 | 0 | 0 | 6 | 0 | 0 | 6 |
| 4 | 0 | 0 | 0 | 5 | 0 | 0 | 5 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Other | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Totals | 28 | 28 | 22 | 96 | 1 | 8 | 183 |

| 4.b. Learned society committees | PhD student | Post-doctoral researcher | Early career academic | Established/senior academic | Industrial researcher | Other | Totals |
|---------------------------------|-------------|--------------------------|-----------------------|-----------------------------|-----------------------|-------|--------|
| 0 | 26 | 26 | 18 | 49 | 0 | 5 | 124 |
| 1 | 0 | 0 | 3 | 26 | 0 | 3 | 32 |
| 2 | 2 | 1 | 0 | 10 | 1 | 0 | 14 |
| 3 | 0 | 0 | 0 | 10 | 0 | 0 | 10 |
| 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Other | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Totals | 28 | 28 | 22 | 96 | 1 | 8 | 183 |

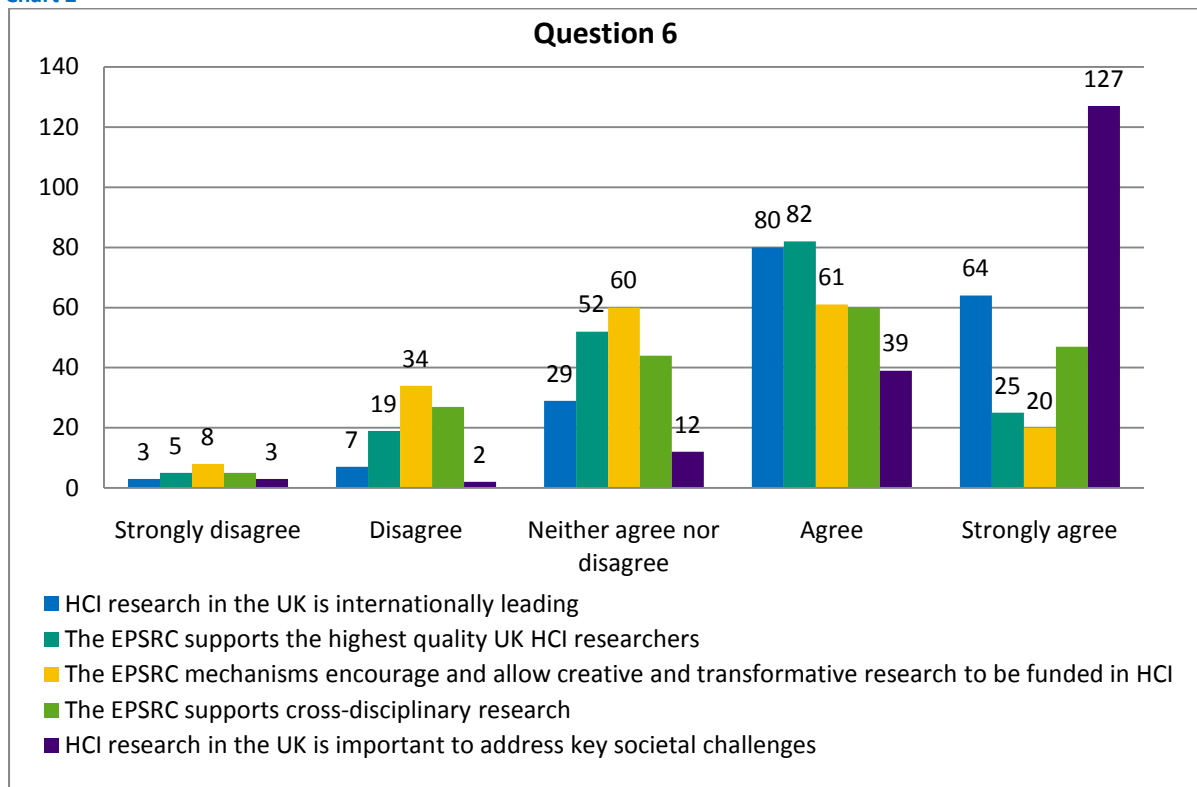
| 4.c. Conference/journal committees | PhD student | Post-doctoral researcher | Early career academic | Established/senior academic | Industrial researcher | Other | Totals |
|------------------------------------|-------------|--------------------------|-----------------------|-----------------------------|-----------------------|-------|--------|
| 0 | 20 | 12 | 6 | 5 | 1 | 2 | 46 |
| 1 | 3 | 4 | 2 | 10 | 0 | 2 | 21 |
| 2 | 2 | 3 | 2 | 17 | 0 | 3 | 27 |
| 3 | 2 | 3 | 5 | 15 | 0 | 0 | 25 |
| 4 | 0 | 1 | 3 | 9 | 0 | 0 | 13 |
| 5 | 0 | 2 | 2 | 15 | 0 | 1 | 20 |
| 6 | 1 | 0 | 1 | 12 | 0 | 0 | 14 |
| Other | 0 | 3 | 1 | 13 | 0 | 0 | 17 |
| Totals | 28 | 28 | 22 | 96 | 1 | 8 | 183 |

| 4.d. User/industry panel | PhD student | Post-doctoral researcher | Early career academic | Established/senior academic | Industrial researcher | Other | Totals |
|--------------------------|-------------|--------------------------|-----------------------|-----------------------------|-----------------------|-------|--------|
| 0 | 26 | 25 | 19 | 61 | 0 | 8 | 139 |
| 1 | 1 | 3 | 2 | 21 | 1 | 0 | 28 |
| 2 | 1 | 0 | 1 | 10 | 0 | 0 | 12 |
| 3 | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Totals | 28 | 28 | 22 | 96 | 1 | 8 | 183 |

The community response to Question 6 revealed very strong support for the international quality of UK HCI research and the importance of the research to the UK through the address of societal

challenges. There is a more mixed response to the assertion that the EPSRC mechanisms encourage creative and transformative research.

Chart 2



Question 7 of the survey asked: “What are the key future challenges that UK HCI researchers can address and how can the UK research be better placed to contribute?” These responses were considered carefully by the review panel and helped to shape their conclusions presented in the [Report of the EPSRC Review of Human computer Interaction Research in the UK](#). Appendix B presents the full list of responses to this question.

The survey included a description of 6 sub-areas of HCI that the panel had identified (see page 10 for more information about these sub-areas). Question 8 of the survey asked researchers to indicate whether each sub-area of HCI featured as a primary interest, secondary research interest or not at all in their own research. In the following diagrams each coloured line represents the collection of responders with a given primary interest (indicated in the legend). *Chart 3* plots the frequency of these responders against the primary interests. As an example, the following table summarises the 97 responses which list *Theories and Methods* as a primary research.

| Evaluation | Responders with a primary interest in Theories and Methods |
|---------------------------------|--|
| Primary research interest | 52 |
| Secondary research interest | 42 |
| Does not feature in my research | 3 |

Thus, the *Theories and Methods* series in *Chart 3* has a data point at 52 on the *Evaluation* axis.

Chart 4 has data points representing the number of responders with a primary or secondary interest in the sub-area indicated by the axis, as a percentage of the total number of responders included in each series.

Chart 3

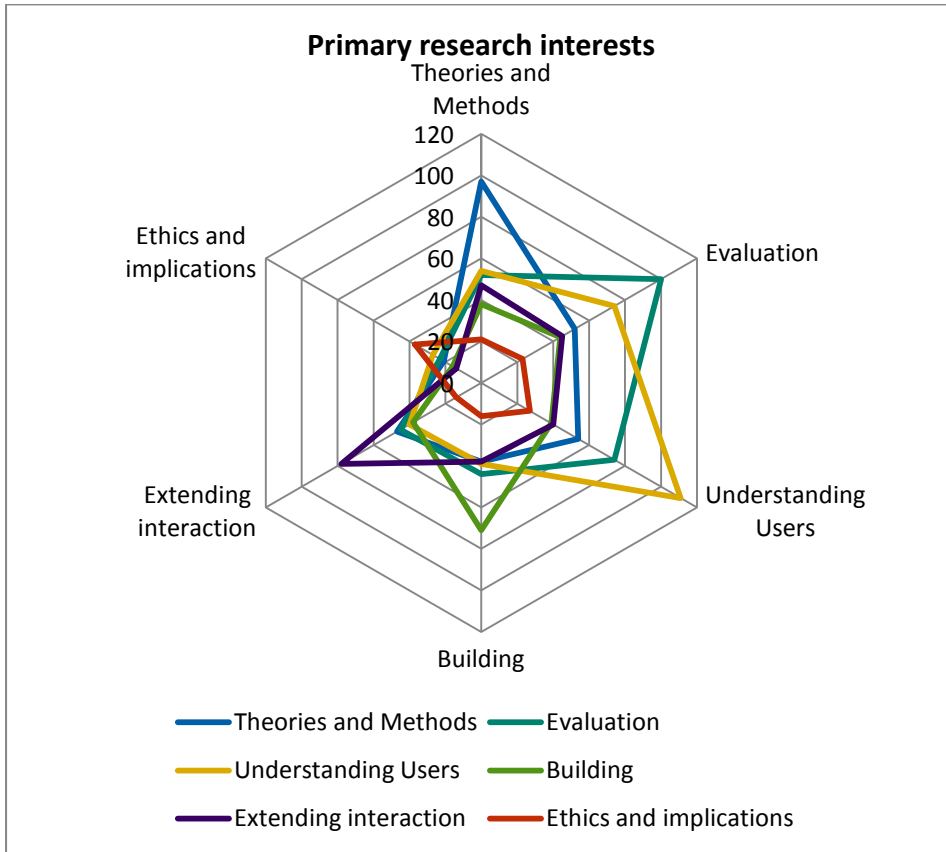
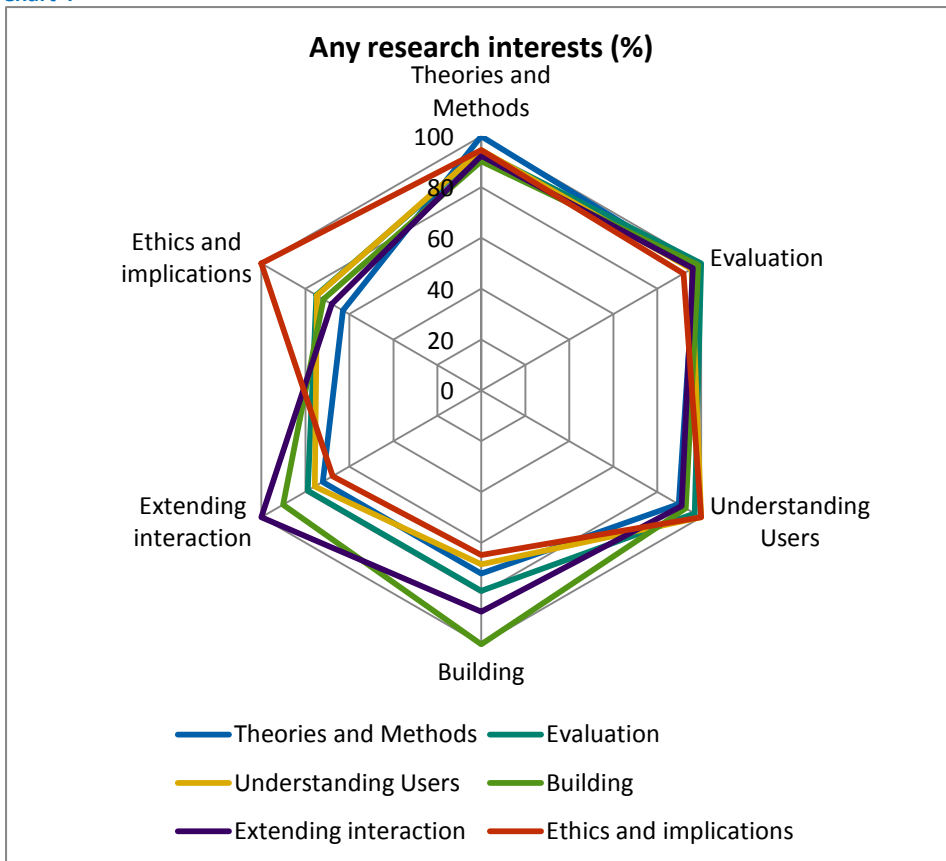


Chart 4



HCI Theme Day

Agenda for the HCI Theme Day

Held on the 19th January 2012 at the Mercure Manchester Piccadilly hotel from 10.00 am to 4:30 pm

A full attendance list is included as Appendix A of this report.

| | | |
|------------------------------------|---|---|
| 9:00-10:00 am | Registration and Coffee | |
| 10:00 -10:10 am | Welcome | John Baird/ Liam Blackwell, EPSRC |
| 10:10 -10:30 am | Introduction and Overview | Dave Robertson, University of Edinburgh |
| 10:30 -11:00 am | Keynote Speaker: | Stephen Whittaker, UCSB |
| 11:00 -11:15 am Tea/ coffee | | |
| 11:15 -12:45 pm | Session 1 – a taxonomy of HCI | |
| 1:00 -1:45 pm Lunch | | |
| 1:45 -2:15pm | Keynote Speaker: | Youn-Kyung Lim, KAIST |
| 2:15 -4:00 pm | Session 2 – Future directions, opportunities and challenges for HCI | |
| 4:00 -4:30 pm | Round up | |
| 4:30 pm Close | | |

Sub-areas of HCI – identification and analysis

HCI is a broad field and in order to investigate the strength and weaknesses of HCI research, it was important to identify broad research themes within HCI. A list of 6 sub-areas was produced by the panel in an attempt to capture the wide range of activities and foci present in the HCI research landscape.

1. **Theories and methods**
The development of new theories, models, paradigms and frameworks for analysis, design and application;
2. **Evaluation**
The use of experiments, studies, envisionment workshops or other forms of user engagement to understand or evaluate proposed designs or prototype technologies;
3. **Understanding users**
Studies of different target groups and settings to inform the invention and design of new technologies;
4. **Building**
The development and evaluation of platforms, architectures or component technologies, that underpin the interaction between human actors and ICT systems;
5. **Extending interaction**
The development and evaluation of new techniques of interaction and use, including new modalities of input and output, and new sensors and devices.
6. **Ethics and implications**
The identification of possible individual and/or societal implications and consequences of innovative technologies or novel uses of ICT.

The attendees at the Theme Day on the 19th January explored the strengths, weaknesses, opportunities and threats relevant to UK HCI research in each of the 6 sub-areas. With the help of the review panel these discussions have been summarised as follows.

Theories and Methods

Strengths

- The UK has strengths in research into systems for appreciation of diversity and minority groups
- The UK is one of the international leaders in the development of new theories and methods and has produced some visionary papers
- Experience-centred design, ethnography, user-centred design, formal methods/statistical approaches, paradigm building and design/HCI/ubiquitous computing critique are all UK strengths.

Weaknesses

- There is not enough work on scaling theories/methods to large society level systems/problems
- Work is needed to package theories and methods for industry/wider use
- Integration with other theoretical/method frameworks is weak.

Opportunities

- There are opportunities to build connections between research and practice and leverage research for the commercial world through more effective design processes and methods (with an emphasis on *design*)
- Crowd-sourcing and big data present huge opportunities for the field to contribute
- Another opportunity comes from transferring successes across different domains and sharing best practise.

Threats

- The theories and the merits of the theoretical work are not visible to less theory/'method' driven elements of HCI community and the wider computer science/ICT communities
- Coherence is limited (maybe due to the maturity of the discipline).

Evaluation

Strengths

- The multidisciplinary culture is a big strength in the UK and we have an eclectic community with integrated methods and approaches
- The Research in the Wild calls have stimulated evaluation in the wild. This includes movement towards app store and crowd sourcing (c.f. threat)

Weaknesses

- There is a lack of large-scale penetration of industry practice
- The research portfolio has a preponderance of small-scale studies. Fixing this will include a culture of paying for much bigger participant pools.
- Evaluation is sometimes not seen as part of a broader design process and this is a weakness.

Opportunities

- The availability of new forms and sources of data provides new opportunities in the evaluation of technologies on a larger scale
- Better outreach 'marketing' and public engagement can convey the societal and economic relevance of HCI and also lead the research agenda. This includes an opportunity for greater integration with industry and organisations in order to push the field.

Threats

- There is a lack of continuity in research areas – exacerbated by short-term funding
- There is danger of going too far down the route of 'App store' evaluation model which could lead to a lack of systematic evaluation approaches
- Monopolisation of access to data by large corporations and the ethics of access to data could provide barriers to the effective use of this data for evaluation.

Understanding Users

Strengths

- The UK has strengths in variety: the variety of user groups, methods (including close links with the social sciences) and application domains all add to the richness of the landscape and benefit the field.

- The UK culture of collaboration and a strong willingness to work in an international and multidisciplinary way is a key strength
- There is an inherent importance in this area: it matters (e.g. managing power stations)

Weaknesses

- Access to large data sets (loyalty cards, banks etc.) is difficult and often tied in red tape or held by large corporations
- Experiments on narrow user groups (missing cultural diversity etc) are a weak point in the research landscape
- The field is hindered by various disconnects between stakeholders: e.g. user – societal level; understanding users – final evaluation; researchers – public; researchers – school education.

Opportunities

- There are opportunities to utilise new methods e.g. science fiction, literature, film...
- Opportunities also lie in the consideration of new user groups beyond ageing, health, abstracted “user” (somebody with their device) and growth.

Threats

- Commercial activities controlling research and data could threaten access to information about users. Equally, as the community tries to move to new user groups there could be various difficulties in accessing the appropriate groups
- Our research remains North America and Europe focussed – what about countries such as China or India? This could also constitute an opportunity.

Building

Strengths

- There is strong connectivity between HCI and Computing in the UK (as compared to North America, for example).
- The diversity of the prototypes we build in the UK is high, especially small things like apps.
- Large corporations are mainly based in the US; therefore there is less control by these corporations over the things that we build.
- Access to EU funding is an additional source to exploit.
- There is a liberal funding regime for high risk research (though this was a contentious issue within the discussion groups that took place).
- HCI is embedded across different departments (this can be a strength for the research, but also a weakness because it means less visibility and harder to get funds).

Weaknesses

- The large IT companies are mainly in the US which means there is less access to corporate funding and collaborations in the UK.
- The UK culture of entrepreneurship in the research base is not as high as in the US.
- UK academics are bad at commercializing ideas. Anything that comes out of research that is close to a product is not funded, nor do corporations want things not ready for product (a gap).

- Funding in UK is too short term to fund long term or large projects such as building ecosystems. No time to deep dive.
- After grants wrap up, we are not good at sustaining, maintaining and sharing technologies that have been built.

Opportunities

- There is an opportunity for better PR for the field, including importance of user-experience (UX) being more widely recognized.
- We need a better reward structure for things that get commercialized.
- It is easy to create and commercialise small things, such as Apps through the App store, but need more support to commercialise larger scale technologies.
- We need to devise better funding schemes for cross-disciplinary research.
- There is a need for better support from EPSRC to encourage industry to adopt high risk research.
- Researchers should pursue stronger collaboration with industrial partners and a better understanding and targeting of the SME landscape would be a good start.
- We can and should use opportunities to get hardware and software people together.
- Get HCI on the new computing at schools agenda. The opportunity is now!

Threats

- There is a lack of infrastructure and teaching to support the new computing at schools agenda, particularly in the HCI domain (who can teach the HCI?).
- Good students with relevant training often come from overseas but we don't have money to pay them.
- Lack of PhD students throughout for working on projects (departments without CDTs)
- Not enough building of hardware toolkits.
- Need more support for cross-disciplinary work for working with industry, for example.

Extending Interaction

Strengths

- UK research is considered world leading in the area of extending interaction and it has been well supported by the EPSRC
- We have developed multiple methods (e.g., social, technological) that are being applied to innovative systems, in the areas of gaming, learning and health, that have provided new insights, understandings that has substantially advanced the field.
- We have a distinctive brand of innovative research that addresses a class of messy problems. This approach is world leading – it is innovating the design process and is producing very distinctive methods that are being taken up globally.

Weaknesses

- There is poor link up between HCI research on innovative interfaces and start-up companies. Many potential innovations are marooned at the prototype stage, when funding ends.
- The in the wild studies initiative has proven to be very promising, but costly. It would be very valuable if they could be extended to investigate long-term effects on behaviour, and in so

doing, developing streamlined and generalised methods for carrying this style of much needed research

Opportunities

- We can address critical societal problems, such as health, well being, energy, and addiction, using our armoury of unique multidisciplinary techniques and approaches
- Behavioural change is very topical; government policy makers, the general public and HCI researchers are very interested in its application and impact. What we can offer as a community is a test-bed of methods, and innovative prototypes to evaluate theories that have yet to be supported empirically and will make a huge impact on society
- There is a huge interest in multimodal technologies currently worldwide, such as gesture, touch, speech and combinations of these. UK has world leading researchers and teams in sensing technologies. We are also experts in collaboration, CMC and social media research. An opportunity is to bring these two strands together to develop the next generation of extended technologies and user experiences. It is high risk, adventurous and integrative.
- Another opportunity is to provide ways of addressing the big data challenge through human-centric lenses, such as sense-making, privacy, ownership and control.
- There are many new domains that can be explored for potential innovation and commercialisation, that are beginning to be researched in HCI, such as creativity, automotive interaction, consumerism, and wisdom. They are strongly related to emerging real world problems but currently unsupported.

Threats

- A lot of problems are associated with private companies owning individual's data leading to 2 sets of problems: 1) comprising individual's rights and (ii) theoretical – researchers have limited or no access to that valuable big data and therefore it is hampering the development of theory and technology.
- There is the danger that findings from extending interaction studies, such as brain computer interaction, can be prematurely exploited for political ends raising significant issues, such as surveillance.

Ethics and Implications

Strengths

- The UK has generally strong ethical governance (NHS frameworks, BCS, RAEng etc) and a strong public service ethos (corporate social responsibility etc)
- The innate inter-disciplinarity in UK HCI research and the ability of the UK community to be critically self-aware is a big strength
- Value sensitive design and 'in the wild' participatory approaches are strongly pursued in the UK and this can include serious consideration of the ethics and implications of research
- The UK is bold in taking risks and addressing unpopular topics.

Weaknesses

- There is a disconnect between some design processes and engineering
- Some established frameworks create an inhibiting effect on the exploration of more appropriate ways to consider ethics in ICT and HCI

- There is a lack of push in research drivers – researchers should connect more strongly with governmental/corporate change drivers
- The UK is weak in addressing all aspects of social inclusion, full social spectrum and accessibility.

Opportunities

- The consideration of ethics as a productive research practice is an opportunity for the future
- Success can be reinforced and issues can be brought to light through embedded and established public engagement to make the implications of technology more visible
- As part of this wider agenda, the ICT in schools review provides an opportunity
- The UK HCI community is cohesive and there is active engagement from relevant public bodies with a view to establishing a framework and culture of ethical consideration in ICT research.

Threats

- There are ambiguities and misconceptions about what the ethics and implications of technology mean – whose ethics? Sometimes, this is seen as a box-ticking exercise without appreciation of the motivations and merits of such studies
- Moreover, the lack of a common language for the communication of the value of HCI to industry, government and even other academics
- There are challenges in guaranteeing diversity and maintaining a full range of views in research
- Treating this separately rather than integral to the research would have a detrimental effect on the subject
- There is a perception of a negative effect of honesty with respect to negative risk
- Other threats include naivety in affecting behaviour change and the difficulty in defining metrics and assessing comparative benefits.

Future directions and opportunities in HCI

The second session of the Theme Day invited participants to discuss future directions and opportunities for HCI research in the UK. The discussions were framed around three questions:

1. What are the future opportunities for HCI research in the UK in the next 10 years?
2. What are the barriers to achieving these ambitions?
3. Do we have the right research expertise and environment in the UK to overcome these barriers and realize our potential?

The discussion groups were led by the review panel members who were grateful to participants for the interesting and engaging debates that emerged. The points raised and insights gained from this session were used by the panel to help with them assess the key review questions which were discussed with the panel on the 20th January at the Mercure Manchester Piccadilly Hotel. A list of the key questions together with summary of the panel's conclusions based on the Theme Day discussions and other evidence can be found in the full [report of the EPSRC Review of Human Computer Interaction Research in the UK](#).

Appendix A: HCI Theme Day attendance list

| | |
|---------------------------|--------------------------------------|
| Professor Ann Anderson | University of Glasgow |
| Professor Bob Anderson | University of Nottingham |
| Dr Penny Allen | BBC |
| Dr John Baird | EPSRC |
| Dr Madeline Balaam | Newcastle University |
| Professor Russell Beale | University of Birmingham |
| Dr Ben Bedwell | University of Nottingham |
| Dr Tony Belpaeme | Plymouth University |
| Professor Steve Benford | University of Nottingham |
| Dr Nadia Berthouze | University College London |
| Dr Liam Blackwell | EPSRC |
| Professor Ann Blanford | University College London |
| Professor Steve Brewster | University of Glasgow |
| Dr George Buchanan | City University London |
| Dr Maria Burke | University of Salford |
| Dr Matthew Chalmers | University of Glasgow |
| Dr Lizzie Coles-Kemp | Royal Holloway, University of London |
| Dr Hannah Collins | EPSRC |
| Dr Robert Comber | Newcastle University |
| Mrs Kathleen Cummins | University of Dundee |
| Dr Parisa Eslambolchilar | Swansea University |
| Dr Mike Evans | BBC |
| Professor David Frohlich | University of Surrey |
| Ms Jo Garrad | EPSRC |
| Dr Simon Harper | University of Manchester |
| Professor Pat Healey | Queen Mary University of London |
| Dr Marina Jirotko | University of Oxford |
| Professor Matt Jones | Swansea |
| Mrs Claire Lane | EPSRC |
| Professor Oliver Lemon | Heriot-Watt University |
| Professor Youn-kyung Lim | KAIST, South Korea |
| Professor Ji Ming | Queen's University of Belfast |
| Dr Eamon O'Neill | University of Bath |
| Professor Jon Oberlander | University of Edinburgh |
| Dr Marianna Obrist | Newcastle University |
| Professor Patrick Olivier | Newcastle University |
| Professor Stephen Payne | University of Bath |
| Professor Helen Petrie | University of York |
| Dr Chris Preist | University of Bristol |
| Dr Sara Price | Institute of Education |
| Professor Rob Proctor | University of Manchester |
| Dr Janet Read | University of Central Lancaster |
| Dr Jon Rimmer | University of Sussex |
| Professor David Roberts | University of Salford |
| Professor Dave Robertson | University Edinburgh |

| | |
|----------------------------|---------------------------|
| Professor Peter Robinson | University of Cambridge |
| Professor Tom Rodden | University of Nottingham |
| Professor Yvonne Rogers | UCL |
| Dr Andrew Rose | EPSRC |
| Dr mc schraefel | University of Southampton |
| Dr Abigail Sellen | Microsoft Research |
| Professor Helen Sharp | Open University |
| Dr Sriram Subramanian | University of Bristol |
| Professor Harold Thimbleby | Swansea University |
| Dr Nava Tintarev | University of Aberdeen |
| Mr Andrew Tyrer | Technology Strategy Board |
| Dr Annalu Waller | University of Dundee |
| Dr Peter Wallis | University of Sheffield |
| Professor Steve Whittaker | UCSC, California |
| Dr Jason Williams | Orange |
| Professor William Wong | Middlesex University |

Appendix B: Survey responses

This appendix contains all written survey responses to Question 7.

| |
|---|
| <p>7. What are the key future challenges that UK HCI researchers can address and how can the UK research be better placed to contribute?</p> |
| <p>* connected societies/communities * privacy/security of data and information * intelligent support for everyday tasks - leading to increased efficiencies and quality of life * 'user experience' is the leading desirable skill for high-tech employers (US data) * ubiquity of technology is not matched by ease of use - maximising potential is vital * essential to support policy changes such as 'at-home' healthcare, more efficient work/travel practices, etc.</p> |
| <p>- Fusion of HCI with emerging technologies (modalities, sensors etc) - Increase the interaction between HCI and other disciplines for the design of (more) intelligent technologies and services for the user - Modelling of user behaviour</p> |
| <p>- making use of social networks/media in everyday life - providing access to HCI technology to all parts of the society (social and age demographics)</p> |
| <p>- Need not only University-based research but also industrial research. - Need more support for researchers - including PhD students - to be on the international scene: i.e. funding for attending conferences ; press coverage - in the same way as US researchers</p> |
| <p>- Reducing energy demand - improving information systems in health care - fostering citizen science projects - HCI enables public engagement - responding to ethical and privacy challenges of the information age - improving the ways we work, travel, play, communicate, and live at home - motivating healthy behaviour - accessible technologies for children, elderly and disabled people - Fostering learning and knowledge - connecting people</p> |
| <p>1. Combining HCI with content analytics and large scale intelligent data analysis 2. Richer, semantic interfaces (e.g. utilising language-based interaction) 3. Building on UK research strength in computer vision and speech technology to develop richer multimodal interaction. 4. Development of interaction technologies oriented to social care, independent living, and assistive technologies (there is a huge economic/social/demographic motivation for this). 5. To contribute best to these challenges... trust our high quality researchers to largely set their own research targets and challenges through responsive mode funding.</p> |
| <p>1. HCI as we teach it is about making computers work better as tools. There is (potentially) a better way (based on natural language dialogue) where the computer is proactively helpful. This requires social skills. 2. HCI is usually based on a transaction model - the interaction needs to be more like a bicycle.</p> |
| <p>a better understanding of the effects of computers and robots on humans, and in particular a better understanding of the associated ethical issues and implications.</p> |
| <p>A focus on existing technologies and improvements in design that industry cannot work on. Not just a push towards the bleeding edge. Also a change in focus to allow for design being a bigger part of HCI, rather than being evaluation driven. This would push for novel uses of ICT rather than working out how you would evaluate it first and then only building things that fit into comfortable evaluation strategies. Effectively putting in, or allowing for, more risk.</p> |
| <p>A major challenge for HCI researchers is in understanding and contributing to a world in which HCI issues are ever more saturated in every aspect of everyday life, and for increasingly larger numbers of people. Developing the discipline means having strong new visions for what HCI can be, rather than relying on the old ubiquitous computing concepts of 20 years ago. A key challenge for the discipline that is fundamentally related to the above is understanding what the bounds and scope of HCI actually is, and whether it will begin to fragment under the strain of ever broadening interests, or whether this broadening will help HCI successfully redefine itself and continue to make itself relevant to the use of digital technologies.</p> |
| <p>Allow more industry involvement</p> |
| <p>Allow Post-Doctoral researchers to PI EPSRC proposals.</p> |
| <p>Almost all HCI is about excitement, satisfaction and contentment, particularly for developing new products and services. An area that is often missed is safety critical HCI, for example in nuclear power, aircraft, healthcare, driving, diving, finance, etc. Appropriate methodologies have not yet</p> |

been developed, and access too many of these areas is much harder than the "consumer-focused" area of conventional HCI. Formal methods in HCI is an established discipline, but is very hard to find good referees in. Refereeing EPSRC proposals is a key future challenge! HCI requires better processes; since it covers so many subfields, experts appropriate to proposals are hard to find. There are many ways to improve the processes [ask me!]

Almost every aspect of UK society is becoming increasingly dependent on technology. The key challenges for UK HCI are to dream of a future where this technology benefits everyone in society, to reconcile these dreams with (and change) reality, and to help society avoid/recover from the nightmares of bad technology.

Applications of HCI in healthcare. Just this morning I was reading about apps to help autistic children. As always, UK research can be better placed to contribute by having adequate funding.

appropriate interactions with industry - and funding

As I see it; the key challenges are to do with recruiting and retaining the best possible researchers. This starts at Masters level where funding is incredibly difficult to secure - if you are unsure about research as a career, few would choose a PhD as a method of finding out. This alone I am sure costs the UK HCI body. Secondly is the funding structure for PhDs. Firstly, funding for three years when most PhDs now take 4 makes no sense to me. It generates a huge amount of stress and distraction which impacts quality of life severely. Related to this stress is a subsequent disinclination to continue in research. The level of funding is also low, especially when compared to EngD students (a difference of £4000 is a BIG difference). The other thing which seems to put people off is the lack of a career structure. After completing a PhD, most people are at an age where they would like some kind of job security and begin to put down roots. Having to spend several years in post-docs, moving around the country in temporary contracts again is a frustration. I understand the argument behind universities where you complete your doctorate hiring you for a lectureship but the subsequent upheaval it causes again seems to create a high level of stress and a disinclination to continue in research. Although this seems to be a list of complaints, these things are making a big difference at a grass-roots level and I am sure creating the environment in which the best people simply no longer wish to work in HCI. If that is the case, other future challenges don't seem worth listing.

As interdisciplinary researchers, people in HCI are well placed to contribute to a great many of the grand socio-technical challenges of our time, including improving health outcomes, providing better care for the elderly, transforming organisations, and helping people to enjoy their working and leisure time more. None of these grand challenges can be properly addressed by a single discipline or approach. HCI also has a strong tradition of socio-technical critique, leading to innovation in other areas of computer science, artificial intelligence, design, management, etc. UK research will be best placed to contribute through continued support for diverse research programmes, from the most forward looking to the most grounded and pragmatic and providing more support for interdisciplinary working.

As mentioned in Q6 above, two key future challenges that can be addressed are: the problem of a growing, especially ageing, population; cross-language communication between humans.

As technology becomes more ubiquitous and pervasive, more research needs to be performed into how this technology can be interacted with, and how it can be beneficial to everyone around

assisted living, overall accessibility (not just of online services), usability of complex products, usable security, user creativity, quality of work, quality of life,

Behaviour change for better healthy living - in all people (but particularly older people). Safety - medical device errors. User Interfaces - beyond keyboards and mice. Intelligent objects - pervasive computing around the home. Methodology - user-centred design methods are effective, but by no means comprehensive. Generally, the best way for UK HCI research to contribute is to ensure that research funding is about user-led innovation.

Being given the space and time to explore new and very different aspects of HCI without the pressures to deliver commercial benefits. More attention needs to focus on the theoretical aspects of HCI. There is a need for more opportunities for small scale researchers to conduct 'stress-free' research.

Better transition from academic research to practical application in industry

Big data society and information overload for expert decision-makers. Communication of

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| uncertainty (e.g. in simulation models) Ageing population and increased need for human-machine interaction. Speech + touch interfaces for mobile devices. Can be better placed by training many more graduates with language technology /NLP skills. |
| Challenge: A balance needs to be struck between having an impact (and building systems), and classical (more theoretical) research. HCI will benefit from researchers with a more rounded background, that have additional expertise in particular types of applications (e.g. medical expertise, expert systems, natural language processing) etc Strengthening the UK position: The UK is already strongly placed in terms of know-how, and it's important that despite tightening of belts, some of this (more theoretical) expertise is maintained while moving towards more applied research that addresses issues in society. (Good!) training in project management for PIs should be mandatory - in almost every project I've seen, better use of the resources could have been made if official and structured project management was supported and available. Support for recruiting participants. Liaising with correct organizations and user groups should be rewarded and be supported by the EPSRC. Either pools of user groups should be made more available, or financial support to set these up should be. Likewise, funding for experiments/studies should be explicitly earmarked. I'm surprised how many HCI projects don't even budget for this in their proposals! - After all, it's relatively small amounts for noticeable benefits. |
| Challenges: -Improving methods for designing effective user interfaces that can be used by all users. This may require automatically adapting interfaces to people's abilities, knowledge and experience, interests, personality, and affective state. - Producing effective digital behaviour interventions that support people to live more sustainably, healthily, and happily. This includes methods for computers to show empathy, personalize interactions based on a good user model, and use effective behaviour change and motivational strategies. How to better place UK research: - There are several excellent researchers working on intelligent user interfaces and digital behaviour intervention in the UK. But they often work in relative isolation (I know of several good researchers who are the only established academic in these areas in their institution). A cross-UK doctoral training centre would help to establish critical mass. |
| Challenges: feeding back HCI's lessons and principles into the core concepts and infrastructures of 'mainstream' computer science; customisation, tailoring and adaptation of systems to individuals' changing contexts and interests; acting as a corrective to 'AI-in-disguise' approaches to autonomic system operation and automatic classification/categorisation of complex information. Being better placed to contribute: UK research is inhibited by the exclusion of PhDs from normal grants. |
| Climate Change: through the appropriate access to information wherever people are, reducing the need for travel. |
| Cognitive aging, cognitive robotics, hand-free interaction |
| Consolidating the research area to gather theoretical insight and embracing research philosophies which show the maturity of our field (incremental research, building theories, developing causal insight). |
| Context-aware interaction Design of health and social care technologies Large data (and its implication for interaction) |
| dealing with handicapped persons to resolve an interesting problem for a special community |
| deep collaboration |
| Define the scope such that the term HCI can encompass a spectrum of related technologies ranging from embedded devices to social interaction mechanisms |
| Designing technologies for children and teenagers that give them better outcomes and fit into their connected lives so they can better contribute to society. Key challenge is too much technology too little creativity. |
| Development of theory and translational research (i.e. how can future practice be more strongly informed by research?). |
| Devising and promoting effective methodologies for the co-design and development of ICTs, with particular reference to older people. More broadly, investigating the potential and the challenges for participatory innovation in the digital economy, e.g., in application domains such as social media. |
| Distilling the stories that matter to people (all sectors and demographics) from data and |

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| presenting those stories in ways that communicate the meaning of the stories as needed/wanted, and that the stories can be verified as true and relevant. |
| Educational challenges - using innovative technology to support teaching through the challenges of rising class sizes. Healthcare - designing to support an ageing population and well being in society. The UK can be better placed to contribute through a greater emphasis on the importance of societal benefits of research as well as economic. |
| Educational HCI - particularly informal education and public/lifelong learning, not necessarily through managed formal mechanisms. |
| Embodied, physical and visceral interaction. New paradigms and approaches required for creative and cultural uses of technologies. Designing for complex group, social and public settings. Importance of user-led 'research in the wild' approaches to grounded HCI research. |
| Emerging mass production technologies - e.g. multi-touch and voice control - how well researched in terms of HCI? What should the HCI community be researching now for the next generation of mass production technologies? In the move to 'personalised, pervasive learning' not losing the pedagogy and the teacher - similarly in games based learning - the balance between learner-centric and teacher-centric control is challenging in designing for effective educational interaction. |
| Enabling users to manage lifelong personal data - privacy & security issues related to that, rights & responsibilities, legislation & regulation. Brain-computer interface; assistive technologies (especially with ageing population) On the training & career development side - a generation ago there was healthy activity in HCI research embedded in other academic disciplines/departments (e.g., psychology, sociology, education). Pressures from RAE etc. have (arguably perhaps) led to current situation where most HCI research is in computer science & engineering, and (arguably?) the current and future generations of HCI researchers get/will get rather diluted background and training in social science. There is a real need to combat pressures and difficulties in both conducting truly interdisciplinary research (i.e., that is excellent both in social science terms as well as technically) and in training and career development of the next generation. |
| Encouraging better democratic process; social mobility. Access to education. Better editorial models for a world where publication is free. To contribute the UK needs to support conceptually rich longer-term theory-based research as well as more application-oriented programmes. |
| Encouraging larger projects that support collaborations between disciplines. |
| Encouraging more effective and efficient use of all kinds of technologies. Work more closely with industry. The latter is a 2-way street. Industry must contribute more to supporting research as well as expecting more impact from research. And that support must be in addition to EPSRC support, not instead of. |
| energy efficiency and increased technology performance demand |
| Engineering and societal applications |
| ENSURING THERE IS NO SOCIAL EXCLUSION ENSURING THAT THERE IS MOTIVATION TO HAVE WORK FUNDED AND TO STAY IN THE UK MAKE IT EASIER TO GET FUNDING EG INTERVIEWS OR WORKSHOPS RATHER THAN FORMS |
| Equality in access to information - which leads to levelling the playing field for disadvantaged groups in education and employment. |
| ethical challenges |
| extending interaction would be of important in allowing multimodal interactions for practical applications such medical diagnosis, preoperative planning , virtual reality based training. |
| Firstly usability-too many systems are not intuitive and require prior skills/knowledge Ubiquitous systems - right now HCI is far too fragmented and cannot be interfaced either at all or easily without prior knowledge, additional hardware or software. |
| Flexible re-use of existing technologies together with . This requires standardization. If this proves difficult (as it has over the years) research should also focus on mechanisms to establish interoperability between research products. |
| Future challenges include understanding how different types of individuals use technology and whether this is harmful or helpful to themselves and society. Key areas that need further research |

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| include: cybercrime, social support, security, trustworthiness of source, whether information online is understood and whether it reaches the right people, online deception. |
| Future challenges: looking at alternatives to the mainstream modes of interaction. |
| gesture computing, pervasive devices, educational technologies: Focus on partnership working |
| Getting spoken interfaces working is a huge challenge, which the UK is extremely well-placed to address, but we're relying heavily on non-UK funding, which leaves many institutes vulnerable. Other countries (notably Germany) invest significantly and directly in this area. |
| Getting their research into practice. Getting practitioners to think of UX as a social rather than an individual experience. More influence on UK government digital initiatives (eg away from broadband access as a proxy for online participation). More funding is needed to understand the gulf between theory and practice - that would really produce "impact" |
| Greater focus on the end-user experience for applications and technology. Emphasis on usability through project development (not just a crude evaluation at the very end). |
| HCI and other multimodal research should have a higher profile in emerging research areas such as Cyber-Physical systems and also security. A key challenge is to create truly cross/multi-disciplinary centres in the UK; perhaps an initiative such as the "Grand challenges" in microelectronics might help to coalesce the HCI community, which appears somewhat disjointed at present. |
| HCI is a naturally interdisciplinary activity. The more transformative it is, the broader the interdisciplinarity. This can result in researchers being vulnerable at times of research census, resulting in more conservative, traditional research being undertaken. |
| HCI is embedded and critical to engagement with users in healthcare, sustainability and most the key societal challenges.. Many of the key societal problems focus on understanding and responding to the needs of society HCI is uniquely placed to understand these needs and help design for them |
| HCI is too often still seen as human-COMPUTER interaction. Interaction is moving to alternative devices, but also to robotics. It would perhaps be better to call the initiative human-MACHINE interaction, as HCI no longer covers the research field. |
| HCI related fields often work at the cutting edge of technology, identifying new applications of technology. Funded needs to account for the vertical as well as horizontal nature of the domain. |
| HCI research has moved on from its initial spectrum and now comprises more areas than are not "officially" recognised. Also, HCI research is now more tightly linked to other research areas, but cross-disciplinary research is not supported. |
| HCI research is at a crossroad because much of its past has been anchored in activities where for example the smartphone industry is devoting immense effort. As I see it, one of the viable avenues out of this will be for HCI to broaden its scope to comprehensively address more complex concerns than single-user usability, and to deepen its theoretical insights to ensure lasting contributions. |
| HCI research is good at combining novel technical solutions with societal challenges to create novel solutions. This aspect of HCI is recognized by the funding body and the digital economy aims to support this. However HCI researchers are also capable of working with technology innovators to create innovative interactive solutions that they cannot create on their own. I believe this is not that well funded by UK research councils although we are in a great position to harness this potential (right now responsive mode is the only avenue for this). UK research should try to find a way to bootstrap innovation from this angle. |
| HCI research needs to return to a strong focus on the use of valid and rigorous scientific methods motivated by theory. The huge proportion of EPSRC HCI budget is spent on work that has no methodological validity and no long-term value. Frankly, much of what EPSRC has funded is embarrassing. HCI is seen by scientists as a bit of joke. EPSRC has accentuated this problem. |
| Health is the big one in my opinion. Both obesity and mental health issues have the potential to cause great damage to the country, both socially and economically. Interventions exist that can help us address these issues, but these interventions are expensive and not scalable. Technology allows us to create scalable interventions for the biggest problems facing society. What is needed is a closer connection with the Health community, the MRC and more support in engaging in health |

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| research frameworks. Energy consumption and sustainable food consumption are further examples of the massive challenges facing society that can be addressed through the appropriate design of technology. I think this is what HCI research should be focusing on. Health, Energy, Food |
| Health, Energy & Climate change, Social behaviour |
| healthcare & wellbeing, sustainable living, globalisation. |
| Helping new researchers with little or no experience in the field. For example, providing specific funding for these populations and help them develop a career in a HCI topic they are interested in. Also, acknowledge and favour the importance of cross-disciplinary work, especially with fields such as psychology who can add additional value and insight in various contexts, such as the workplace. |
| helping society and people make sense of data |
| Historical institutionalism in interfaces and the impact of new connection technologies (hardware and software) combine to create severe risks to the beneficial use of new technologies. Combined social impact and improved detailed HCI research funding should be playing a significant role in EPSRC's grants broadly. While not ignoring basic cognitive and capability research in HCI, a strong push towards integrating HCI and societal impact into many other research areas, particularly but not only in computer science, should be pushed by EPSRC. |
| How do we work with the community in the field designing and developing with the communities having real impact, that leads to a long term understanding of HCI, instead of 'hiding' in labs and conducting experiments and trying to make new technologies. Focus needs to be on Human aspects of HCI and not on the tech. More long term studies in real world contexts of technologies that have been designed and built with communities are needed. |
| How to design and evaluate interactive systems that truly meet users' techniques using not only novel technologies, but novel approaches |
| How to utilise the transformative nature of technology by integrating it meaningfully into culture, the economy and wider society. |
| Human robot interaction: UK well placed to do this because UK is a centre of excellence in vision research, speech and language technology and robotics. Multimodal interfaces: cutting edge research on interfaces that utilise both verbal and non-verbal communication (e.g., hand gestures) in HCI would give the UK's already very strong gaming industry a potentially lucrative edge. Research on using Kinect to track and interpret hand gestures and head movement is already underway in the UK. This work should be encouraged. |
| Human-centred computing (HCI built for humans, based on human communication model) has been recognised as the next generation computing. UK researchers are in a good position to address the challenges related to this research topic if provided with appropriate funds. |
| human-robot interaction |
| I believe HCI (in its broadest sense) can and should contribute to the sustainability agenda. But to do so, the research must be naive 'greenwash' and must incorporate a solid understanding of the sustainability issues it addresses. |
| I feel that UK's HCI researchers can address the following key challenges: 1. HCI in primary education - with increasing economic pressure on parents to work additional hours, a large number of children will benefit by having scientifically sound techniques of self learning through computer based games that effectively combine knowledge with an element of fun. To this end, HCI researchers can collaborate with education specialists and child psychologists. 2. HCI in defence and disaster response - the need for robot companions that can interact with humans through haptic feedback in low visibility conditions is becoming an important area in defence and disaster response. Still there are many challenges to be overcome to develop a robot that can survive the uncertainty of such environments. 3. HCI in medicine - a reliable haptic feedback system to assist surgeons in minimally invasive surgery is an open field yet to be fully addressed. 4. Household robot companions - with increased demand for toys and electrical appliances (ex. vacuum cleaners) with some sort of intelligence, HCI researchers can explore what features would revolutionize the demand for them in the future. |
| I think the gain a better understanding of the social impacts of technology is the core future challenge for UK HCI researchers. |

I think the key challenge is to form long term cross disciplinary research collaboration particularly with other engineering areas as well as the social sciences. I think HCI being a relatively applied area of research should focus on both academic and societal impact. Also importantly, the commercialisation of HCI research should be placed close attention. HCI researchers in the US for instance are particularly successful in this.

I was involved in a variety of projects in the Alvey programme when HCI was in its infancy. In that programme we were able to engage in cross disciplinary work, well grounded in application contexts and with a variety of academic and industrial relationships. Since then HCI has tended to be drawn into the academic 'rat race' where what matters is high quality journal papers within disciplines of limited scope. The result is too many narrow studies that are inward looking to the current concerns of researchers. I believe that to deal with the major society implications of everybody going on-line we need programmes that are outward looking, cross disciplinary and working closely with those developing and using HCI for emergent applications. My current work on hci for electronic patient records shows clearly the mistakes that get made when a narrow group of informatics specialists determines what is needed by a complex and varied user community - a great deal of public money has been wasted because of inadequate understanding of the users and their organisational context. We need analyses that start with a socio-technical understanding of the context in which users operate and good mechanisms for working with users towards forms of interaction that effective and usable and deal with the array of societal and organisational implications that arise from their use.

Improving impact of HCI research outcomes and improving public visioning to encourage user led innovation in application Ethics and social science of HCI in relation to social order

In my particular research area, which focuses on clinical applications, a key challenge is translating technologies to human patients. This is made difficult by the regulatory hurdles, and the limited number of UK companies within the medical device area. Better sharing of expertise between research groups and dialogue with industry would probably help here.

In short: the engineering mentality. Their conviction that HCI research is no more than decorative fluff.

Independently of the specifics of the UK government's 'Big Society' initiative, it seems to me true that HCI needs to be cast much more broadly. It needs to better understand how new technologies can be conceived, designed, developed, configured and governed/managed, so that it can enhance the ability of individuals, and even more so, families and communities, to better self-organise to achieve social outcomes that they want for themselves and others. In this way, it can make a positive contribution to the Wellbeing agenda, and not just GDP!

Interaction design for highly distributed computing (e.g. Cloud); mobile technologies in social context; effective interaction for knowledge workers The UK needs to better support effective researchers (by output, for unit inputs); there is too weak a connection between funding and performance, and funding too often comes in lumps, 'booming' then 'busting' the centres; effective structures for effective researchers should achieve more at lower cost. The UK also needs to focus more on building (well engineered) systems, informed by focussed user studies, than repeated investigation of socio-technical issues. Compared to the US, our ability to 'build' examples is weak.

Interaction with ubicomp systems, interaction with intelligent agents, interaction with open online data

Interdisciplinary research is important in many aspects of HCI. Funding that encourages this would go a long way towards addressing a range of potentially key challenges.

It is essential that we push on with understanding human behaviour and that artificial systems are designed with that knowledge at its centre.

Issues with mobile device use and always-on technology; understanding how people's behaviour is being shaped by these new technologies and how best to design the technologies so that they are appropriate for intended use.

It is essential to promote non-classical approaches to HCI, particularly any forms of communication which rely on the direct translation of brain activity into forms of control and communication, such as those pursued in the domain of brain-computer interfaces

It seems to me that some certain US universities are producing HCI research well in advance of our own. We need to be more ambitious with our research methods and have a more open arena

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| for creative researchers to grow and investigate their own ideas. |
| Keeping pace with technological changes and societal needs. |
| Key challenge: novel input methods using visual information (micro-gestures, facial expressions, human-human interactions etc). The UK has been fairly well placed to contribute because it has strong groups in computer vision and machine learning but I'm not sure if there is enough effort focused on HCI applications. I hope the support for research in computer vision for HCI grows. |
| Key challenges: HCI for severely disabled (physically and/or learning) users |
| lack of funding |
| Making things simple, context aware and can support older users and those with low technology exposure and those with special needs. |
| Making sense - Provenance |
| Mixed Reality interaction, Multi-touch interaction, Multimodal interaction, interacting in ubiquitous and pervasive computing environments |
| Mobile technologies; not enough knowledge of UK research at large to comment further. |
| Mobility and ubiquitous computing is still a key challenge - people interacting while moving, or whilst doing other stuff. We've done so much research on this, but mobile devices still suck to use whilst mobile, and very few people use any kind of ubiquitous technology other than phones. Other than that, I think a key thing that we have been a bit slack on is designing for dirty horrible reality - a lot of HCI research appears to be predicated on some lovely cuddly world where everyone is nice and friendly, sharing their lovely photos with their lovely family or whatever. Reality is not just about the lovely side of things. Should we design technology for people who want to lie cheat or steal - maybe not, but perhaps we should be considering this in our designs? Further to the above - design for more complex social situations than 'single person' and 'family' - if over a third of marriages end in divorce, how should design of social systems take account of this? |
| More collaboration is required to develop the quality research environment. |
| More support for applied research over traditional research into algorithms, methods, or theories. Closer links with the once world-leading UK video game industry. |
| More support for creativity and innovation, greater alignment with major societal challenges such as aging |
| More user friendly HCI , higher accuracy and flexibility |
| More User-Oriented, More Intelligent, More Areas should be incorporated |
| Moving away from design for the desktop towards a more open, play-based paradigm of interaction |
| Moving beyond the desktop, ensuring that users have full understanding and control over the systems that they will increasingly be in contact with, engaging ever broader participant groups in research, enhancing quality of life for users with disabilities through technology |
| My personal view is that we need much more hard-nosed evaluation of utility and impact, with real users; too much evaluation is subjective and based purely on undergraduates. There seems to be more emphasis on this in the UK community, which is encouraging |
| Natural user interfaces: wearables, speech and gesture interfaces which move beyond the keyboard and mouse Understanding how to support communication and creativity through interface design |
| New methodologies using "out of the box" thinking that will leap-frog this area into very useful outputs. Make use of the strong cross-disciplinary research happening in the UK |
| New understandings of how users interact with information - UK research needs to place more emphasis on building technology through an understanding of user needs and requirements. |
| Not stifling imagination |
| Not sure |

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| Not sure |
| Open Design, Intellectual Property Protection, Confidentiality |
| Post-humanism and associated ethical and social issues relating to this. |
| Providing the research to inform industrial development - instead of often trying to build an industrial product. We need better ties to industry to move our contributions into a development setting. I would say that the key challenges are around extreme personalisation and customisation. Adaptation of the interface and interaction, a great focus on the intangible parts of the user experience and a move away from only lab based usability (task completion time). Longitudinal and unobtrusive methods to let us understand what people are actually doing without bias, and a move away from questionnaires / surveys / interviews. So in summary, longitudinal unobtrusive observation to understand emergent behaviour in naturalistic settings; interface decoupling and platform agnostic interface and interaction. Foundationally, how can we start to address information overload in a society which requires more and more cognitive and intellectual effort to understand and live within it. At the moment we expect this to occur by dividing our attention in increasingly small segments, without any depth to the interaction - this cannot be sustainable. |
| Putting better HCI in front of the user's nose without them noticing |
| Question too large |
| Reliance on electronic devices and the internet, the gadget and information overload that brings and ensuring widely adopted technologies are accessible to all. Stronger connections to industry would help, in such a way that innovations are registered as UK intellectual property, there is the infrastructure in place to make use of it in the "real world" and the original researcher does not get shafted. |
| Research addressing real society needs with strong rationale for the proposed agenda. |
| Scalability, human agent collectives |
| Security |
| Shift in consumption of media Ubiquitous computing Intergenerational technology Accessibility and technology - inclusive design |
| social exclusion / loneliness, security, privacy, mobility, ageing |
| Societal reliance on interactive technologies for public life, risks and opportunities not yet properly explored, including how people create and maintain their own digital/social identities and how they understand others'. Real-time digital augmentation of the physical and social world, whole range of implications from ethical to cognitive. Growth of anywhere-anytime interactions, moving the cognitive object of interaction away from the hardware towards information objects (current guise is 'the cloud', was 'semantic web'). Maximising opportunity given by new paradigms for pointing (e.g. multi-touch interfaces). |
| Sorry I am probably a little fresh to the field to know the answer to this right now. |
| Stakeholder engagement. Funding stakeholders as professional contributors to research, funding placements of stakeholders within research communities and vice versa |
| Strengthen fundamental research on future technologies. A solid theoretical foundation is vital for developing new technologies and putting it on solid ground. |
| study of mobile and unconventional (e.g. kinect) platforms |
| Support the creation, dissemination and protection of user-led content. Harness technology in support of behaviour-change. Develop elegant communication and networking systems to support older adults at home. Bridge the technology-society gap by developing technologies that connect people in need more effectively. Use the sandpit approach to bring the different HCI disciplines together. |
| Taking "big society" ideas to people in industry. Expose non-academics to the sort of problems we solve and create frameworks for their participation. |
| Technology that responds to the very different contexts of co-presence and networked. ie. why do i come into a shared workplace instead of working from home, or vice versa? |

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| <p>Technology underpins most, if not all, human endeavour today. With the explosion of data and the ubiquity of communication technologies, HCI research is critical if the UK is to benefit from the digital economy. In particular, more focus on involving users in the design and deployment of assistive technologies in healthcare and education will improve quality of life and quality of care. Technology has the potential to provide independence and quality of life for people with a wide range of disabilities. Independence correlates with increased self-esteem, reduced behavioural problems and more efficient care provision. The key to the effective harnessing of technology is a better understanding and exploitation of HCI.</p> |
| <p>tensions between HCI and Design communities</p> |
| <p>the digital citizen: creating a more engaged society through HCI</p> |
| <p>the importance of understanding the built environment (Architecture). Increasingly the built environment is becoming an important part of HCI (in particular as digital technologies are becoming embedded in our environments. The UK has leading communities in the architectural theory, some of these combine expertise of the built environment (Architecture) and Computation (eg Space Group at the Bartlett, UCL).</p> |
| <p>The increasing complexity of socio-technical systems, the increasing ubiquity of mobile technologies; increasing role of online services to manage all aspects of life; issues of societal inclusion and exclusion; privacy in an online world; our ageing population and economy; and the importance of technology in healthcare to make the NHS work better and as treatments spread out from the hospital into the community more. HCI researchers should naturally be working on engaging and current issues, unlike other disciplines like history and English literature, we should take advantage of this opportunity to gain support from, and be better known, by the public.</p> |
| <p>The key challenges are supporting innovative industries in the future of the internet of things</p> |
| <p>The key future challenges are how we can meet the needs of those on the fringe of society and allow them equal access to digital economy. As we move into more and more government and private services being available through the web what implications will this have on those who for a variety of reasons struggle to access ICT.</p> |
| <p>The major challenges for HCI currently are the societal impacts of technology. These are manifold and range from the fact that built-in technological obsolescence is depleting the Earth's resources at a tremendous rate to the use of social networking to drive social change. And these issues are not only global but have profound and unknown consequences on all scales of society from the family unit upwards.</p> |
| <p>The mismatch between the speed of development of the technology and people's ability to use it.</p> |
| <p>The need to respond quickly to new opportunities. More for funding new research groups.</p> |
| <p>The UK IS internationally leading in developing the influence of art/performance/design, anthropology, and a number of other research methods across the social sciences, arts and humanities in the field. However, these techniques are still overly focused on designing bespoke software for existing computer architectures. HCI will become more influential by drawing on emerging 'basic' science to suggest novel interactive computing designs (optics, emerging materials chemistry, microelectronics, communications), bringing the diverse sense of epistemologies we have as a community to bear on the fundamental design of computing systems, and bringing to these disciplines in turn the reflexive consideration of how to think laterally between different ways of conducting research.</p> |
| <p>The UK is small, but varied. We can conduct user studies in large cities such as London, and rural areas such as the Highlands. We should exploit this diversity and build UK-wide test-beds to tackle future challenges in HCI. But at the same time we should do this in an ethical fashion, which I believe touches on your point 6 below.</p> |
| <p>There is a need to more actively address design of future, novel interactive systems. Much HCI research is still rooted in the improvement of existing systems - a worthy activity, but funding should be focussed on more long term and potentially disruptive technologies, that could impact society.</p> |
| <p>There is a need to understand and influence the industrial development context in order to inform and integrate HCI research output.</p> |
| <p>There seems recently to have been too much of a shift from fundamental understanding of the</p> |

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| nature of interaction and how to support this for learning, work and leisure to bottom up adhoc development of technologies. We do not learn well enough from the past and we seem to go through the same cycles with each new technology. The real challenges of the future will come with the societal impact of social media and how it is used for military, terrorist, influence and connectedness (and health and wellbeing benefits) for an ageing population. We do need better support for cross-disciplinary research - many of the problem we currently face as a nation with limited resources can only be tackled by having appropriate funding for creative, interdisciplinary solutions. |
| There should be a complete transparency between the decision makers and educators to fund and resource appropriately. Revision of individual project's achievements should reflect in the future funding. |
| To better incorporate the social sciences |
| To continue undertaking internationally recognised research |
| Ubiquitous and Mobile computing are the growth areas that touch everyone, usable security and privacy in these areas is important to maintain trust in systems. |
| UK research can play a leading role in Social Signal Processing; the development of Pervasive and Ubiquitous computing platforms; human interaction with autonomous and intelligent decision support systems. |
| Understanding complex situations; bridging the gap of those situations typically approached using qualitative vs quantitative |
| Understanding HCI as shared social phenomena rather than individual acts of computer operation. More interdisciplinary research with the arts and social sciences |
| Understanding how to design engaging interfaces. |
| Understanding how to harness potential of novel technologies in a range of contexts; ensure multi-disciplinary aspects of HCI, design, human factors are recognised and developed. Ensuring scientific contribution of HCI elements of research projects are recognised in review processes, encouraging fellowships and inter-disciplinary research, maintaining support for collaboration in hci type research in different institutions. |
| Understanding the principles and properties of HCI (from user experience, interaction and new and novel devices) so that they can be used to enable better and engaging experiences |
| Usability and UX are key components of the knowledge economy. If the UK intends to achieve greater competitiveness then there needs to be encouragement of and funding for both blue sky and applied research in HCI. The big challenge is to forge a mutually beneficial link between academia and industry where both parties can participate in and benefit from Research Council funded research. No Government has to date achieved this. |
| Usability evaluation is very highly skewed toward lab research. More focus should be placed on realistic, in situ evaluation with close links to or directly with industry, so that a better appreciation is obtained for the much greater limitations here, wrt to access to users, but the very high value obtained by targeting real target users and environments. |
| Usability, and investigation actual user issues rather than being concerned with anticipated problems with technology. |
| Use by the public - and not just a select band of technological sophisticated users. What does HCI mean for someone living in Moss Side, Peckham? It probably means making sure they get better health care, feel more secure, receive better education. It doesn't mean that they need a new mobile App! |
| Use of digital technologies |
| We don't know what technologies will prove to be important, so the UK should encourage strong research groups with successful track records of innovation and impact to follow their own instincts. |
| We need to see more fundamental research. Unfortunately the trend is that to be published in the top HCI venues, there is an increasing focus in 'sexy' demos, rather than serious theory. Without developments in theoretical models and frameworks, we will, however, make little progress. Mobile |

interaction, and design of mobile services are going to be ongoing research topics, as the use of mobile services changes society, and shapes new uses of mobile systems. The UK has a very strong research base in this area, with many strong industrial collaborations. We need to make sure we don't lose this lead. A major area of interest will be in the overlap of cloud computing services, massive data analysis, machine learning, information retrieval. Designing the interactions for such systems in such a way that the interaction is tightly coupled to the data analysis will require much better interaction between these fields. Creating programmes which encouraged joint research among machine learning, information retrieval, interaction design, and cloud services would lead to interesting, and practically significant results.

We should be looking more at solving real world problems and getting our systems out into the hands of real users. With the democratisation of software development and the lower carries to entry we are seeing the real innovation being done by individuals in their own home rather than in research institutions.

What is it that is really important for people to be able to do? How can developing technologies be made accessible to a diverse range of user needs?

Working in the area of healthcare, I see lots of new technologies being introduced into the NHS that are potentially disruptive but where HCI researchers could play an important role in contributing to their design and evaluation. However, there is currently not enough strong linkage between HCI and health informatics communities within the UK (and internationally).

Worldwide competition, particularly from Asian countries. Also challenges with the reduced funding available. The research councils need to maintain funding at the existing levels.