

**IMPACT EVALUATION OF PEOPLE AT THE CENTRE OF  
COMMUNICATION AND INFORMATION TECHNOLOGIES  
(PACCIT) PROGRAMME**

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**FEBRUARY 2009**



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# 1. EXECUTIVE SUMMARY

## Aims and Objectives of the Evaluation

**1.1** As stated by ESRC in the Invitation to Tender, the main aims of this evaluation of the People at the Centre of Communication and Information Technologies (PACCIT) were to: a) Identify and assess the ways in which PACCIT has achieved impact through its dissemination, networking, research and related activities, including its academic/business collaborations and knowledge transfer; b) Document specific impacts resulting from PACCIT; and c) Identify best practice and lessons for further ESRC/EPSRC research and future industrial collaborations. This study thus assessed contributions made by the PACCIT Programme and its constituent projects toward non-academic impacts.

## Background to PACCIT

**1.2** Funded at a time when the use of Communications and Information Technology was exploding and diversifying, the goal of the PACCIT Programme was, as the Director put it, “to place people at the centre of the design challenges of IT. PACCIT explores the interactions between people, computers and organisations and how information and communication technologies can be designed to support these more effectively.”

Initially a cross-Research Council Programme, with 13 projects funded by ESRC and EPSRC to encourage interdisciplinary research, PACCIT evolved into a programme explicitly encouraging collaborations between academics and non-academics. The then-DTI co-funded eleven LINK collaborations with industry; thus PACCIT was novel as the first LINK programme involving social sciences and being led by ESRC. Six additional LINK-like projects involved collaborators from the public and voluntary sectors.

## Conceptual Framework for the Study

**1.3** We geared this study to both: 1) identification of examples and processes of impact generation and 2) capturing for future use both lessons learned by PACCIT and implications for good practice in other ventures. Attribution of causality is a perennial challenge for impact studies, with widely recognised issues including but not limited to: multiplicity of causes underlying any one impact; subtlety of processes involved; long-term nature of impact development (in many cases) and idiosyncratic or even dim memories. To help tackle ambiguity and complexity, we made use of a conceptual framework of knowledge flows and an integrating Framework of Core Questions. This enabled us to conduct an integrated analysis triangulating across diverse methods including, but not limited to, surveys, semi-structured interviews, case study development and document analysis, as well as across diverse perspectives of academics and non-academics.

**1.4** Fundamental to our conceptual approach was our commitment to examining possible evidence for multiple types of impacts, including some subtle and process-based impacts, rather than simplistically searching only for “tangible” impacts. Furthermore, as noted by ourselves and others in impact studies, we were prepared for the fact that many impacts take place over time and in some unexpected ways. Despite the inevitably “snapshot” nature of our evaluation at this point in time, we felt that it might be possible to identify some short-term impacts, perhaps track the development of longer-term impacts through different phases, and deepen understanding of how impacts can be generated over time.

1.5 Thus we gathered evidence relevant to five categories of impacts at various phases of development:

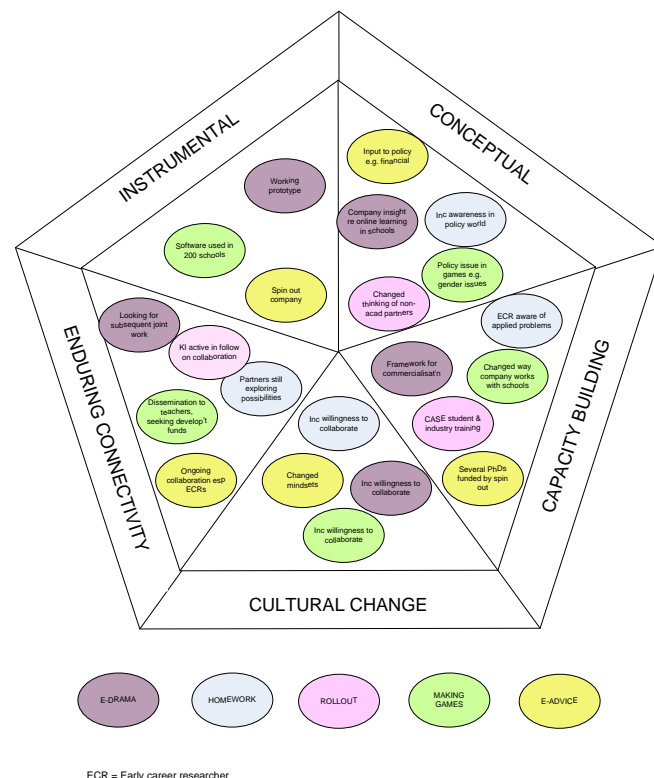
- Instrumental Impacts
- Conceptual Impacts
- Capacity-building Impacts
- Cultural Change Impacts
- Enduring Connectivity Impacts.

In addition, we viewed individuals involved in PACCIT as a resource for insights as to processes and good practice advice for funders, academics and non-academics hoping to generate non-academic impacts from research in the future.

## Key Findings

1.6 A substantive set of impacts has been achieved by PACCIT, reaching across multiple sectors in industry, policy and practice. The number of successes afforded particularly by the 17 later Phase, LINK and LINK-like projects represent a successful portfolio. Examples of impacts include but are not limited to: a spinout company; a commercialised software product used in 200 schools; a working prototype for an innovative educational approach; increased awareness in policymakers ranging from education to health to financial matters; changed thinking in some companies and knowledge intermediaries; increased willingness to participate in academic/non-academic collaborations among many established and next generation researchers as well as non-academics, and a variety of continuing interactions between academics and non-academic partners.

1.7 The following Figure illustrates a variety of examples of impacts generated by the five Case Study projects.



**1.8** PACCIT has given rise to some tangible Instrumental Impacts and some Conceptual Impacts, with raised awareness or understanding brought about by research. Many of these impacts are still just beginning or in progress, but are nonetheless important. Thus we would affirm that the Programme has indeed contributed to the following two of its stated objectives:

- “To encourage the application and exploitation of new research insights in the development of more effective IT systems and products, by supporting projects which involve commercial or industrial collaborators. Better-designed IT products should lead to a growth in the market and increased uptake by wider constituencies of users.”
- “To disseminate new understandings to users and choosers of systems. By increasing public and professional awareness of cognitive and social factors that are at the centre of design problems and what can (and cannot) be achieved by good cognitive design practices, demand for better systems will be stimulated. This would reflect a shift from judgements of IT systems based on the number of features of the system to judgements based on the effectiveness for the user(s)' requirements.”

**1.9** Evaluation of the PACCIT Programme illustrates clearly the importance of capturing diverse sorts of non-academic impacts, beyond the obvious tangible Instrumental Impacts. The Programme has also led to Capacity-building Impacts, including the ability to work across the academic/non-academic boundary. Connectivity between academics and non-academics has been the hallmark of the later Phases of PACCIT. Broad networks and direct personal connections have indeed been stimulated and grown by the Programme, through its funding, orientation and activities. It appears that the Programme helped to bring about not only an enhanced experience base but also an increased willingness to embark on similar collaborations in the future. We see this as a resource for enabling generation of additional PACCIT impacts in the longer-term, an important “living legacy” of PACCIT. Thus we would suggest that the Programme has not only met but surpassed the third of its stated non-academic objectives:

- “To expand the network of research collaborations in the people and IT domain between the research base and the commercial and public sectors.”

## Conclusions

**1.10** The catalytic PACCIT Programme has provided an unusual opportunity to take an in-depth look at an innovative approach to fostering impacts. Our findings indicate that the Programme's emphasis on connectivity of research to topical subjects and, latterly, also to non-academic collaborators, appears to have been fruitful. A variety of types of impacts have been generated by the Programme, to various degrees of manifestation. In addition to specific outcomes derived from PACCIT research projects, many of the involved individuals are likely to participate in similar collaborations in the future, with even more “ripple effects” of the PACCIT thus spreading through time.

**1.11** The study lent weight to our view of non-academic impacts of research as both diverse and developing through stages over time, such that short-term proxy indicators capturing aspects of connectivity (including attitudes and interactions) can be useful in the face of waiting for long-term impacts.

**1.12** Our findings have allowed us to tease out implications that may be useful in conceptualising and assessing impacts. When attempts are made to identify non-academic impacts, we would stress that:

- Expectation of tangible non-academic impacts could be based sensibly on a portfolio of investments, rather than expecting such impacts from each constituent project. Generation of non-academic impacts is a difficult, messy process often dependent upon

uncontrollable external factors; there may thus be a sensible analogy with venture capitalists' limited expectations for successes over a portfolio of investments (conventionally framed as one successful company out of ten investments).

- Not only Conceptual and Capacity-building, but also Cultural Change and Enduring Connectivity Impacts should be recognised and valued, along with Instrumental Impacts.
- Many impacts develop over time, through various processes and phases, not manifesting fully until long after a project-end evaluation.
- Particularly in the case of longer-term impacts, attribution to a specific funded research project may well be impossible.
- Case Studies can illuminate processes involved.
- Triangulating use of multiple methods and multiple sources of knowledge will enhance the richness and robustness of the understanding of impacts.

1.13 We hope that this evaluation will prove useful to ESRC and others, through both its explication of processes and phases inherent in the development of impacts and its collection of suggestions for good practice and future funding schemes. We would recommend in particular that future programmes facilitating non-academic impacts would:

- Support collaborations in which academics and non-academics have the time and scope to build connections as they work together
- Provide opportunities for follow-on funding (as in ESRC's new scheme) as bridges toward full research utilisation by non-academics, perhaps particularly but not exclusively those involved in commercialisation.
- Enhance understanding as to roles, obstacles, good practices and stages of development of non-academic impacts
- Place explicit value upon the full range of types of impacts.



## 2. INTRODUCTION: POLICY & PRACTICE CONTEXT

This evaluation of the People at the Centre of Communication and Information Technologies (PACCIT) was commissioned by the Economic and Social Research Council (ESRC) with the following purposes as stated in the invitation to tender:

- (a) Identify and assess the ways in which PACCIT has achieved impact through its dissemination, networking, research and related activities, including its academic/business collaborations and knowledge transfer.
- (b) Document specific impacts resulting from PACCIT
- (c) Identify best practice and lessons for further ESRC/EPSRC research and future industrial collaborations

Further objectives include assessment of:

- (a) the extent to which the Programme met its policy and practice impact objectives, including the extent to which it promoted academic/business collaboration and knowledge transfer;
- (b) the ways in which the work of the PACCIT Programme has been utilised and applied by practitioners and policy makers, including an assessment of the exploitation of the project results through commercial/industrial collaborators;
- (c) how PACCIT research has influenced changes in professional practice within the public and the private sector;
- (d) how the Programme's work has influenced policy formation and development;
- (e) examples of impact achieved and any identifiable economic impact derived from the Programme.

The PACCIT programme was funded at a time when interest was growing rapidly as to the ways in which new ICT technologies could best be used. Its emphasis on putting people at the centre highlighted the need for both social science and computer science understanding if challenges were to be tackled effectively.<sup>1</sup> Indeed, as technology use changed, moving for example toward more mobile and ubiquitous usage, the PACCIT programme evolved toward emphasis on use of communication and information technologies in the home and in public domains and by non-traditional or potentially marginalised groups of people.<sup>2</sup> This was in line with policymakers' concern about access to the technologies.<sup>3</sup> The very structuring of PACCIT was innovative. Initially a cross-council programme, to encourage interdisciplinary research, PACCIT evolved into a programme explicitly encouraging collaborations between academics and non-academics. DTI co-funded LINK collaborations with industry; thus PACCIT was novel as the first LINK programme involving social sciences and being led by ESRC. Additional LINK-like projects were analogous in involvement of non-academic collaborators, although these were from public and voluntary (rather than private) sectors.

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<sup>1</sup> The Director in her Final Report stated, for example: "The goal of PACCIT is to place people at the centre of the design challenges of IT. PACCIT explores the interactions between people, computers and organisations and how information and communication technologies can be designed to support these more effectively."

<sup>2</sup> In the Final Report, the Director noted: "The design challenges are to produce usable and acceptable ways to access a wide variety of online information and services for users of different ages, abilities and experiences."

<sup>3</sup> As voiced for instance in [Closing the Digital Divide](#), DTI Policy Action Team 15 Report, 2000.

## Box 1: List of projects PACCIT research programme\*

### PACCIT PHASE 1

1. Dr. Healey (University of London), Professor Garrod (University of Glasgow), Dr. Lee (University of Edinburgh), Dr. Oberlander (University of Edinburgh)  
**MAGIC: Multimodality and graphics in interactive communication**
2. Dr. Scaife (University of Sussex), Professor Rogers (University of Sussex), Professor Rodden (University of Nottingham)  
**E-space: shared dynamic information displays for transaction-based activities**
3. Professor Heath (King's College London), Mr. Vom Lehn (King's College London)  
**Design for interaction and collaboration**
4. Professor Hitch (University of York), Professor Rodden (University of Nottingham), Professor Ormerod (University of Lancaster), Professor Hughes (University of Lancaster)  
"The way we were": situational shifts in information encoding and retrieval
5. Professor Lloyd (University of Edinburgh), Professor Pooley (Heriot-Watt University), Dr. Dewar (University of Edinburgh)  
**Socio-technical systems design: knowledge capture and management using patterns**
6. Professor Cheng (University of Nottingham), Professor Cowling (University of Nottingham), Dr. Burke, (University of Nottingham), Mr. McCollum (Queen's University, Belfast)  
**Applying principles of representational design to humanise automated scheduling systems**
7. Dr. Dowell (University College London), Dr. Gotel (University College London), Professor O'Shea (Birkbeck College)  
**Collaborative case-based learning in distributed and synchronous environments**
8. Professor Hunter (University of Aberdeen), Professor Logie (University of Aberdeen), Professor Gilhooly (Brunel University), Professor McIntosh (University of Edinburgh)  
**Effective decision support in the neonatal intensive care unit**
9. Professor Fox (ICRF), Dr. Glasspool (ICRF) **Decision support for risk management planning**
10. Prof. Jones (University of Glasgow), Dr. Cawsey (Heriot-Watt University), Professor Barrett (Beatson Oncology Centre Glasgow), Dr. White (Glasgow Primary Care Trust) **Investigating the impact of tailored reports on anxiety**
11. Professor Wright (Cardiff University), Professor Pham (Cardiff University), Dr. Dimov (Cardiff University), Dr. DeRoure (Southampton University) **Spoken and written language in adaptable multimedia documents**
12. Professor Monk (University of York) **Multimedia communication as a recreational activity**
13. Dr. Plowman (University of Stirling), Dr. Luckin (University of Sussex) **Exploring and Mapping Interactivity with Digital Toy Technology**

\*From Appendix A of the Director's Final Report

Cont...

## PACCIT LINK PROJECTS

14. Dr Jonathan Freeman (ITC), Dr Alex Carmichael (The Victoria University of Manchester), Dr Stephen Cox (University of East Anglia), Professor Helen Petrie (City University), Robin Worboys (British Sky Broadcasting Ltd), Mark Wells (Televirtual Ltd), David Rix (Premier Microelectronics Europe Ltd)  
**VISTA - Virtual Human Interface for the Media Set-Top Box**
15. Professor Nick Chater (University of Warwick), Henry Stott (Oliver Wyman & Company), Dr S. Hodges (University of Warwick), Julia Beaver (NOP Financial), Martin Redington (Autonomous Software Ltd)  
**E-ADVICE - The Cognitive Science of Financial E-Advice**
16. Professor Yvonne Rogers (University of Sussex), Dr Michael Gardner (Chimera), Andy Wyper (VictoriaReal)  
**IN TOUCH - Designing New Forms of Connectivity for Extended Social Groups**
17. Professor Wendy Currie (Brunel University), David Branscombe (Fullard Learning Ltd), Dr Gordon Ross (DCS.com)  
**ASP-VH - Developing a Risk-Assessment Framework for the Deployment, Hosting and Integration of Business-Critical Information Systems by Application Service Providers**
18. Professor Scott Lash (Goldsmiths College), Dr Celia Lury (Goldsmiths College), Professor David Morley (Goldsmiths College), Dr Andreas Wittel (Nottingham Trent University), Susie Brooks-Smith (Archangel Filmworks), Alex Osman (Hildebrand), John Mills (Video Networks)  
**BROADBAND - Interactive Media in a Cross-Platform Environment**
19. Professor David Buckingham (University of London), Dr Andrew Burn (London Institute of Education), Caroline Pelletier (London Institute of Education), Jeff Woyda (Immersive Education Limited)  
**MAKING GAMES - Developing Games Authoring Software for Educational and Creative Use**
20. Professor John Barnden (University of Birmingham), Jonnie Turpie (Maverick Television), Amanda Oldroyd (BTextact Technologies)  
**E-DRAMA - Enhancement of People, Technology and their Interaction**
21. Roland Tongue (Open Mind Productions), Dr Rose Luckin (Univ of Sussex), Simon Fuller (Channel 4)  
**HOMEWORK – Home and School Linked via Divergent Technology in a Pedagogic Framework**
22. Andy Minnion (University of East London), Professor David Nicholas (City University), Dr Karen Bunning (University of East Anglia), Bob Regan Jr. (Macromedia), Kate Broom, Lewis Perkins & Fred Heddell CBE (Royal Mencap Society), Rod Paley and Robin Skelcey (Xtensis)  
**APPLE - Access and Participation for People with Cognitive Disabilities in Virtual Learning Environments**
23. Dr Ehud Reiter (University of Aberdeen), Yvonne Higgons (Cambridge Training and Development Ltd)  
**SKILLSUM - Automatic Generation of Personalised Basic Skills Summary Reports**
24. Linda Young (Campden & Chorleywood Food Research Association), Stanley Cauvain (CCFRA), Professor Peter Cheng (University of Sussex), Professor John Wilson (University of Nottingham) and the following partners in the baking industry: M. Jarman (E. Botham & Sons Ltd), J. Whittle (British Bakeries Ltd), S. Cook (Fine Lady Bakeries Ltd), M. Coslett (Tesco Stores Ltd), P. McStrafick (Tom Chandley Ltd), G. Alderson (Scobie & McIntosh Ltd), J. Cummings (Asda Stores Ltd), I. Murphy (Warburtons Ltd), R. Ball (Sainsburys Supermarkets Ltd), D. Middlehurst (Rathbones Bakeries Ltd)  
**ROLLOUT - Innovative Representations for Scheduling for Quality and Training**
25. Dr Peter Day (University of Brighton), Dr Jon Dron (University of Brighton), Mark Walker (Sussex Community Internet Project)  
**CNA - Community Network Analysis and ICTs: Bridging and Building Community Ties**
26. Professor Andrew Webster (University of York), Craig Gulliford (ACIS), Matthew Ward (York City Council), Dr Peter Wright (University of York), Professor Andrew Monk (University of York), Dr Nik Brown (University of York)  
**BLISS - Constructing Public Confidence in ICT Systems: Time, Dependability and Trust**
27. Professor Jonathan Raper (City University, London), Professor Helen Petrie (City University), Dr Joseph Woods (City University), Professor Janet Askham (Kings College, London), Nick Groome (Ordnance Survey), Jenny Harding (Ordnance Survey), Steve Tyler (Royal National Institute for the Blind)  
**LBS4ALL - Location-Based Services for People with Mobility Problems**
28. Dr Julia Galliers (City University), Stephanie Wilson (City University), Neasa Lannen (Bromley Hospitals' NHS Trust)  
**ACE - Information Appliances in Clinical Environments**
29. Professor Arnold Wilkins (University of Essex), Professor David Thomson (City University)  
**Optimising the Adjustment of Colour as a Means of Reducing Visual Stress**
30. Professor A.G. Gale (University of Derby)  
**ART – Attentive Responsive Technology**

The aim of this study was twofold: to capture indications of non-academic impacts and to contribute understanding that will enhance future efforts toward generation of impacts from ESRC investments. The study concentrated on the following PACCIT objectives (**Box 2**).

### **Box 2: PACCIT objectives relevant to this study**

- To encourage the application and exploitation of new research insights in the development of more effective IT systems and products, by supporting projects which involve commercial or industrial collaborators. Better-designed IT products should lead to a growth in the market and increased uptake by wider constituencies of users.
- To expand the network of research collaborations in the people and IT domain between the research base and the commercial and public sectors.
- To disseminate new understandings to users and choosers of systems. By increasing public and professional awareness of cognitive and social factors that are at the centre of design problems and what can (and cannot) be achieved by good cognitive design practices, demand for better systems will be stimulated. This would reflect a shift from judgements of IT systems based on the number of features of the system to judgements based on the effectiveness for the user(s)' requirements.

## 3. METHODS

### Conceptual Approach

Because we wish our studies to be *useful*, not simply summative, we have geared this study to both: 1) identification of examples and processes of impact generation and 2) capturing for future use both lessons learned by PACCIT and implications for good practice in other ventures.

Our approach to this Case Study has been “purposeful, pragmatic and cognisant of the complexities involved”, as recommended in ESRC’s 2005 Symposium (Davies et al. 2005). We have sought multiple perspectives, in line with the PA Consulting/SQW (2008) Economic Impact Study’s Final Report, which noted (p.4) that “impact assessments will, in most cases, need to consider a wide range of outputs and impacts and consequently beneficiaries”. To help us distil complexity into clarity, we have made use of a conceptual framework such as we developed for our Psychology Impacts Study, which illustrates flows of knowledge, expertise and influences involving policymakers and practitioners. (Key points captured in Meagher et. al., 2008)

We took a positive attitude toward working with PACCIT-related individuals in order to find examples of impacts and indicators of impacts in progress (the 2005 ESRC Workshop recommended focusing on successes). Similarly, we have drawn on our extensive experience of drawing out insights and reflections on impact-generating processes, helping academics and non-academics to crystallise messages that can help ESRC or others hoping to generate non-academic impacts from research. We are interested in the evolution of the 7-year Programme (through its three phases) and in realistic timeframes of both impacts and indicators of impacts in progress.

To ensure a robust analysis, we have made use of triangulation of both diverse methods and diverse perspectives. We have also found that development of a common Framework of Core Questions makes it possible to triangulate findings from across a multi-method study and thus ensure depth of insight and robust interpretation.

Another layer of triangulation was provided by diversity of perspective since we gathered input and insights from diverse key informants:

- The Director and Administrator
- Researchers
- Chair and Members of the Programme Management Committee
- Collaborators from industry, policy, practice

Since we were seeking to identify examples of success in generating impact, we were particularly interested in those stakeholder/user individuals who could describe impacts (or indicators of impacts in progress) and who could reflect upon the processes, activities or roles that led to the impacts, ideally offering generalisable lessons learned (including positives and negatives). Most of the users we interviewed contributed to the narratives for illustrative constituent case studies in which academic and non-academic perspectives were triangulated for each project; these and additional users provided input along with academics via our survey.

### Challenges Inherent in Impact Evaluation

Even as funders become increasingly eager to demonstrate non-academic as well as academic impacts from research, researchers exploring such impact assessment have come to realise how inherently challenging this task is. In a comprehensive summary of literature

on connectivity between research evidence and public services, for example, the authors observed:

“we are unlikely any time soon to see such comprehensive evidence neatly linking research, research use, and research impacts, and that we should instead be more modest in our expectations about what we can attain through studies that look for these” (Nutley et.al 2007, p.271)

The authors go on to comment in more detail:

“Many empirical studies have shown that only rarely will research impacts be direct, instrumental and clearly identifiable, such as when research leads directly to specific policy choices, or when research is neatly captured and codified in tools and instruments such as guidelines, protocols or organisational processes (explored in Chapter Two). Instead, much important ‘decision making’ is diffuse, hard to identify and characterised by ‘non-decisional processes’ and the progressive establishment of new routines (Weiss, 1980, 1982. When this is the case, research provides ‘a background of empirical generalisations and ideas that creep into policy deliberation’ (Weiss, 1980, p381). Research may also be absorbed and internalised into practitioners’ tacit knowledge as it emulsifies with many other sources of knowledge (experience, anecdote, received wisdom, lay knowledge, and so on). In doing so, it may leave few telltale signs of its passage, role or impact. Thus, research can contribute not just to decisional choices, but also to the formulation of values, to the creation of new understandings and possibilities, and to the quality of public and professional discourse and debate. Capturing these subtle and diverse impacts poses considerable conceptual, methodological and practical challenges.” (Nutley et.al, 2007, pp.283-4)

In the face of these challenges, we have utilised a portfolio of qualitative and quantitative methods to identify to the extent possible a range of impacts, within the context of the evolution of the 7-year Programme and discovery of realistic timeframes for both impacts and indicators of impacts in progress. As recommended in the 2005 ESRC Workshop, we have deliberately sought to capture not only “instrumental impacts” of research but also more subtle (yet vitally important) impacts in the form of “enlightenment effects, capacity building and cultural change” among research users.

Although other definitions exist for types of impacts, we use the following definitions (Nutley et al. 2007, p.36): “Broadly, *instrumental use* refers to the direct impact of research on policy and practice decisions. It identifies the influence of a specific piece of research in making a specific decision or in defining the solution to a specific problem, and represents a widely held view of what research use means. *Conceptual use* is a much more wide-ranging definition of research use, comprising the complex and often indirect ways in which research can have an impact on the knowledge, understanding and attitudes of policy makers and practitioners. It happens where research changes ways of thinking, alerting policy makers and practitioners to an issue or playing a more general ‘consciousness-raising role’. Such uses of research may be less demonstrable but are not less important than more instrumental forms of use”. Capacity-building can refer to education, training and/or development of collaborative abilities. We also explored cultural and attitude change as well as development of lasting relationships, or “enduring connectivity”.

## Overview of Methods

Our Methods are described in detail in [Annex A](#), along with our evaluation of advantages and disadvantages of the methods used. We triangulated across multiple methods and gathered multiple perspectives. In brief:

- A [Framework of Core Questions](#) was used to frame the study and to integrate analyses from different methodologies [Annex B](#)
- An online [Survey](#): Despite evident survey fatigue (two previous surveys already conducted by others), we achieved a response rate of 45%, with 50 surveys returned so that all but 3 of the 30 projects were represented by at least one respondent. While about two thirds of the respondents were academics (and two thirds of these



were Principal Investigators), nearly a third of the respondents were non-academics or knowledge intermediaries, so a good diversity of perspectives was present. **Annex E**

- **Semi-structured Interviews:** Six interviews were held with individuals having an “overview perspective” (individuals such as academic and non-academic Management Committee members, the Director, Administrator) and an additional 17 interviews were held with academic and non-academic individuals involved in the projects selected as Case Studies) **Annexes C,D**
- **Case Studies:** a set of five projects was selected, informed by document analysis and discussion with overview individuals, in order to capture and illustrate impacts from ESRC PACCIT funding. Case Studies were also selected to illustrate a range of types of impacts, arenas of impact, and potentially useful insights into process.
- **Document Analysis:** A variety of materials were analysed, including but not limited to the Director’s Final Report and project highlight reports on the PACCIT website. **Annex F**
- **Media Analysis:** Seven key publications (broadsheets, popular science press and IT trade press) were searched for references to PACCIT or the five Case Study projects. **Annex G**
- **Observation:** A post-Programme PACCIT workshop was attended on future themes and funding trends.
- **Integrative Analyses:** Input from across methods has been brought together in this report, along with critical reflection on the methods themselves.





## 4. FINDINGS

### Introduction to Presentation of Impacts

The findings of the various methods were analysed individually and then brought together to shed light on the Core Questions and form the substance of the Report, particularly this section on Impacts, and subsequent Commentary and Discussion sections. Integrated analyses have made it possible to:

- (a) assess extent and present examples of impacts
- (b) elucidate important processes and
- (c) reflect upon evaluation methods.

A big picture sense of the extent to which the Programme was effective in meeting its policy and practice impact objectives (including promotion of academic/business collaboration and knowledge exchange) is complemented by documenting specific examples/developing case studies. Within this section on Impacts, Case Studies will be presented below as they not only provide specific information as to impacts and processes but also set the scene for the overall programme. The subsequent explication of survey results which have been aggregated on a variety of points (e.g. sectors reached, types of impacts, developmental stages of impacts achieved, obstacles to generating impacts, and so on) then provide an across-the-board view of the Programme as responses were received from all but three of the thirty projects. Digging deeper through the survey and particularly through interviews has made it possible to identify and assess processes or mechanisms through which PACCIT achieved impact (e.g. dissemination, networking, academic/business collaborations, knowledge exchange) --- and thus to identify lessons learned as to process and best practice for future ESRC/EPSRC research and collaborations with non-academics.

### Illustrative Case Studies of Impacts

Five case studies were developed from the evidence gathered from this study to capture and illustrate different sorts of impacts in different arenas as well as to give a flavour of how the impacts have been generated.

For each of the case studies we describe the main non-academic impacts and the users and stakeholders involved; we discuss the routes taken to achieve these impacts; and analyse some of the key knowledge exchange lessons for both academic researchers and non-academic partners. The fact that each Case Study has led to three or more types of impacts reflects the multi-layered complexity of the generation of impacts from research.

## Case Study 1: MAKING GAMES

<b>Project:</b>
MAKING GAMES: Developing Games Authoring Software for Educational and Creative Use (RC £211,605; DTI £242,293; Industry contribution £389,889)
<b>Principal investigator:</b>
Professor David Buckingham; Co-PI Dr Andrew Burn, Project Manager Dr Caroline Pelletier (Institute of Education, University of London)
<b>Research summary:</b>
MAKING GAMES explored the use of a game-authoring tool with teenagers as part of the education process. It investigated what was added to the educational experience by allowing children to author games, what it means to be “game-literate” as both user and author, and how game-literacy is taught and learned. The project developed a software tool (Mission Maker) that enabled teenagers to create their own computer games, and then evaluated its use in the classroom. As a result of its use, the key elements of game literacy have been identified and a method of instruction was developed to enable pupils to understand the principles of game design. The tool is being developed further by the private sector partner to support commercial exploitation.
<b>Users &amp; stakeholders:</b>
<ul style="list-style-type: none"> <li>• Non-academic collaborators: Immersive Education Ltd</li> <li>• Other users: a number of schools that used the software</li> </ul>
<b>Key types of impact:</b>
<ul style="list-style-type: none"> <li>• Instrumental</li> <li>• Conceptual</li> <li>• Capacity Building</li> <li>• Cultural Change</li> <li>• Enduring Connectivity</li> </ul>
<b>Highlighted non-academic impact:</b>
The primary impact was the development of a working software product, with supporting teaching materials, that is now being used by over 200 schools. One teacher commented that “it has been assimilated wholeheartedly into the work of Year 8”. The Institute of Education has also used it for teacher and staff development in Masters programmes.
<b>Other non-academic impacts:</b>
<p>Another impact has been within the policy arena. One aspect of this is the relationship with Becta, the government agency responsible for ensuring the effective and innovative use of technology throughout learning. Becta worked quite closely with the project throughout and has revised its policy for ICT (Information &amp; Communications Technology) in schools, allowing the purchase of higher-specification PCs which enables them to handle the demands of gaming environments. Furthermore, the university partner has participated in policy-related workshops and conferences, e.g. reviewing the significance of the growth of media pastimes for gender equality. BECTA also attended those particular meetings. It was noted that gender had not been on the agenda for years but that these meetings had reawakened interest. Members of the project team are also involved with Ofcom (which has a strong interest in media literacy) and the National Association for Teaching of English.</p> <p>Participating in the project had helped the Institute to appreciate what is involved when producing commercial products. Research projects in higher education can carry on for a long time, and can be more adventurous and move away from the original specification where necessary. However in a commercial environment, particularly with a 3 year timeframe, there were limits on how much exploration could be done because the product had to be commercially viable in the end. Having an end-product had its benefits too, though: “it’s incredibly cheering to know that it is actually being used; it can make other academic projects look limited in comparison”.</p> <p>Equally, Immersive Education learned a great deal from working with an academic group. They support the Institute who are exploring new projects, e.g. extending the work to create Shakespeare-based games and looking to the Royal Shakespeare Company as a potential co-funder. However, lack of follow-on funding is seen as having to some extent limited access to additional knowledge exchange opportunities and impacts.</p> <p>Dissemination of learning from the project continues. In addition to the work of the academics, one of the teachers involved in the project regularly speaks at conferences and events, and has contributed to a book on media literacy. The project is also featured in a video on <a href="#">Teachers TV</a>.</p> <p>Working in the schools led to localised non-academic impacts. One teacher commented that the project had been very good for the children, had added to the skills of the teachers involved and also</p>

had deepened a culture of enquiry in the school. An unexpected impact on the children who were involved in using the product was the development of their inter-personal skills. Immersive Education noted that the quality and helpfulness of the children's feedback improved markedly over the 3 years of the project.

Some participants felt that another impact was that the agenda has moved on from using games to teach a subject to emphasise high-specification game-making in its own right. For example, it is being recognised that game development encourages writing because the students have to develop the game narrative and "back stories", giving a purpose to the writing. However the application in schools appears to show both types of adoption, i.e. both where the children create the games and where teachers create the games.

#### **Routes toward non-academic Impacts:**

##### **Processes, activities**

A process that had worked well for the project was the iterative development and assessment in schools. The field assessments were planned and undertaken by the academic partner, afterwards providing feedback to the commercial developers. This participatory design process had allowed Immersive Education to work closely with teachers and students to meet real needs. This, and the funding over 3 years, made it possible for them to take time to reflect on the work with teachers and students without so much of an immediate need to build and sell products. The approach enabled them "to work with academics and base design on research rather than hunches."

Another productive process was the requirement from the PACCIT programme to meet every 3 months with the DTI monitor. This person was felt to be extremely helpful in getting project members to clarify what they were doing and had also helped sort out occasional disagreements.

Being involved in the programme meant that Immersive Education was able to engage with other games developers such as EIDOS and Blitz. Not only did these companies host visits, they were also involved in the project to an extent: judging the games created by the children and helping to write the teachers' materials. The project's guiding board had games industry representatives on it who were very supportive as well.

##### **Key roles**

Three of the project team can be classed as Knowledge Intermediaries:

- one academic at the Institute had previously been a secondary teacher, having worked for a number of years in one of the schools chosen to use Mission Maker
- another academic had previously worked in industry, which gave them an understanding of the constraints under which commercial companies operate and of what was achievable within the timescales
- the senior manager in Immersive Education had a background in teaching

This meant that the various partners had a reasonable understanding of each other's worlds.

In addition, one of the academics acted as the project manager as part of their "day job". The commercial partner considered that this had been critical to the project's success.

#### **Key knowledge exchange lessons:**

##### **For Academic Researchers**

- It can take a considerable time to find a suitable commercial partner. Larger companies may not feel that the funding is enough to warrant involvement. Smaller companies can experience cash-flow problems that can in turn jeopardise the project.

##### **For Non-academic Partners**

- Be aware that, in order to achieve the project outcomes, the planned match funding may not be enough and commercial partners may have to contribute more than they originally budgeted.
- The end of the project does not necessarily mean the end of dissemination or other project-related work (such as contributing to articles, case studies and evaluation reports).

##### **For all Partners**

- The lead person for each academic and non-academic collaborator needs to have sufficient experience, seniority and time in order to effect actions.

## Case Study 2: E-ADVICE

<b>Project:</b>	
E-ADVICE: The cognitive science of financial E-Advice	
<b>Principal investigator:</b>	
Professor Nick Chater (University College London, formerly University of Warwick)	
<b>Research summary:</b>	
<p>This project combined work on human decision making, especially in the financial realm, with an effort to understand how to build applications that would help people use their money more effectively. Psychological research underpinned the development of “financial e-advice products”, electronic systems providing financial advice on strategies appropriate to particular customers. A new cognitive model of decision making under risk was developed, contributing to award-winning academic research. At the same time, a prototype on-line financial system was developed based on explorations of user behaviour and of how to support on-line financial advice. Together, the partners launched a spinout company to exploit the research understanding in a commercial context.</p>	
<b>Users &amp; stakeholders:</b>	
<ul style="list-style-type: none"> <li>• Spinout company, Decision Technology</li> <li>• Oliver Wyman &amp; Company, NOP Financial, Autonomous Software Ltd</li> <li>• Clients of Decision Technology</li> <li>• Policymakers, financial and retail sectors, education, health boards</li> </ul>	
<b>Key types of impact:</b>	
<ul style="list-style-type: none"> <li>• Instrumental</li> <li>• Conceptual</li> <li>• Capacity Building</li> </ul>	<ul style="list-style-type: none"> <li>• Cultural Change</li> <li>• Enduring Connectivity</li> </ul>
<b>Highlighted non-academic impact:</b>	
<p>The most significant non-academic impact was the spinout of a company, now several years old with some ten employees. Decision Technology <a href="http://www.dectech.org/">http://www.dectech.org/</a> describes itself as “a part-academic, part-commercial research group dedicated to the study of human decision-making and the development of any associated practical applications”. Although the company is not doing exactly what the project did, “the spinout came into existence because the grant was there”. The company was co-founded by Professor Chater and his non-academic partner Dr Henry Stott. It provides a range of research for financial and retail sectors in particular.</p>	
<b>Other non-academic impacts:</b>	
<ul style="list-style-type: none"> <li>• There has been a real attitude shift. In fact, the lead researcher feels that he is “in a totally different world from where I was seven or eight years ago regarding linkages.... Now when I start up a project I often think in terms of bringing together relevant stakeholders, seeking their opinions, identifying key issues and I would not have done this before PACCIT, so it has changed my mindset substantially.”</li> <li>• The lead researcher and other involved researchers now take on some work with applied aspects (often also publishable academically). For example, one researcher has a paper relating to credit cards in a top academic journal. Another has provided input to the Citizens Advice Bureau.</li> <li>• A next generation researcher, while still an academic, shifted to quite an applied direction, for example working on a project for a government department to understand the psychology of consumers who use the department. The researcher, who also now works with BBC on large online projects, not only benefited from his actual research experience but also an intangible effect of PACCIT: “I suspect it also helped that the PACCIT project was an applied piece of research, meaning I was already in the mindset of thinking about ‘what makes this research useful or important’ and dealing with other stakeholders whose goals may have been different from my own.”</li> <li>• The company has funded 4-5 PhDs (working part-time) so there is a direct capacity-building impact, even beyond the original next generation researcher involved in the project. These individuals tend to continue to have a mindset toward interest in applied problems.</li> <li>• The work has had an impact on thinking at the Association of British Insurers and submissions have been made to the Treasury’s Thoresen review on generic financial advice.</li> </ul>	
<b>Routes toward Impacts</b>	
<b>Key roles</b>	
<ul style="list-style-type: none"> <li>• PACCIT brought together two key individuals with complementary motivations; this two-way</li> </ul>	

collaborative relationship was pivotal to the project and the eventual spinout. As the lead academic, Chater was intrigued by the prospect of combining pure research with potentially commercial applications. As a (former) Director of the financial services consulting firm Oliver & Wyman, Henry Stott took a sabbatical to pursue a PhD, bringing commercial awareness. Both felt that there was a dual opportunity in this project, for both research and commercial interest. Together, they co-founded Decision Technology. In effect E-ADVISE served as a two-way internship allowing individuals to get a feel for what collaboration would be like and what impact they might have.

#### **Processes**

- Even now there are many involved individuals that have links back and forth between the company and academia. "Decision Technology has a porous boundary between academia and the commercial world and this will continue".
- Explorations with the private sector identified this innovative, risk-taking niche as an opportunity best-suited to a start-up.
- "Knock-on impacts will be rumbling along for a long time." Ongoing connectivity is seen as a very good proxy indicator for likely impacts of the future.

#### **Key knowledge exchange lessons:**

##### **For Projects/Academic Researchers**

- Given that the PACCIT project led to both a spinout and a great deal of academic attention in key journals, a lesson learned is that some theoretical work that can be quite important in academic research can be stimulated by something like a PACCIT project that considers potential applications.
- There is a very real gap between groundbreaking research that is too speculative for commercial funding but too applied for traditional research grants. PACCIT-like grants are good for facilitating those relatively few academics who want to move toward application; "these are the sparks that these sorts of grants help kindle".
- "Have a proper relationship with at least one or more non-academic partners at the outset of a project, the deeper that relationship the better..... it would be very hard to suddenly start at the last minute putting non-academic partners into something once you have got the money."
- There has been a huge cultural shift in UK higher education in the last decade. This might make spinning out a company easier.

##### **For Non-academic Partners**

- In terms of having an influence in conveying new research, it helps to have a long-term relationship and to have been able to repeat things over the years.
- There can be so much movement within companies, "a natural eddying around", that this can make for a less stable platform to see things through to commercialisation; it might be wise to spend more money, more quickly for this sort of project. If you really hope to engrain research into your company, an institutional relationship (between a company and a university, outlasting changes in personnel) would be your only way to ensure that.
- Basically, PACCIT worked as a pilot study; it helped get the company going to where it can generate its own revenue.

## Case Study 3: E-DRAMA

<b>Project:</b>	
E-DRAMA: Enhancement of People, Technology and their Interaction (RC £251,747, DTI £198,060, Industry contribution £373,753)	
<b>Principal investigator:</b>	
Professor John Barnden (University of Birmingham)	
<b>Research summary:</b>	
<p>This project used Artificial Intelligence (AI) to enhance e-drama, i.e. online improvisation where human actors interact through personalised avatar characters in reality-based or imagined scenarios. The project drew on Hi8us's field-tested "e-drama" software, BT's 3-D experience and AI from the Department of Computing Science at University of Birmingham. The project devised ways to make the human actors' avatars more able to detect and respond to the emotional tone of ongoing interactions so that they can facilitate the role-playing more effectively. The project also introduced a fully-automated avatar in order to help facilitate role-play and consequently reduce the load on the human director of improvisation. The prototype developed proved popular with the school children with whom it was tested. The project been used to raise awareness of the area of research and its application with the public sector (e.g. local government and regional development).</p>	
<b>Users &amp; stakeholders:</b>	
<ul style="list-style-type: none"> <li>• Non-academic collaborators: BTextact Technologies (BT's research &amp; development group), Maverick Television</li> <li>• Non-academic sub-contractor: Hi8us (as a charity, they could not be a primary collaborator in the project)</li> <li>• Other users: a number of schools that used the software (over 3 iterations of the software)</li> </ul>	
<b>Key types of impact:</b>	
<ul style="list-style-type: none"> <li>• Instrumental</li> <li>• Conceptual</li> <li>• Capacity Building</li> </ul>	<ul style="list-style-type: none"> <li>• Cultural Change</li> <li>• Enduring Connectivity</li> </ul>
<b>Highlighted non-academic impact:</b>	
<p>The primary impact was the development of a working prototype blending the three technologies that contributed to the project. This has been used by Hi8us to show to prospective clients the impact of e-drama in the future, extending the work the project had already done to raise awareness with both staff and children in schools. An attempt to attract further funding for the commercialisation of the product was unsuccessful, and further attempts are still to be made. As a result, the developed system remains as a prototype</p>	
<b>Other non-academic impacts:</b>	
<p>The second major impact described was a form of capacity-building: the development of collaboration experience and abilities. For the smaller companies, the experience showed them that they could engage with research groups and larger companies, with their very different cultures, and nevertheless contribute to the project and see visible results from the collaboration. For BT, it allowed two staff to gain experience of working in such collaborations, and they have now gone on to work on other collaborative projects: "the lead programmers are out now developing new applications with partners – it was working on the PACCIT project that has given them different perspectives". For the University, working with commercial companies raised new issues for the academics to explore, particularly because of the need for practical application of their research.</p> <p>The ability to test prototypes in schools was seen as very valuable. The system was used in several experiments aimed at investigating students' reactions to it, working with male and female students in the 14-16 age range. The main improvisational scenarios used were: a school bullying scenario, a scenario concerning a school student having an embarrassing illness (Crohn's disease), and a homophobic bullying scenario.</p> <p>The partners were exposed to different organisational cultures, particularly attitudes to hierarchy, and learned how to work with these differences. This ability to work well between different cultures and sizes of organisations was seen to contribute to the credibility of the smaller companies involved: "We are seen to be an organisation that has the capacity to collaborate with corporates and serious academic institutions, which adds credibility to our work".</p> <p>There is willingness for further collaboration, particularly between the University and Hi8us. An</p>	



(unsuccessful) application for a further joint project was made and they are now investigating another potential project, this time with the Economics department. Hi8us also assists with university workshops, for example, a workshop on Health and Technology for the health sector where E-Drama was demonstrated as one of the technologies.

Within BT, there has been interest in the project from the Corporate Social Responsibility (CSR) team, which is looking at how BT supports communications skills in schools as part of their Better World campaign. Although only a prototype was developed, it provided insight into online learning in schools. Maverick produced a DVD about the project, which is quite heavily used by BT; for example, with local government authorities to raise their awareness about ways in which education might develop in the future.

The project gained attention within Advantage West Midlands (the local Regional Development Agency). A consultancy project, directly related to the research content of E-Drama, was awarded to one of the University team by a local company.

### **Routes toward non-academic Impacts**

#### **Processes, activities**

The project established monthly meetings at the outset, which was mentioned by all participants as key way of building the trust necessary for collaboration. Steering group meetings rotated locations and were combined with social events where possible. 'Show and tell' sessions presented E-Drama to university and other groups. BT provided a tour of a number of projects at their research and development laboratories, creating wider awareness of Hi8us among the research community there.

Given the relatively low amount of developer time that Hi8us could commit to the project, a key factor in the development of the prototype was co-locating the BT and Hi8us developers for concentrated periods of time on each other's premises. This had the added advantage of helping them understand each other's quite different cultures. BT has since used this approach in other projects.

#### **Key roles**

There was no critical "knowledge intermediary" role in the project. However the BT team leader had many years of collaborative experience between BT and universities that she felt had contributed to the successful working relationship they had with the project, despite being geographically distant from the other partners.

The University singled out the role played by the departmental business development manager, who had been good at identifying potential collaborators. She was also on the project steering group for the project so maintained an active role in the project, e.g. advising on budgets.

### **Key knowledge exchange lessons:**

#### **For Projects/Academic Researchers**

- Be clear at the outset about intellectual property rights, and anticipate the likely desire of commercial parties to protect their existing IP.
- Evaluate the benefits of co-location for software developments that involve more than one collaborator.
- Recognise that, for most commercial partners, all time on a project has to be accounted for, e.g. attending meetings will count as project time and be charged to the project.
- The academics doing the main research work should not also be dealing with the administrative detail such as the production of the required Quarterly Reports and the running of meetings.

#### **For Non-academic Partners**

- Recognise that the overheads of participating in projects can be demanding and plan accordingly. Funder reporting and financial management can be a burden.
- Evaluate the benefits of sharing intellectual property rights with other collaborators, and be clear at the outset about the approach to be taken.
- Gaining feedback from users (in this case, school children) is very valuable, not just for correcting problems or improving usability but also for suggesting new and useful ideas for development.

#### **For All Partners**

For geographically-dispersed projects, consider the use of audio-conferencing, shared workspace and web-related tools that allow collaboration regardless of location.

## Case Study 4: ROLLOUT

<b>Project:</b>
<p>ROLLOUT: Innovative representations for scheduling for quality and training (RC £264,844; DTI £150,000; Industry contribution £366,000)</p> <p>Note: ROLLOUT drew upon understanding gained in a preceding PACCIT Phase I project, Applying principles of representational design to humanise automated scheduling systems, funded with RC £264,650.</p>
<b>Principal investigator:</b>
Professor Peter Cheng (University of Sussex), (Project Manager, Linda Young CCFRA/Baketrans)
<b>Research summary:</b>
<p>Building on a Phase I project on the design of representations for scheduling, this LINK project involved academics, a research and technology organisation and a consortium of ten companies. The project tested principles of representational design of systems by applying them to the complex, dynamic world of real-time rescheduling of the activities of commercial bakers. Multiple variables and non-traditional computer users provided challenges to development of a diagram-based system that could act as a tool help support the baking industry. ROLLOUT proved to be relatively easy to learn, with the capacity to produce schedules quickly that could often avoid major problems. The project, including real-world bakery trials, allowed knowledge acquisition techniques and observational studies to examine the impact of the system on workers' patterns and environment.</p>
<b>Users &amp; stakeholders:</b>
<ul style="list-style-type: none"> <li>• User/Knowledge Intermediary: RTO Campden &amp; Chorleywood Food Research Association (CCFRA), then the same key players but in their new BakeTrans technology and knowledge consultancy working with the baking industry</li> <li>• Supermarket chains with in-house bakeries (i.e. Sainsburys, Tesco, Asda)</li> <li>• Commercial bakeries (i.e. E. Botham &amp; Sons, Ltd, British Bakeries Ltd, Fine Lady Bakeries Ltd, Tom Chandley Ltd, Scobie &amp; McIntosh Ltd, Warburtons Ltd, Rathbones Bakeries)</li> </ul>
<b>Key types of impact:</b>
<ul style="list-style-type: none"> <li>• Conceptual</li> <li>• Capacity Building</li> <li>• Enduring Connectivity</li> </ul>
<b>Highlighted non-academic impact:</b>
<p>Ongoing active collaboration is taking place with the private sector knowledge intermediary organisation, BakeTran. This has led to the successful pursuit of a post-ROLLOUT CASE studentship funded by EPSRC and a joint application (along with an international food company) for EPSRC research funding, now pending. Leaders of the SME BakeTran themselves feel that they have benefited from exposure to the thought processes of the researcher, altering the way they approach problems of clients who need knowledge-based systems. They have benefited from the project in terms of presentation, visualisation and ways to break down information and knowledge for presentation to different companies. Potentially acting as a multiplier of impacts, BakeTran is itself in a position to utilise understanding gained from the project to influence other companies in the longer term, through consultancy and training.</p>
<b>Other non-academic impacts:</b>
<p>As a Conceptual Impact, new understanding of the difference that could be made by human computer interaction was achieved in many of the companies involved. A key concept promoted by the academic research was the importance of leaving the "domain expert" (the human baking manager) in control of the baking process, so that local or timely knowledge can be incorporated into scheduling. "Providing room for baking managers to help in scheduling is a better philosophy of using IT than throwing automation at it." For some companies, this was at odds with the direction they wanted to pursue. However, for some partners, awareness was raised as to the potential of using IT-based systems that allow more human expertise and interactive use of data to help tackle problems. For example, one company said at the end of the project "We have re-thought some of our working practices as a result of being involved in the project." A major supermarket established a production planning programme on principles similar to ROLLOUT, which helped to create sufficient interest to provide a budget for the programme.</p> <p>All collaborating companies have participated in the work done; all have copies of what was done, a prototype version of software and data files for an example bakery that was defined by non-academics. However, none of the commercial partners developed the prototype further into working</p>



models for themselves. Had follow-on funding been available, individuals involved felt it could have allowed subsequent knowledge exchange or collaborations leading toward further impacts.

Some companies incorporated project information into training materials for their training managers. For companies beyond the collaborators, the PI wrote was interviewed by the trade press; the project team wrote articles for the same and participated in a CCFRA open day.

In terms of capacity-building impacts, Research Fellows associated with the project were inducted into the approaches of the project and the follow-up EPSRC CASE studentship is developing knowledge acquisition and modelling tools for the actual baking process itself. Academic publications of the PI incorporate insights from the PACCIT project, which may have an ongoing impact on academic readers, perhaps even contributing toward long-term perceptions of work involving non-academic partners as “valid”.

#### **Routes toward Impacts:**

Frequent meetings with non-academic partners, even beyond regular project meetings, helped to develop momentum and made it possible to replace champions quickly when necessary.

#### **Key roles**

A pivotal “knowledge intermediary” role was played by the baking industry’s RTO organisation, Campden & Chorleywood Food Research Associates, and now by BakeTran. The PI regards this project in many ways as a partnership between the knowledge intermediary and academia, acting at the interface of companies. Two key individuals were able to help the project by identifying potential non-academic collaborators, assisting with ongoing networking, providing credibility and assisting contractual or other components of growing/ maintaining lasting relationship with private sector collaborators more broadly. Fortunately, they also brought knowledge of how to manage DTI projects. At least four of the original collaborative companies continue to use the two individuals as filters, not unhappy with the academics but seeming to find it easier to communicate with the BakeTran people. The knowledge intermediaries believe that, as well as expertise and many years in this sort of work, their *outlook is crucial* to their role, in that they possess a willingness to examine the potential of new technologies and move them along toward working effectively. When spotting a new technology, “rather than just saying ‘it is interesting’ and moving on – we say ‘it is interesting, but what can we do with it?’”

#### **Key knowledge exchange lessons:**

##### **For Projects/Academic Researchers**

- Include a knowledge intermediary who brings expertise, a network, ability to communicate and an ability to understand the mindset of commercial collaborators as well as to appreciate academic research and perhaps even do some applied research of their own.
- Think about commercial exploitation from the beginning of the project, involving all key players including university knowledge transfer staff, so that everyone understands both the potential and the limitations as to what can be done within a project, in a particular industry setting.
- Manage expectations of commercial partners, so that they know they are not getting a tailored solution for their particular problem.
- Realise that non-academic timeframes may be much shorter than academics, and that champions, commitments and priorities can change within the lifetime of a research project.
- A practical element of demonstration, in which non-academics get to play with something and provide iterative feedback, works particularly well with IT projects.

##### **For Non-academic Partners**

- Ask searching questions up front regarding whether or not the end “product” of the research project is likely to be useful (although of course no one knows for sure); try to get a sense of how tangible the end product is likely to be.
- Consider formally assessing progress toward objectives of interest to non-academics, on a regular basis throughout a project.

## Case Study 5: HOMEWORK

<b>Project:</b>	
HOMEWORK: Home and school linked via divergent technology in a pedagogic framework (RC £249,930; DTI £133,800; Industry in kind: £255,088) (formerly, with Dr Plowman of the University of Sussex, in PACCIT Phase 1 project: Exploring and Mapping Interactivity with Digital Toy Technology £149,495)	
<b>Principal investigator:</b>	
Professor Rose Luckin (London Knowledge Lab, and visiting Professor University of Sussex)	
<b>Research summary:</b>	
Drawing upon concepts from educational technology, TV production and Artificial Intelligence, researchers and non-academic collaborators worked with teachers, learners and parents to develop a system for maths teaching on a tablet PC. Because this personal learning device was used both at school and at home, the technology helped to link parents, teachers and learners in a way that increased: children's attention, teachers' ability to monitor learning during teaching and parents' collaboration in their children's learning.	
<b>Users &amp; stakeholders:</b>	
<ul style="list-style-type: none"> <li>• Open Mind Productions <a href="http://www.openmind.co.uk/">http://www.openmind.co.uk/</a> (SME specialising in new technology-based imaginative and educational products)</li> <li>• Channel 4</li> <li>• Private sector television consultant</li> <li>• Pilot school teachers, children</li> <li>• Policymakers</li> </ul>	
<b>Key types of impact:</b>	
<ul style="list-style-type: none"> <li>• Conceptual</li> <li>• Capacity Building</li> </ul>	<ul style="list-style-type: none"> <li>• Cultural Change</li> <li>• Enduring Connectivity</li> </ul>
<b>Highlighted non-academic impact:</b>	
In part due to HOMEWORK, the PI is recognised as knowledgeable in matters such as parents and learning, computers in the home, mobile technology that are related to current policy, e.g. Home Access government initiative. Even though in specific terms HOMEWORK promoted an approach different from current policy, the work has probably contributed to awareness of benefits that technology can bring when trying to link home and school learning. The PI now sits on the board of Becta, a key policymaking unit for ICT in education, where she chairs the Research Advances Committee. She is also currently on a fellowship, so has time to disseminate in both academic and non-academic channels. Thus, two and a half years after HOMEWORK, she is in an excellent position to inform policy. Furthermore, "the landscape is more open to hearing what we've got to say now". Insights gained during HOMEWORK thus seem to be generating an Conceptual Impact, raising awareness and understanding and informing policies.	
<b>Other non-academic impacts:</b>	
<ul style="list-style-type: none"> <li>• A prototype for a new interactive television demonstrator as a learning device set within the HOMEWORK system was developed and trialled successfully with pupils, teachers and parents. Children showed increased engagement with learning and possibly also learning gains; teachers could integrate the technology into classroom practice and monitor what happens; and parents appreciated the opportunity to collaborate in and understand more about their children's learning.</li> <li>• Although unfortunately the prototype has not yet become commercialised into products (no funding was available for larger trials and development), the SME that was the chief collaborator has taken learning from HOMEWORK, such as the potential for engaging parents and what works for children/teachers, and applied this learning to other software products it has developed for that age group.</li> <li>• The Principal Investigator continues to interact with both Open Mind Productions and the private sector consultant, exploring future possibilities. In addition, in part as an impact of PACCIT, other companies are talking with the Principal Investigator.</li> <li>• Willing to work with non-academics in the future, a "next generation researcher" learned about differences between academic and non-academic ways of working in terms of priorities, methods, timescales and concern with marketing practicalities. For example, commercial emphasis on high production values turned out to contribute to success of interventions.</li> </ul>	

## Routes toward Impacts

### Processes

- Continuing dialogue between the researchers and the main company partner was key. The PI and the main company leader, as well as a private sector consultant (who since left the UK) had worked together previously, as consultants on a non-academic project on interactive TV. The champion within another company partner left very early in the project.
- The main company partner won several days of business advice from another scheme and devoted one to PACCIT.
- Quarterly meetings, including PACCIT representatives, were useful for focusing the team. Generally, multiple meetings and plenty of time spent helped mutual understanding of what people were doing.
- Inter-disciplinarity was a very big part of this project.
- Project trials with students, teachers, parents allowed for iterative growth in understanding, including unexpected learning – such as the value placed by parents on learning about what their children are doing in school, via the technology.
- When the project got to the point of designing content and sharing development and production, academics and the company programmers worked well together in actually creating the programme, even though they had different perspectives.
- HOMEWORK was demonstrated at open evenings and special events, to audiences including policymakers.
- The project was highlighted in an article and a video on the BBC Southern counties website

### Key knowledge exchange lessons:

#### For Projects/Academic Researchers

- Agendas of academics and companies can be very different, so there can be tensions. Organising the way they work together and the timing of who does what can, however, can make collaborations positive.
- “Academics can do an awful lot of the groundwork that informs innovation.” Effectively, this is a way for companies to manage risk.
- “Impacts of the real world on your commercial partners can be enormous, unanticipated and difficult to predict... Recognise that that is a fact of life. Think how you could help your non-academic partner in the bad times.”
- Manage expectations for everybody. Make it clear to non-academics what is realistic to expect from a project and what is being expected of them.

#### For Non-academic Partners

- Be careful with contracts in the future (e.g. with DTI) to see what sorts of expenses you would actually incur in terms of business requirements, financial auditing and so on.
- It was very interesting to be exposed to the different approaches that academics take to testing and hypothesis and evaluating results, as cold-blooded testing and trialling is something that generally small companies do not have time or money to do.
- Be aware that it can be very difficult to find funding that would bridge the gulf toward commercialisation by supporting large trials and other necessary steps in the long process of moving interesting findings closer to the risk-taking stage of commercialisation.

#### For All Partners

- Companies and universities have different timescales and degrees of flexibility. Academics may value agility and like to respond quickly to what is happening and move along with the technology, but a business has to produce things to deadlines with certain amounts of money ascribed to certain things.

## Sectors Reached

PACCIT projects did succeed in reaching a variety of sectors, as illustrated in some depth by the Case Studies. Key non-academic audiences for the research were spread across industry, policy and professional practice sectors. Just as many of the research projects represent “niche” foci of study, so do many of the collaborators and presumably, prospective audiences. (For example, one case study project focussed on the challenges of developing useful scheduling processes with partners consisting of large commercial bakeries and supermarket chains with small in-house bakeries.) The theme of school education ran in some form throughout many of the projects, with potential interest to relevant policymaker and practitioner audiences accordingly. Media at various levels represented another natural set of audiences for development of technologies.

Whereas the 13 PACCIT Phase 1 projects focused on research conducted in a relatively conventional academic mode, in the later Phases the 17 LINK and LINK-like projects involved some 41 non-academic collaborators (see listing of PACCIT projects in [Box 1](#)). Eleven LINK projects involved some 34 commercial organisations, many of which were SMEs or small to medium sized enterprises (e.g. Immersive Education, Macromedia); a few large corporations (e.g. BT, Sainsburys) were also involved. An additional six LINK-like projects involved four public sector and three voluntary sector partners. Beyond the formal non-academic partners, audiences touched by the Programme also included those who attended PACCIT Programme public events (the Director cited some 600 delegates, nearly all non-academics) as well as the many who visited the website (the Director cited over 160,000 hits, with half by commercial entities).

Survey respondents reported that PACCIT research had reached (even slightly or preliminarily) one or more sectors and most of these felt that research had at least begun to reach the private sector. Interestingly, while all Phase 1 respondents saw the private sector as having been reached, not as high a percentage (though still over three-quarters) of the Phase 2/3/LINK respondents did so; perhaps because less time had elapsed or perhaps because, having been focused explicitly by their funding scheme on work with non-academic partners, they were more demanding or fine-tuned in their thoughtful response to this question. Over a third of all the respondents (with a slightly higher percentage of Phase 2/3/LINK respondents) felt there was at least a preliminary effect on policymaking at some level; and slightly more (with about the same percentages across Phases), saw some professional practice being reached by their project ([Table 1](#)).

<b>Table 1: Sectors Reached</b>	Full dataset N=48		Phase 1 results N=15		Phase 2/3/LINK results N=33	
Private	41	85%	15	100%	26	79%
Policy	17	35%	4	27%	13	39%
Professional	19	40%	6	40%	13	39%
None of the above	4	8%	0	0%	4	12%

## Types of Impacts

### Overview

Many impacts of PACCIT fall into the three types of impacts we defined earlier:

- instrumental impacts (“tangible” products or services taken up by companies, policymakers or practitioners)
- conceptual impacts (generating new understanding or raising awareness among potential users of research findings)
- capacity building impacts (training and/or developing collaborative abilities).

“The overarching impacts of PACCIT were: process and mindset”

We have also found evidence of more subtle but nevertheless important impacts:

- cultural change of “increased willingness” to engage in knowledge exchange activity, on the part of individuals and/or institutions or organisations
- establishment of enduring academic/non-academic relationships.

The sheer existence of collaborations, particularly those that last, can be seen as an impact of PACCIT. One overview interviewee felt that “something very powerful” is going on, in terms of culture change, with some academics now engaging more in real-world problems and some non-academic partners also experiencing a change in attitudes; he felt, for instance, that he had seen the effect of a project in some practitioners “now thinking about open and distance learning in a richer, more systematic and systemic way”.

“working partnerships exist between academics at all levels and business and community colleagues. This was quite hard-won.... But for those who were successful, they learned a lot from the PACCIT process.”

“people started to think differently about the whole nature of interaction. Over time, the tone of discussions in meetings changed”

Aggregating all the claims made in the survey of impacts generated or still in development provides us with a relative picture of the types of impacts arising from PACCIT (**Figure 1**). By far, the type of impact claimed the most often was Cultural Change, followed by Enduring Connectivity. These two sorts of impact might be seen to prepare the ground for later additional impacts. The three “classic” sorts of impacts were claimed less frequently, although interestingly Instrumental Impacts was more often claimed than the other two. Perhaps the relatively low explicit emphasis on next generation researchers’ involvement accounted in part for the low number of claims for Capacity-building. Perhaps, although the raising awareness involved in Conceptual Impacts might seem to be easier to achieve than a tangible Instrumental Impact, such impacts are by nature more elusive, making individuals loathe to definitively proclaim their existence.

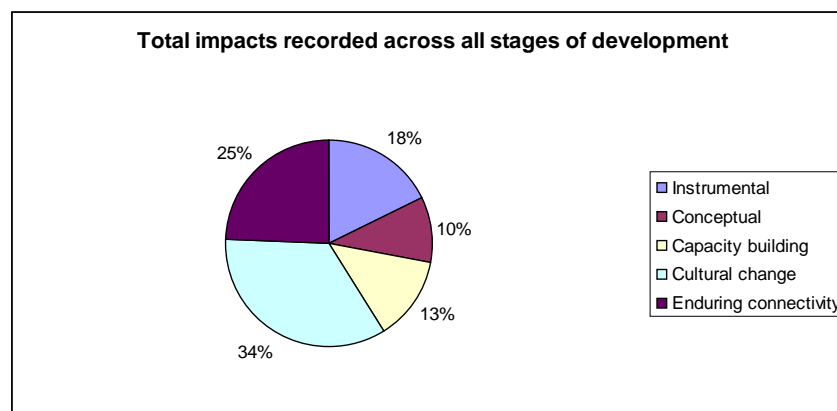
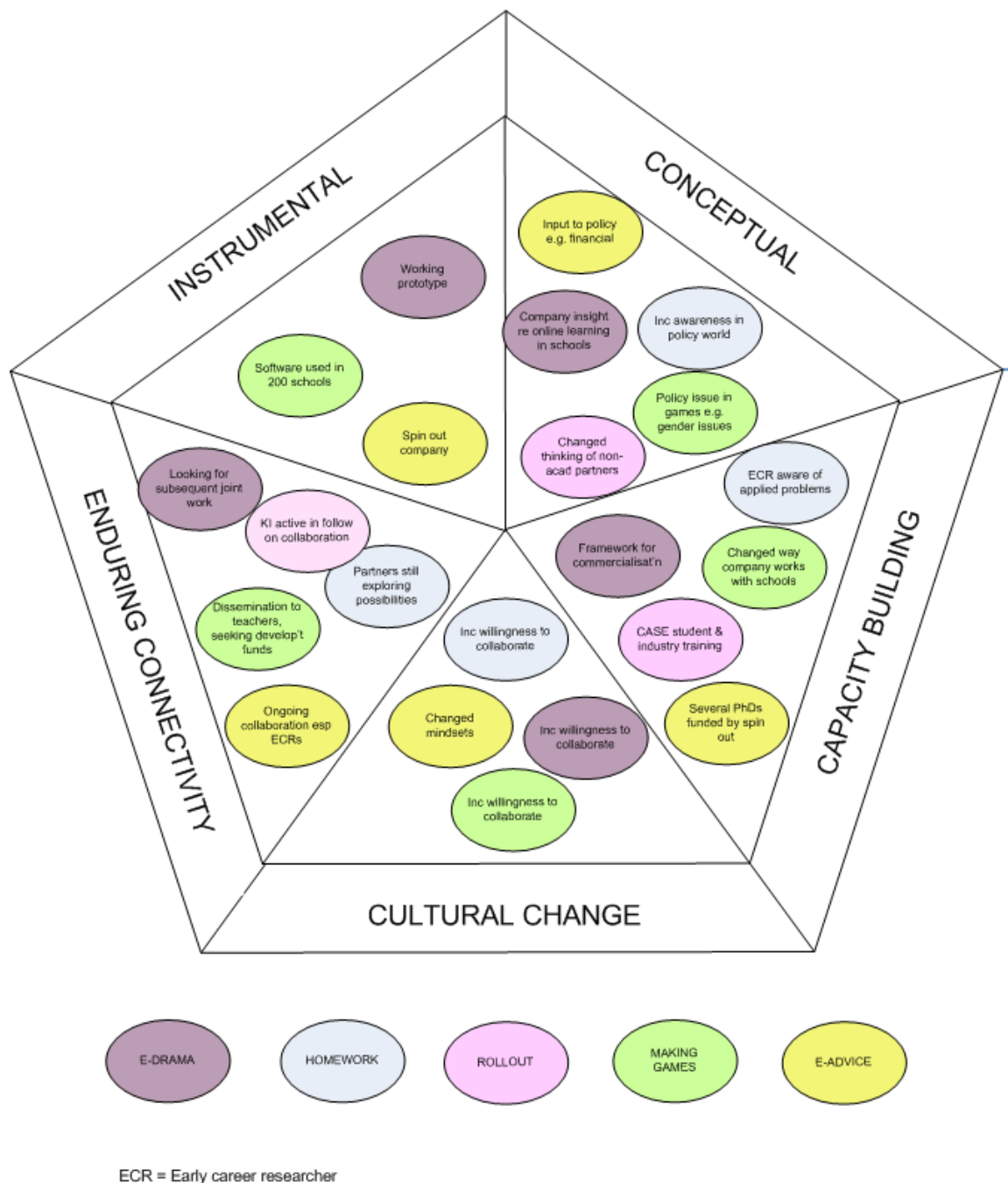


Figure 1: Total impacts recorded across all stages of development

## Examples of Impacts

To provide a richer understanding, **Figure 2** illustrates the five sorts of impacts that have arisen (to some degree) from the various PACCIT projects (Instrumental, Conceptual, Capacity-building, Cultural Change and Enduring Connectivity), as seen in the five Case Studies. Based primarily on interviews, augmented by document analysis and survey text, and triangulated across perspectives, Case Studies provide detail and depth of reflection on processes and impacts. The Case Study projects appear to comprise a large proportion of Instrumental Impacts achieved by PACCIT. It is interesting to note that all five Case Study projects are still exploring Enduring Connectivity, whereas clear, up-to-date information on details of Enduring Connectivity is only readily accessible for half of the remaining projects.



**Figure 2: Illustrative Examples of Types of Impacts**



For the open-text question in which survey respondents were asked to “describe briefly the impact (or impact-in-progress) of which you are most proud”, some 36 respondents made comments. While some judgement calls are required in any categorisation, we found that these responses fell into the following categories (**Box 3**):

### Box 3: Open-text responses regarding impacts

Non-academic impacts captured in Case Studies	Other non-academic impacts	Ongoing connectivity	Academic impacts	No specific non-academic impacts cited
10	6	6	6	8

Thus, it appears likely that this Report’s Case Studies have captured the greatest concentration of non-academic impacts. Other than the Case Study impacts, these are the six **instrumental or conceptual** non-academic impacts as described by a respondent each:

- Local impact on City Council transport planning illustrated by joint paper with Council officer: Report into a method of passenger centred evaluation of PIPs. This is an Information Panel Assessment paper, co-written with an individual in the City of York Council, based on CYC’s own data in the context of the wider **BLISS** project. ACIS (private partner) distributed project report within the company to all its senior managers.
- Work of the project **Investigating the Impact of Tailored Reports on Anxiety** has contributed to the national information strategy for patients with cancer and their carers. Locally in Norwich it has contributed to design of provision for patient information.
- **VISTA** project research and Programme networks contributed to subsequent work of the Principal Investigator’s independent research consultancy company i2 media research. The VISTA project has inspired my research on beneficial impacts of speech-enabled products for improving access to digital media products and services. A good example of the profile and impact of this research is its contribution to an upcoming report to the RNIB on the equipment needs for accessible and usable digital radio equipment for blind and partially sighted people.
- Take up of **MAGIC** research by the Japanese Industrial Research Federation ATR. This was through the placement of two of the researchers within ATR.
- The **APPLE** Project has led through a conference presentation to a dialogue with TechDis/JISC) which resulted in commissioning the Rix Centre for collaborative development with specialist FE Colleges of an accessible e- portfolio for users with significant learning disabilities. Global web accessibility standards were influenced by: presentation to the international W3C Consortium Accessibility; Beta testing of the new Microsoft Operating System on behalf of the intellectual disability user group and an accessibility requirements appendix for WCAG Guidelines Version 2.0. Additionally the Inclusive New Media Design (INMD) project has emerged, identifying best ways to encourage web designers/developers to build websites accessible to people with intellectual disabilities.
- Impact on museum exhibitions -- In light of the **Design for Interaction and Collaboration** project, the researchers organised a small number of small scale international colloquia attended by practitioners, academics and policy makers. These colloquia helped to create longer term collaboration with design companies

who invited the researchers to contribute to their ongoing work through video-based studies and exhibition evaluation.

In addition<sup>4</sup>, some survey respondents cited **Enduring Connectivity Impacts**; these enhancements of knowledge exchange through engagement took the form of continuing dialogue, interactions, consultancy or advisory roles and occasionally conference sessions or small-scale international colloquia facilitating collaborations such as those mentioned in the last impact listed above. Responses also illustrate **Capacity-building**, in the sense of increased reciprocal appreciation of academic -commercial collaborations and follow-on research (even when academic) in which the researchers are interested in applied implications.

### *Impacts and their Degree of Development*

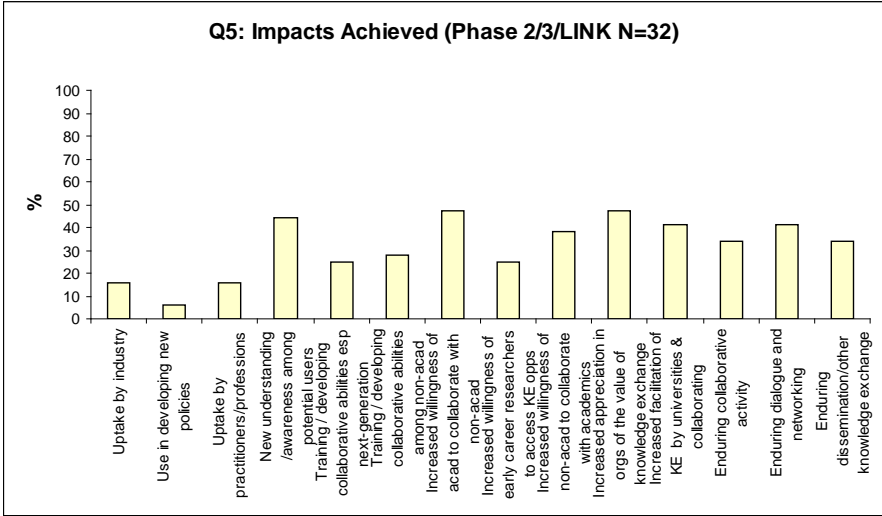
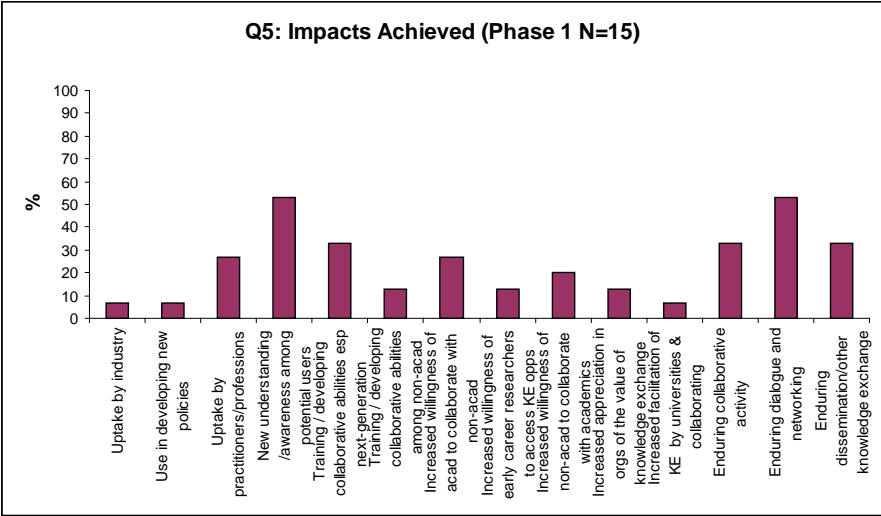
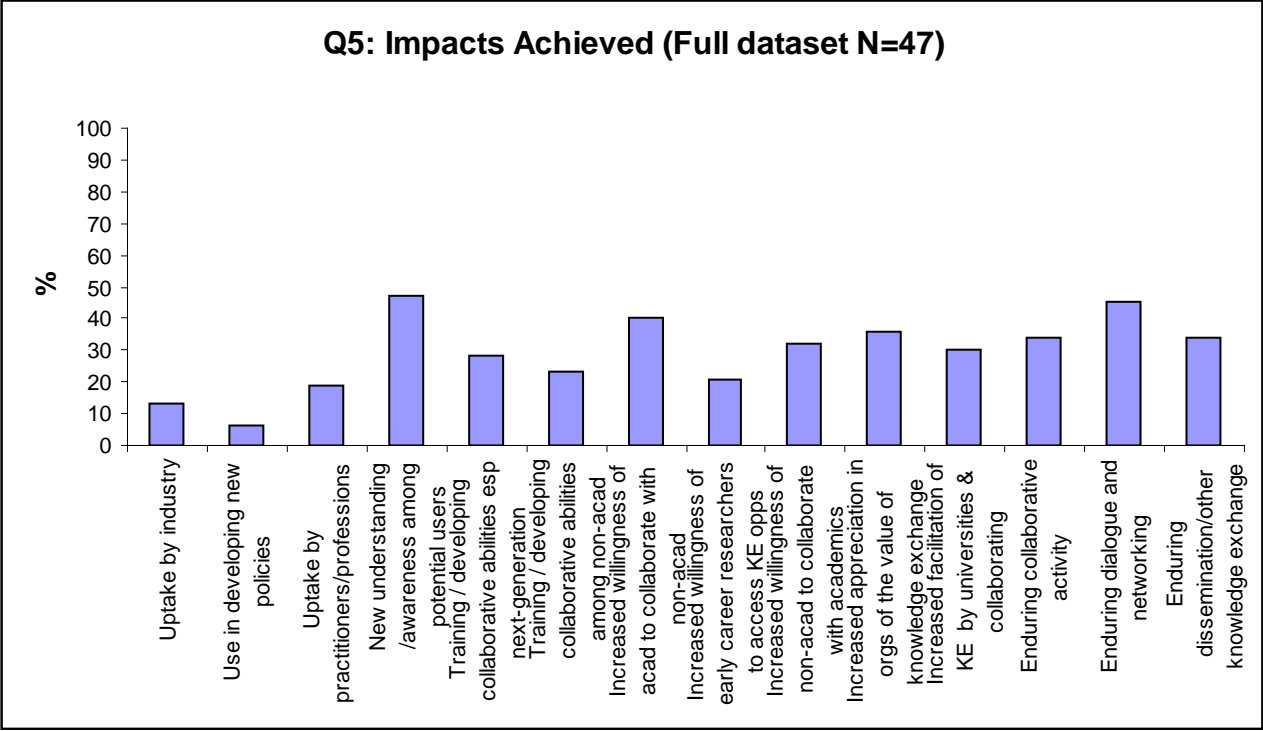
Views of survey respondents made it possible to dig more deeply into specific sorts of impacts, with **Figures 3-5** below showing their proportionality. Survey respondents not only considered in detail some fourteen specific sorts of impacts, they also at the same time offered their best judgment as to how far along each sort of impact was in its maturation (whether it was Achieved, In Progress or Just Beginning).

With 47 survey respondents taking the time to provide detailed input to these questions, several key messages emerge as to each type of impact, as captured below, augmented by input highlights from case studies, interviewees and survey respondents.

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<sup>4</sup> Since comments discussed here were short free text comments from respondents who, unlike Case Study interviewees, did not have the benefit of in-depth discussions probing for subtle impacts; it is likely that some intangible impacts such as culture or attitude change, enduring connectivity or capacity-building, may have existed but not been offered here by respondents as impacts of which they were most proud.





**Figure 3: Impacts Achieved**

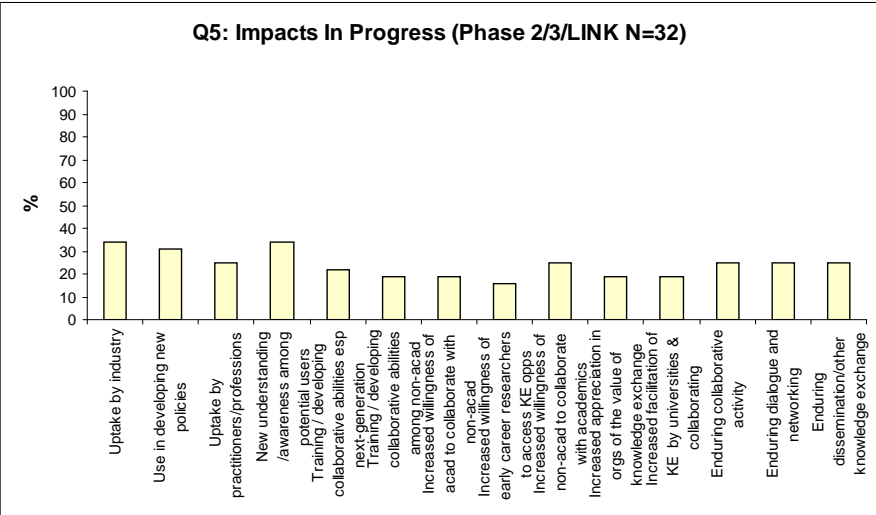
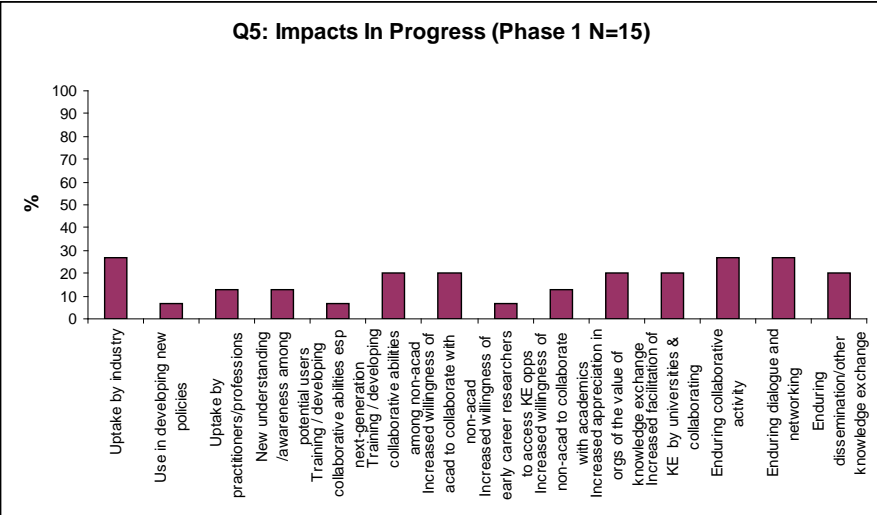
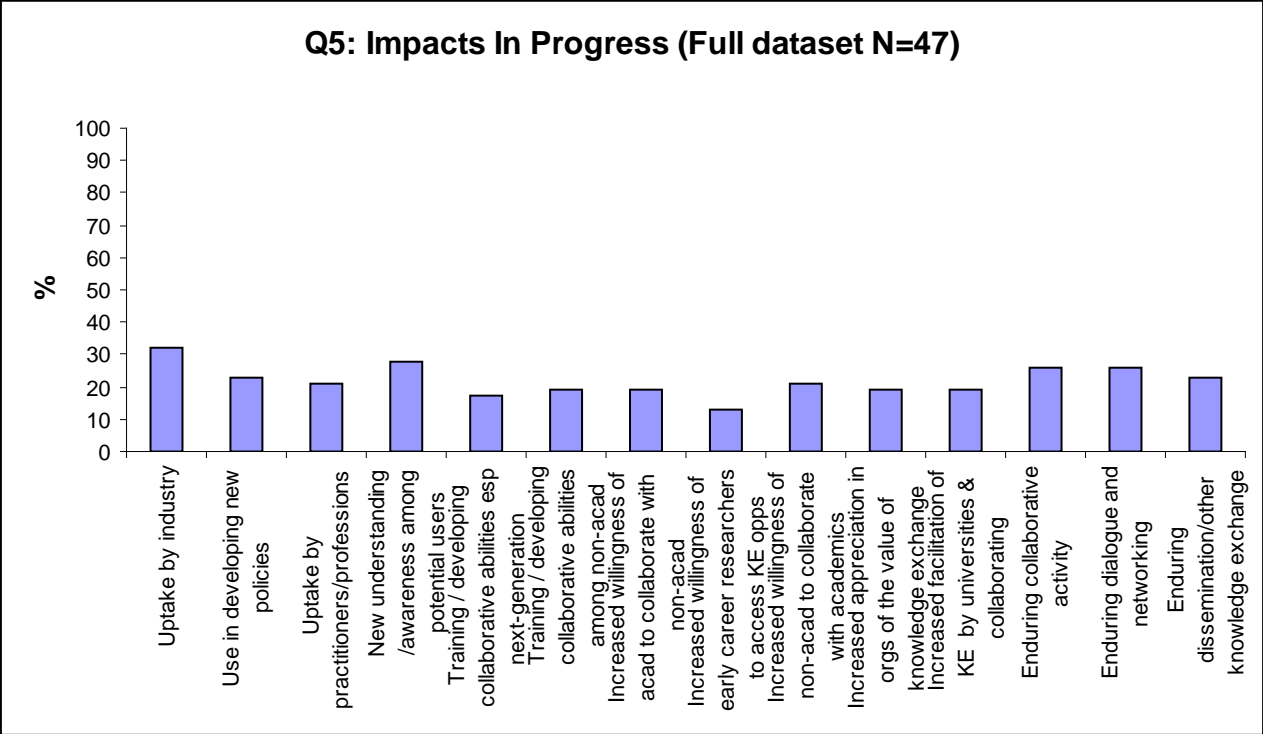
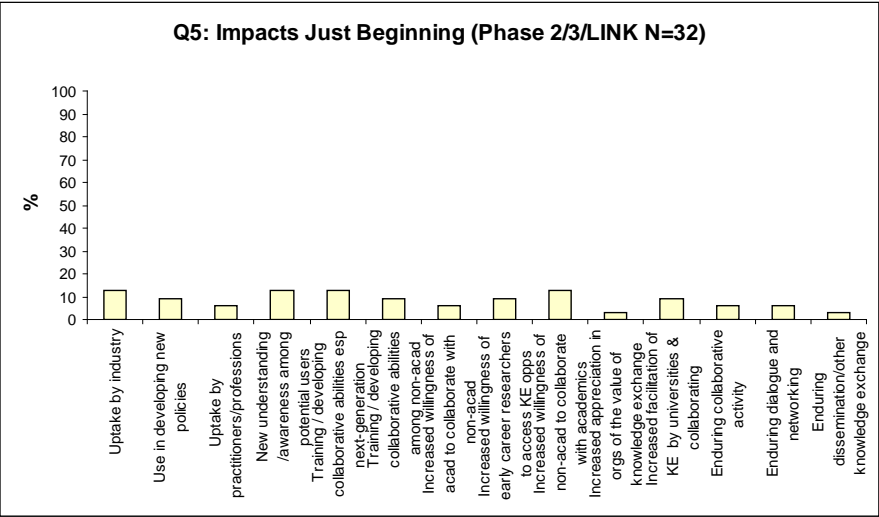
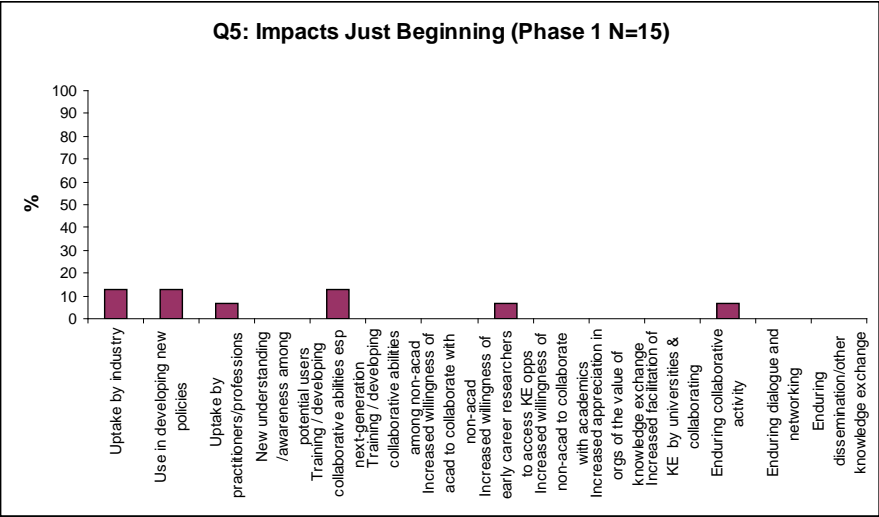
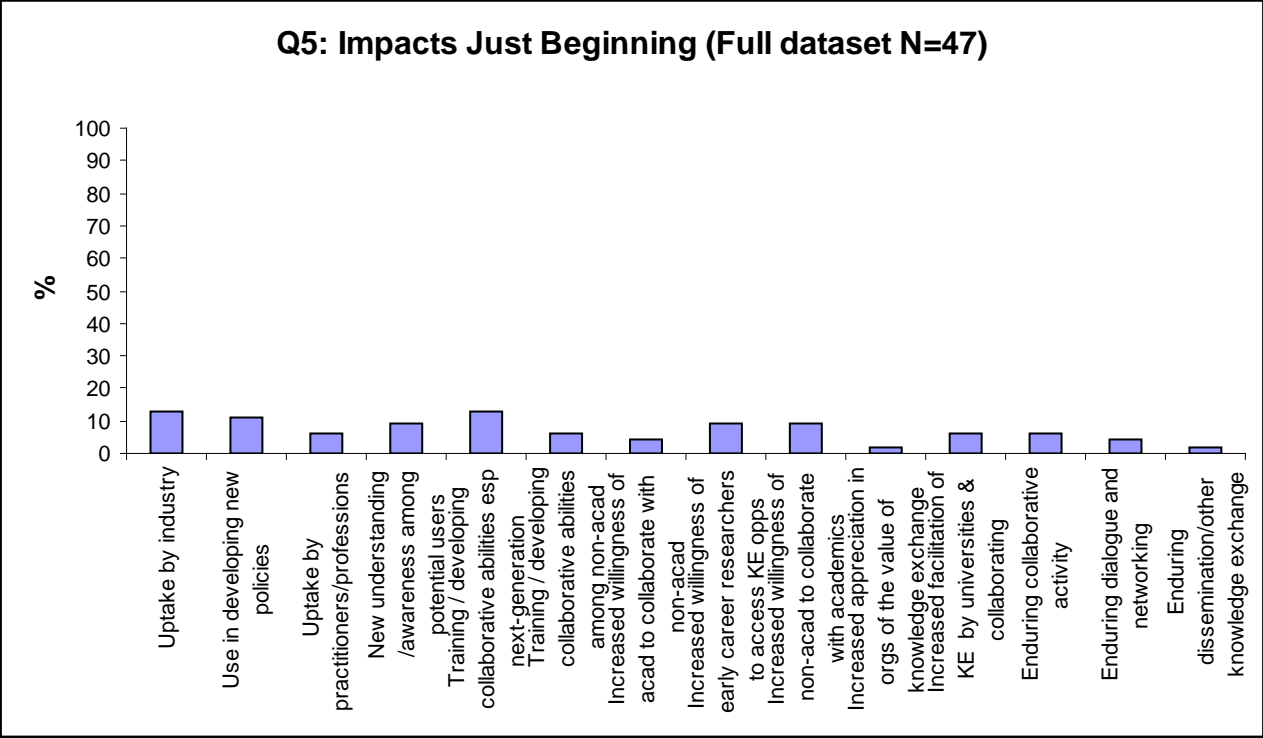


Figure 4: Impacts in Progress



**Figure5: Just Beginning**

## ***Instrumental Impacts***

“Instrumental impacts” (Uptake by industry, Use in developing new policies and Uptake by practitioners, professionals) are illustrated by Case Study examples such as Making Games software being used in schools or the spinout of Decision Technology. Together, these three sorts of Instrumental Impacts represent nearly a fifth of survey respondents’ claims of impacts. (Figure 1) Well over a third of all respondents to this question claimed Achieved status but far more saw the relevant stage of the impact as In Progress or Just Beginning. More than half of those citing industry and policy impacts saw them as In Progress with as many or more claiming Just Beginning as Achieved. However, interestingly, the view of practitioners’ uptake was stronger: nearly as many saw it as Achieved as saw it In Progress, and only a few saw it as Just Beginning.

## ***Conceptual Impacts***

Changing how people think is a key impact. Examples drawn from Case Studies include, for instance, an increasing awareness among policymakers regarding issues raised by Homework and changed thinking as to integration of human and computer elements of scheduling on the part of the knowledge intermediary and some companies involved with ROLLOUT. Most survey respondents (four-fifths of all those returning surveys) claimed some degree of Conceptual Impacts by citing “Generating new understanding or raising awareness among potential users of research findings”. Of just those respondents selecting Conceptual Impacts, nearly half saw them as Achieved with a third of the rest selecting this sort of impact seeing it as In Progress and the remaining tenth seeing these impacts as Just Beginning. While a slightly higher percentage of respondents from the older Phase 1 projects than the more recently-finished Phase 2/3/LINK projects cited these impacts as Achieved, the higher percentage of Phase 2/3/LINK respondents who see impacts In Progress or Just Beginning suggests that this “tail” may manifest into additional Achieved Impacts in the longer-term.

The impact evaluation challenge posed by this sort of impact was captured tellingly by an overview interviewee coming from industry: “A lot of DTI’s *expected* impacts came from a traditional engineering project approach in which a new product/software or whatever is generated to be exploited in market with LINK money. So there was a bit of a learning to do, that it is not quite that simple with social sciences – you don’t get a product in a shrink-wrapped box put on shelves. The impact lies more in that you change the way organisations think – this is a lot less tangible.... not the easy sort of impact like an increase of 50% in sales of a new type of ball-bearing.”

As an example of a conceptual or mindset change, BT was a partner in the InTouch PACCIT project on social networking; this led to a prototype of a contacts directory in which peoples’ contacts were represented by their photographs in a social network. The prototype was not directly downstreamed and developed into a product at the end of the three year project, but the thinking developed in the project was shared with the research and innovation community in BT. From BT’s perspective, the PACCIT project has since provoked new thinking in the area of social networking applications. A related issue is the time needed for social science findings to change thinking in an organisation. It took two to three years after the end of the InTouch project for ideas validated as useful in the earlier project to become most useful to people working on new services in BT.

## ***Capacity-building Impacts***

Examples of capacity-building impacts can be seen clearly embodied in the support of several PhD students by the E-Advice spinout Decision Technology and the sponsorship of

a CASE studentship by ROLLOUT's knowledge intermediary. About an eighth of all the impact claims were Capacity-building Impacts, with just slightly more of these identifying "training and/or developing collaborative abilities *in academics*, especially next-generation researchers" than the reciprocal capacity-building impact of "training and/or developing collaborative abilities *among non-academics*". In both cases, this capacity building was ranked as having been Achieved by about half of those agreeing that this was an impact.

As one knowledgeable overview interviewee noted, it was "important that the researchers learned about how solutions are negotiated between people who want something and people with professional knowledge". There is a sense that such understanding could lead to more tangible impacts in the future. This sort of change in collaborative abilities and even attitudes is documented by the Executive Director in her Final Report: "PACCIT projects have 41 collaborating organizations from private, public and voluntary sectors. All but one of these organisations is new to this kind of collaborative research. Of the 114 academic award holders, all but one were new to this form of collaborative research. When canvassed about the experience, all of the respondents, academic and non-academic, reported finding the experience valuable."

### ***Additional Impacts***

Somewhat more subtle as an impact, but arguably a crucial stepping stone for the future, has been the cultural change of "increased willingness" to collaborate. Examples of increased willingness to collaborate can be found in some of the Case Studies, as in the case of Making Games, with Immersive Education's learning that academics were not necessarily impractical meaning that the company is now willing to collaborate with academics in the future, or in Homework, with a next generation researcher learning about differences in approach but still willing to continue working with non-academics. Across the board, this impact has clearly been achieved by PACCIT. Nearly two thirds of the respondents saw "increased willingness of academic researchers to collaborate with non-academics", with nearly two thirds of these seeing this impact as having been Achieved and most of the rest seeing it as In Progress. Interestingly, nearly two thirds of the respondents saw the reciprocal impact as having occurred: "increased willingness of non-academics to collaborate with academics", although slightly less far along, with half of these seeing the impact as Achieved and most of the rest seeing it as In Progress. Fewer individuals (43%) agreed that the project had resulted in "increased willingness of early career researchers to access knowledge exchange opportunities", although half of these saw this impact as having been "achieved".

Another stepping stone impact lies in institutional or organisational change. "Increased *appreciation* within universities & collaborating organisations of the value of knowledge exchange" was seen by over half of the respondents, nearly two-thirds of whom saw the impact as Achieved, with all but one of the rest seeing it as In Progress. "Increased *facilitation* of knowledge exchange by universities & collaborating organisations" was seen to exist at some level by a similar number just over half (55%) of the respondents, but a smaller proportion of these (a little over half) saw this impact as having been Achieved.

Taken together, the above sorts of Cultural Change Impact represented by far the most numerous of the survey claims, adding up to a full third of all Impact claims made. This is in contrast, for instance, to the "classic" three types of impact (Instrumental, Conceptual and Capacity-building) which *together* added up to far less than half (about 40%) of the Impact claims made. (as seen clearly in **Figure 1**).

The establishment of enduring connectivity could also be seen not only as an impact but also as an indicator of potential future achievements or impacts, over the long run.

Interesting examples from the Case Studies include the “porous boundary” around E-Advice’s spinout company Decision Technology, such that the company supports PhD students who work on relevant problems and former PACCIT researchers often consult or do collaborative work with Decision Technology. E-Drama university and Hi8us partners continue to look for funding for follow-on joint efforts and the PI of ROLLOUT and the knowledge intermediary BakeTran have won a joint CASE studentship from ESRC and are pursuing other joint funding. Looking across all the PACCIT projects, it is a significant result of PACCIT that three quarters of the respondents cited “enduring dialogue and networking” as an impact at some level, with nearly two-thirds of these seeing this as Achieved and most of the rest seeing it as In Progress. Slightly fewer, but still a majority at two thirds of the respondents, identified as an impact “enduring collaborative activity”, which would seem to be even more substantive as a base for future impacts. Half of these saw this impact as Achieved with most of the rest seeing it as In Progress. Somewhat less often perceived as an impact, perhaps because it was seen to be specifically tied to the completed project, was “enduring dissemination/other knowledge exchange activity”. Even so, well over half identified this as an impact, with more than half of these seeing it as Achieved and all but one of the rest seeing it as In Progress.

Taken together, claims for Enduring Connectivity represented a quarter of all impact claims made by survey respondents. Again, as seen clearly in [Figure 1](#), this and Cultural Change add up to well over half (about 60%) of all the impact claims. This proportionality may have implications for impact assessment, in terms of recognising these sorts of impact and in appreciating their presence in the short-term, when typically evaluations are conducted. Furthermore, it is not unreasonable to think that both these sorts of Impacts could be seen to pave the way for future impacts.

In considering the future, it may be worth noting that, as was evident at the most recent PACCIT workshop, future funding programmes appear to have been influenced to some degree by PACCIT --- this could be an impact that, as it were, “keeps on giving”.

### ***Phase 1 and Phase 2/3/LINK***

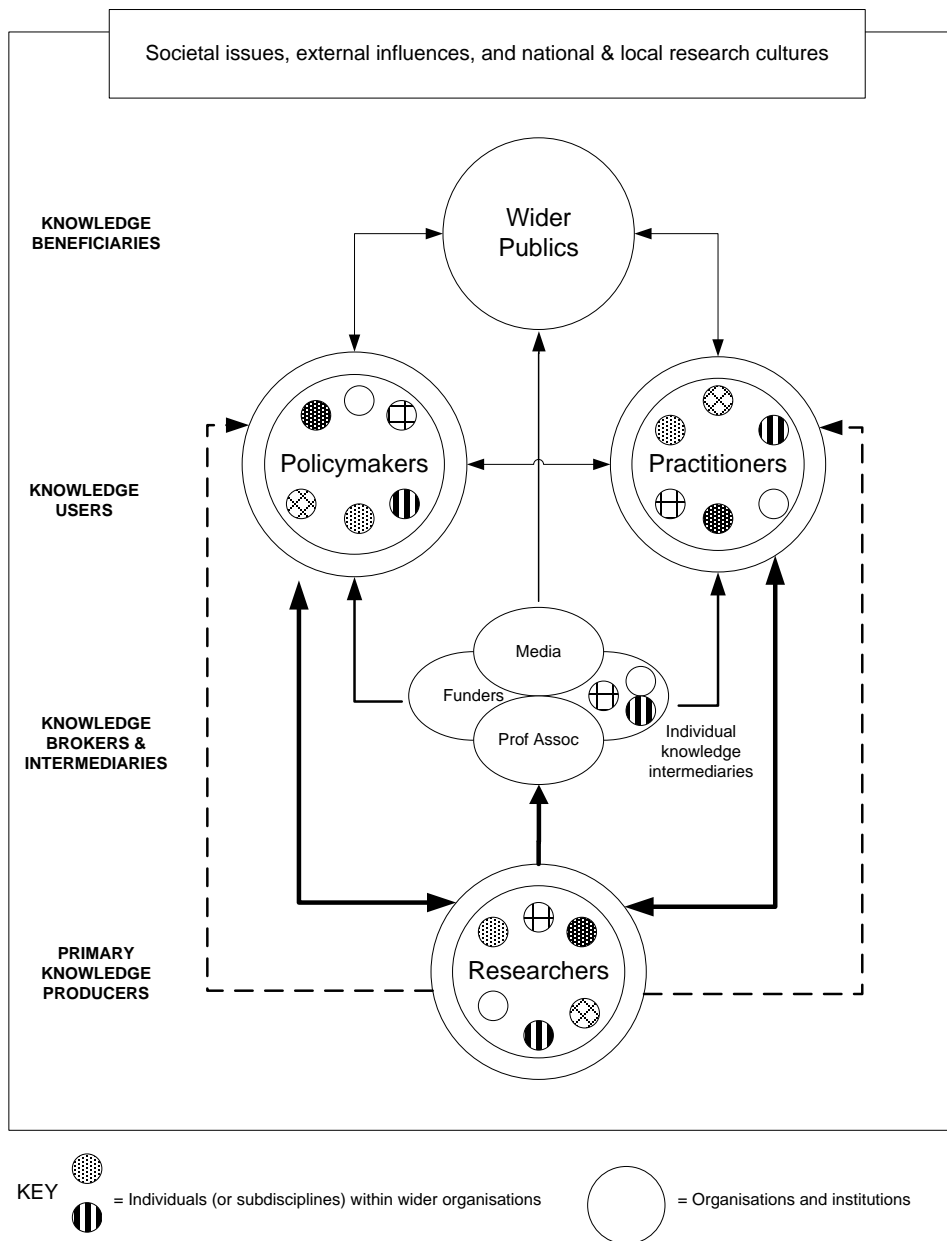
Some suggestive (rather than definitive) differences appear in detailed analysis of Question 5, breaking down answers on stages of Specific Impacts not only from the full dataset (N=47), but also from the respondents from Phase 1 (N=15) and the respondents from Phase 2/3/LINK (N=32). More non-academic impacts appear to be in the process of growing (In Progress or Beginning) from Phase 2/3/LINK than seem likely now to grow from Phase 1 Projects. In terms of impacts perceived by respondents to be Achieved, a greater percentage of Phase 2/3/LINK than Phase 1 respondents (differing by more than 10% ) perceived the following types: Uptake by industry; training/developing collaborative abilities among non-academics; increased willingness of academics to collaborate with non-academics; increased willingness of early career researchers to access KE opportunities; increased willingness of non-academics to collaborate with academics; increased appreciation in organisations of the value of knowledge exchange; increased facilitation of KE by universities & collaborating organisations. Although the last two types in the above bullet showed by far the greatest differential, increased appreciation and facilitation by Universities is a general cultural change in UK higher education and thus the higher percentage cited by Phase 2/3/LINK respondents cannot be fully ascribed to PACCIT but also to the general trend toward increased knowledge transfer. However, increased willingness of non-academics to collaborate with academics in Phase 2/3/LINK projects seems to be a positive reflection of the change in emphasis to industry collaboration in Phase 2/3/LINK. Interestingly, a greater percentage of Phase 1 respondents saw the following types of Impacts as Achieved: Uptake by practitioners/professions; enduring dialogue and networking. (However, the differential in percentages is less when all developmental stages, including In Progress and Beginning, are considered.)

## 5. DISCUSSION: PROCESSES AND ROUTES TO IMPACT

### Overview: Processes leading to Impacts

Research and impacts are connected by processes enabling flows of knowledge. In an article drawing upon an impact assessment of ESRC response-mode psychology awards (Meagher et. al, 2008)<sup>5</sup> we tested and refined the following model of flows of knowledge connecting key players (**Figure 6**).

**Figure 6**



<sup>5</sup> Meagher, L.M., Lyall, C. and Nutley, S. (2008), Flows of knowledge, expertise and influence: a method for assessing policy and practice impacts from social science research. *Research Evaluation* Vol. 17(3): 163-173



A general premise in both that study and this evaluation is that it is possible to learn important lessons about processes or routes to impact, key roles and other factors that facilitate or hinder impacts. Indeed, findings from this evaluation may prove particularly useful, as, unlike response-mode awards, the PACCIT Programme was focused thematically on subjects of real-world interest and in its later phases deliberately encouraged collaborative processes between academics and non-academics. By virtue of the way the PACCIT Programme was framed, it incorporated two of the factors which we suggested enhance processes leading toward impact:

- Value placed upon/incentives provided for generation of impact
- Injections of financial support, dedicated staff, infrastructure

And it explicitly encouraged several others:

- Two-way interactions between researchers and users
- Facilitating role(s) of knowledge intermediaries
- Communication/increasing accessibility of research.

This section discusses routes to impact; factors promoting impact generation; factors inhibiting impact generation; and solutions/good practice suggestions. The section will conclude with a discussion of how impacts may develop over time and the implications of these processes for sensitive impact assessment. This will allow consideration of the earlier study's suggestion that certain kinds of impacts-in-progress may be used as proxy indicators of enhanced likelihood of longer-term impacts.

## Routes to Impact

In our model, a number of different individuals play key roles in facilitating routes to impact:

- Knowledge producers (typically academic researchers although in collaborative Programmes like PACCIT non-academics may be involved in co-production)
- Knowledge users (in policy, practice or indeed the private sector)
- Knowledge intermediaries (funders themselves - particularly when promoting an interactive programme such as PACCIT, the media, professional associations and a wide range of individuals).

Clearly, even beyond researchers striving to do excellent research, different roles were played in implementing the PACCIT Programme and its constituent projects, as seen quite clearly in survey responses which highlighted roles of the Programme itself (and Director) as well as non-academic partners and knowledge intermediaries. The Case Studies clearly reflect the contributions of deeply involved non-academic partners and knowledge intermediaries.

## Programme

An obviously important role of the PACCIT programme, much appreciated by participants, was the provision of funding, acting in some sense as seed capital. Perhaps particularly for SMEs, this funding provided access to academic research that the non-academic partner would often not have funded directly itself. And, of course, probably all involved individuals hoped that they could accomplish enough through this project funding to lay the groundwork and create the credibility for other funding in the future. (Note: this is the "injection of financial support" positive factor.)

The Programme played a variety of additional roles (**Figure 7**). Interviewees noted that the Programme provided productive meetings and networking opportunities, working toward



building a sense of community among the academics. (The Programme also played a strong role in encouraging academic productivity, not the subject of this study.) The Programme also provided what was effectively mentoring, in part through ensuring that members of the Management Committee were familiar with the projects. (The Management Committee held 2-day meetings, with the Director providing project briefings and ensuring that the Committee heard from every project at its beginning and its end.) Overview interviewees were impressed by the efforts of the Programme Director, with one noting, for example, that, rather than telling people what to do, she highlighted potential; she elicited a sense of the richness of what they were trying to do, reflected it back and made suggestions regarding forward movement that they could understand. The Director and Management Committee members (assigned in a “buddy system”) visited individual projects, with hands-on mentoring and support in project management that were viewed as positives of the Programme. For example, one industry partner found it helpful that PACCIT sent a representative to meet with them. Another point of praise was Programme flexibility, helping to re-jig a project with a premise that was not working. The Management Committee itself appeared strongly committed to the Programme, with a fair bit of continuity across PACCIT Phases; it included diverse perspectives from industry and academia.

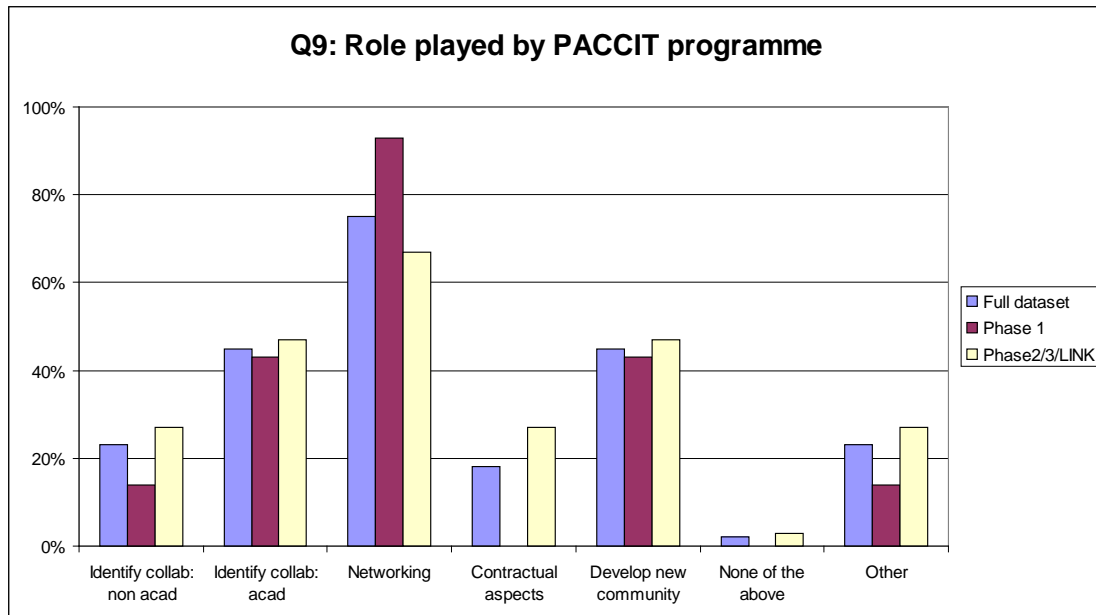
The joint workshops organised by the Programme/Director were regarded as very valuable. One overview interviewee noted the importance of the Director’s role in this regard, in contrast to what usually happens: “Too often (in research programmes), no extra work is done to exploit synergies or to pull out common implications from a set of projects”. Numerous non-academics participated in these workshops, which covered a variety of themes or areas of relevance to different sorts of non-academics. (PACCIT Programme-wide activities included: two networking seminars per year, six additional workshops on specific topics (e.g. media training), several Programme events led by researchers, at least one major user engagement event per year.)

Opinions varied as to the role played in the Programme by DTI, with some seeing it primarily as the generator of vast amounts of paperwork but a few mentioning times when it was helpful, e.g. in helping to find replacement non-academic partners during the programme. The view was often conveyed that DTI was not deeply involved.

Survey respondents selected from among a list of possible roles played by the PACCIT Programme in helping projects to develop impacts. By far, the role seen by most individuals (three-quarters) was help in ongoing networking. Credibility, identification of academic collaborators from other disciplines and development of a new community were also mentioned frequently. In effect, the Programme provided some degree of injections of dedicated staff, infrastructure, as a positive factor. One intriguing additional role was suggested: “While much of industry is concerned with understanding its own business space, e.g. healthcare, financial services, manufacturing, the PACCIT programme is useful if it can encourage cross-industry participation. For example, ICT concerns in financial services are very similar to other sectors, with context being the only differentiator.”

When asked about the roles played by the PACCIT Programme in helping projects develop impacts, 44.2% of those responding to this question said that it provided “help in developing a new community/sense of identity across projects”. In response to a similar question about the roles played by the non-academic collaborators or other knowledge intermediaries, a lower percentage of 29.5% of those responding saw these individuals (whose activity of course was catalysed by the Programme) as providing “help in developing a new community/sense of identity across projects.” There is no documentable evidence on the likelihood that the community would persist to the point of generating further activities without public funding support. (One or two individual projects mentioned trying to carry on small meetings with non-academics post-funding, but made it clear that this was very burdensome.) It was observable that the very last post-Programme PACCIT workshop had a

far smaller attendance than in-Programme workshops. The academics know each other and may well run into each other more often, as this emerging niche tying together computers/IT with people and behaviours consolidates. It is quite reasonable to think that a narrow sense of community would continue in niches rather than being spread across the PACCIT programme that had such diversified stakeholders as bakers and game producers. Indeed, some projects show enduring connectivity, such that the involved academics and non-academics are staying in touch. Since the Programme brought some academics and some industry/policymakers/practitioners together, it is possible (no quantification is possible) that the programme slightly accelerated users' incorporation of consideration of people and behaviours into product/policy/practice development.



**Figure 7: Roles played by PACCIT Programme**

### *Projects, PIs, academic researchers*

Academics, PIs or other key researchers, clearly played the central role of conducting research. Some were also quite involved in collaborative activities or communication. One individual, the PI or sometimes someone else, would usually act as project manager. This role was important, but not a trivial burden. For example, one industry partner when asked to reflect on processes noted with approval their quarterly team meetings. At least one project was assisted by a business manager within the university, which helped, for example, with financial matters. An unhappy role for academics was that of handling what was often seen as overly burdensome bureaucratic and paperwork requirements such as quarterly reports to funders. Sometimes an academic (particularly if the individual had another dimension in his or her background) served as a knowledge intermediary liaison between different partners/participants in the project. In any event, as illustrated in the Case Studies, the PI needed to be able to forge partnerships, either interdisciplinary and/or between academic and non-academic partners. For example the E-Advice case study demonstrated the power of an effective two-way partnership, with the non-academic collaborator as knowledge intermediary linking the academic to the private sector even as the academic brought the non-academic into the world of research.

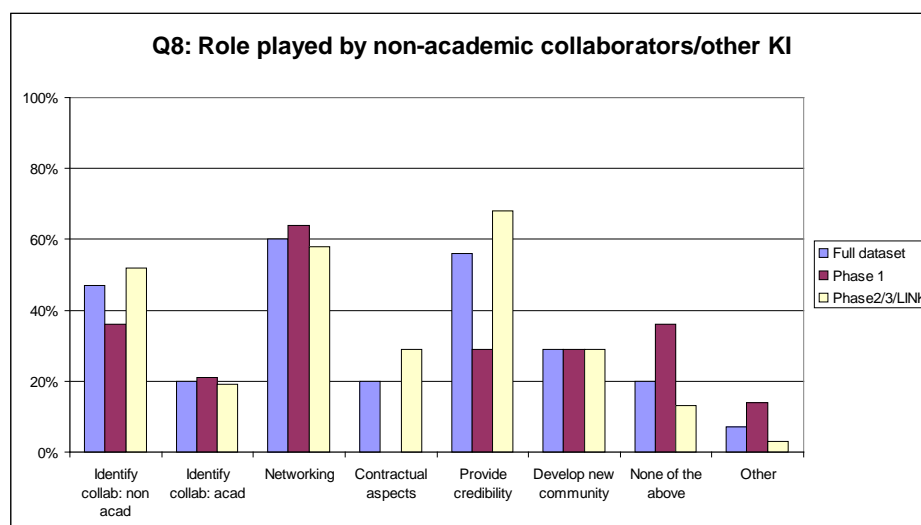
## Non-academic collaborators, Knowledge Intermediaries

Non-academic collaborators played various roles. Some were closely involved with their project, others were a bit more distant. Some offered tangible input, such as software, or other help, such as access for trialling of prototypes (e.g. in schools). Numbers of non-academic collaborators varied per project; for example, one project had 10 company members in a consortium, plus an RTO knowledge intermediary; other projects worked primarily with just one or two non-academic entities or individuals. An issue raised quite frequently was that of change – in a non-academic organisation’s priorities and/or in the liaison assigned to the project, such that champions were sometimes lost. The role played by knowledge intermediaries may be of particular interest. In the ROLLOUT case study, for example, two individuals in an RTO, coming from a research background with extensive experience in an industry sector, made a point of figuring out how one could apply academic understanding to their industry. In the Making Games Case Study, it was clear that three members of the project team were Knowledge Intermediaries, each with boundary-spanning understanding of others’ worlds. The knowledge intermediaries involved in ROLLOUT were seen as critical in bringing together a baking industry consortium with academic research; those knowledge intermediaries are still working with the PI.

Survey respondents were asked to select all roles played by the non-academic collaborators or other knowledge intermediaries (**Figure 8**). The two roles selected most often (by more than half, but less than two-thirds of the respondents) were:

- Help in ongoing networking (with other academics, disciplines, and/or non-academics)
- Help in providing credibility (with home institution, non-academics, and/or funders) (An interesting divergence exists, with a far greater percentage of Phase 2/3/LINK than Phase 1 respondents citing this)

Not surprisingly, a higher percentage of Phase 2/3/LINK respondents than Phase 1 respondents cited Help in identifying potential non-academic collaborators and Help with contractual or other components of growing/maintaining lasting relationships with non-academic collaborators. One individual identified an “other” role that might have also appealed to additional respondents, had it been offered as a choice: “help in providing test beds for our ideas.”



**Figure 8: Roles played by Non-academics**

## Factors promoting impact generation

### Facilitating Factors

Case Studies illustrated the function of various factors facilitating generation of impacts, many of which not surprisingly have to do with relationships and relationship-building. E-Advice, for example, stresses the mutually respecting, two-way interactions that characterise not only the project but now also the spinout company stemming from it, which continues to have a “porous boundary” between academia and the private sector. Trust-building, through regular meetings and periodic co-location of prototype developers, facilitated the outcomes of E-Drama, as another example. Continuing dialogue between the researchers and the principal corporate partner was seen as critical.

Survey respondents were asked to select all facilitating factors that applied in their case, helping the generation of impacts (Figure 9). By far, the most often-cited factor was the straightforward “injection of financial support”. This was followed by “two-way interactions between researchers and non-academics”. Far behind were mentions of “provision of other incentives for generating impacts” (7%); this suggests that the PACCIT funding may have had to act primarily on its own in nearly all projects.

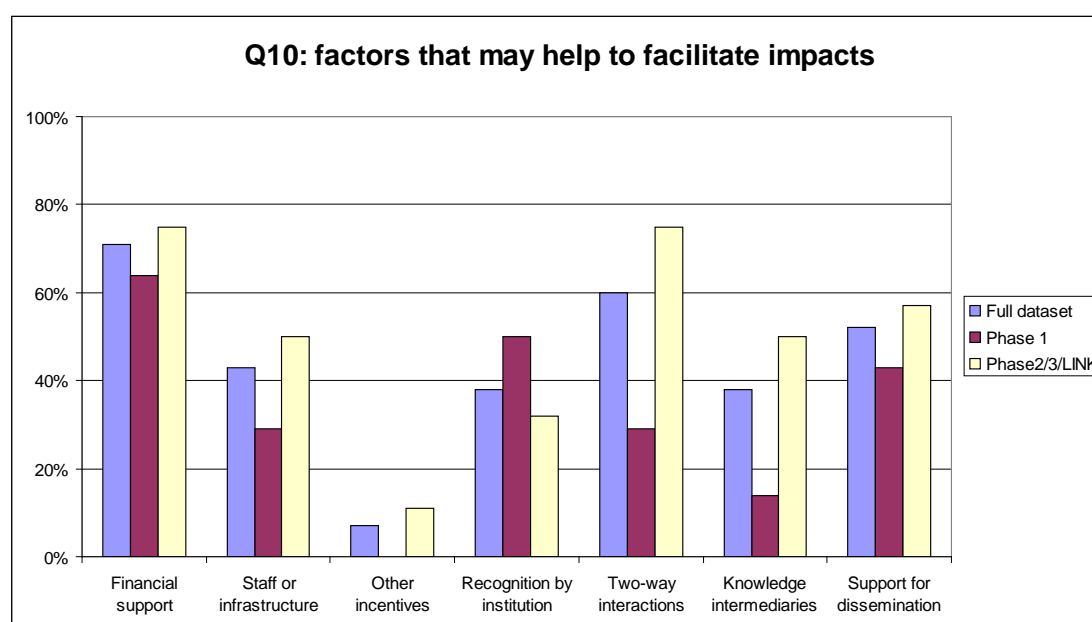


Figure 9 Facilitating Factors

Interestingly, when thinking about facilitation of impacts, a far higher percentage of Phase 2/3/LINK respondents (75%) selected “two way interactions” than did Phase 1 respondents (29%); perhaps because the Phase 2/3/LINK respondents were thinking more along the lines of generating non-academic impacts. Similarly, a higher percentage of Phase 2/3/LINK respondents (50%) cited “Knowledge intermediaries” compared to only 14% of Phase 1 respondents. In fact, percentages of Phase 2/3/LINK respondents were higher than percentages of Phase 1 respondents for all factors with the exception of “recognition by institution”, cited by a full 50% of Phase 1 respondents – the second highest of their choices – but by only 32% of Phase 2/3/LINK respondents.

## Factors inhibiting impact generation

### Overview

The innovative PACCIT Programme was set up deliberately to tackle key challenges, both in terms of research --- interdisciplinary efforts in rapidly emerging or evolving fields—and in terms of bridge-building between academics and non-academics. Survey responses shed light on obstacles and issues encountered in addressing PACCIT’s challenges (**Figure 10**). Appreciation of obstacles standing in the way of generating impacts from PACCIT research may help improve understanding of the processes leading (or not) to impacts. Although unfortunately far fewer (half or less) answered this question than the previous questions, a general proportionality of views can still be seen. By far, most cited “obstacles in maintaining/growing connections and/or knowledge exchange processes that lead toward impacts” --- the basic core of requisite activity. Other than the attribution obstacle, obstacles were selected by a higher percentage of Phase 1 respondents than Phase 2/3/LINK respondents, with “building connections” the most divergent, perhaps indirectly illustrating success of PACCIT at helping to address this obstacle.

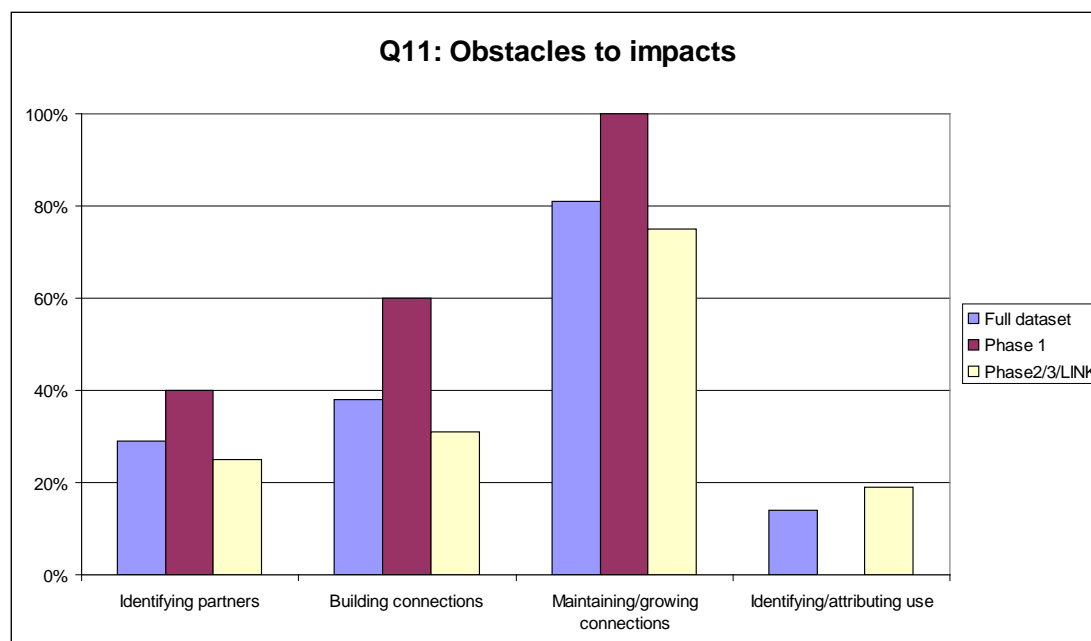


Figure 10: Obstacles

Interestingly, although relatively few respondents answered this question, about two-thirds of those who did so felt strongly enough to offer free text comments. These are clustered below, along with highlights from overview and case study interviewees.

### Post-project Chasm

*Lack of follow-on funding and the time/effort it could support* was the most often cited obstacle when people considered generation of impacts. “Time and money”, one person said succinctly, with another saying “We would probably need more time (and funding) to generate a greater impact”, and another singling out “continuing funding”. Another illustrated this same point by noting specifically that contract researchers in particular have to move along to their next project, if there is no funding for follow-on work. Another’s broader

“The underlying problem was that the direct short-term benefits to the industrial partner (a SME) were too small to really justify their effort. Very roughly speaking, accounting cycles run to much shorter time frames than research.”

“One problem that we encountered in trying to make the shift from academic research to product development was that we were unable to get our product demonstrators advanced sufficiently for a company to take them on board. However, this was as much a fault of the project team as any absence of funding.”

reflections shed light on a gap that might benefit from further support, along the road to impacts: “Lack of longitudinal funding for both academic and non-academic partners to nurture and develop impacts has, at times, led us to chase the next funding opportunity at the expense of building more directly on the foundations of the project findings, outputs and relationships.” Another noted desire for “following up opportunities generated with industry at the end of the project” and that it “seems ironic that there is an emphasis on the impact of funding, and there are many associated impacts in this case without funding that could/should be followed up.” A similar comment was made that an obstacle lies in “running out of funding to finalise project - ongoing collaborations only provide funding (or part funding) for academic partners - we can't move project on without external funding as we need to market and sell rather than refine.” This sudden drop-off, in nearly all cases before commercialisation could realistically be achieved, was also noted by overview interviewees. It is of interest in this regard that several projects got as far as a working prototype, but either because the product-in-progress did not make sense commercially or because there was no funding to develop it further, the prototype did not turn into a tangible “impact”.

Perhaps the most important problem lies in surmounting the gap between research findings and actual uptake, *getting findings to the stage at which a user can utilise them* readily.

The *need for follow-on investment* noted by an overview interviewee is that even potentially applicable projects can end up somewhere in a no man's land, in part because many companies did not understand that the money they put into the project was “the tip of the iceberg” of what would need to be spent to commercialise a finding. Funders were seen by some project interviewees as overly optimistic in what could be achieved within the timescales and budget of the project, not realising the difficulties involved in introducing high-end, high-specification technology into the commercial world.

At least three case studies stressed this problem.

- 1) For example, a case study project resulted in a good product and related teaching materials, but there was no funding to continue the partnership for the commercial partner. Despite various attempts, this lack of follow-on funding has limited the exploitation of collaborative abilities and access to post-project knowledge exchange opportunities. This was felt to reduce the non-academic impacts that the project (and indeed PACCIT) might have had.
- 2) Similarly, in a case study in a completely different industry, an observation was made that companies thinking of exploitation as 3-6 months down the line would probably have liked the project to generate a neat product or readily exploitable IP. One industry project interviewee reflected that, despite having recognised theoretically that research is a leap of faith, he still thought it would have been nice to have something tangible come from the project that could be used, perhaps with only an additional £10-20K for tailoring a prototype to the needs of a particular company. Yet, many in the research world would feel that the project went a long way toward being applicable, as much so as it could be expected to, given its finite duration and its academic environment.
- 3) Finally, an industry partner in a third case study project said feelingly: “ It seems generally that a lot of funding sources want to give money on a commercialisation theme, but when it gets to the point of being interested they say ‘cheerio; and leave. Yet there is a big gulf of research that needs to be done to see if something that seems to work on a small scale ... could actually go on to be commercialisable, so things like bigger trials need to take place before a company could be prepared to take the commercial risks.” Although this SME tried quite hard, it could not find money for this bridge between interesting research project findings and the ability to take an informed risk on



commercialisation. “Had the project been funded all the way through it could have had much more of an impact.”

### Priorities: Post-Project Support

Survey respondents were asked to select the most important from among six types of actions that funding bodies could in theory employ to facilitate the generation of impacts from research, while also continuing to promote research excellence (Figure 11). By far, the single action selected most often was chosen by more than half of the recipients:

- Follow-on funding for knowledge exchange/dissemination or further research collaboration (52%).

Funding bodies may want to consider this possible action quite seriously, given the emphasis placed upon it by respondents. Both Phase I and Phase 2/3/LINK respondents selected this action most often. In addition, the related “Help with follow-up” was selected by over 10% of both of these groups, or 12% of all respondents. Together, these represent nearly two-thirds of the responses, suggesting that there may indeed be critical interventions that funders should play post-project if desired levels of impact are to be achieved.

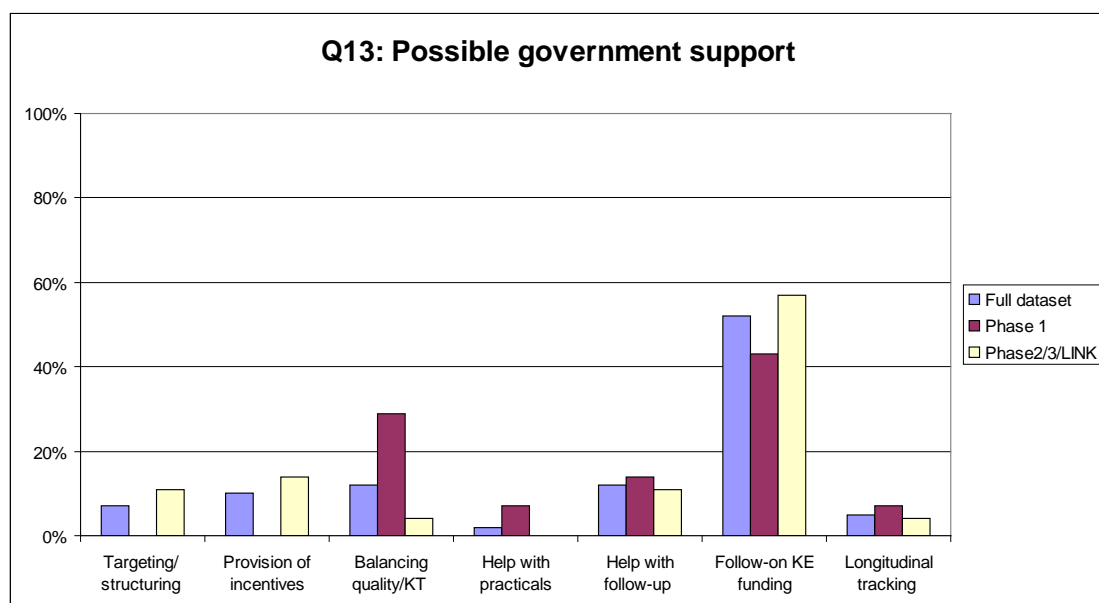


Figure 11: Possible Government Support

### Timing

Regarding *issues of timing and innovation*, an overview interviewee suggested: “Research Council-funded university research cannot be where the market is, or the market should carry it, BUT research has to seem to be exploitable. So, typically by the end of the project there is a problem, the work gets somewhere beyond proof of concept, maybe as far as a reasonably robust demonstrator prototype, BUT there is no chance of taking it to market.” This gap can be increased if early non-academic champions are no longer in post to “remember” the need for further investment and/or to shepherd utilisation in their organisation.

*Timescale mis-alignment* was observed by another respondent: “Time-scales are a problem. Academics tend to work on a time-scale of years, and not mind if a project takes 1-2 years to

get off the ground. Companies (at least in IT) work on a much faster timescale; if they think something is a good idea, they want to start working on it right away.” Overview interviewees noted this obstacle as well. Interestingly, one case study project interviewee had the opposite view of a mis-match: “As academics, we like to respond quickly to what is happening and move along with the technology in what is happening, and not have a very fixed plan and we value agility. However, this didn’t work particularly well for a business that has to be producing things to deadlines with certain amounts of money ascribed.”

### ***Opposing pressures***

A basic tension created by *opposing pressures* was identified as an obstacle: “The impediments to PACCIT are probably structural in that academics must also spend much of their time publishing in scholarly journals which is often at odds with the interests and concerns of industry.” Overview interviewees also noted this tension, for example: “It is a difficult position to put an academic in, thinking of research management, --- they are expected to do excellent research and also to figure out what area of growth would be good for industry and also to select an industry partner that will be a winner. Many companies go belly-up; it is very difficult to ask an academic to learn how to predict that.” While one case study project led to some very respectable, even award-winning academic publications, an interviewee still underscored the gap into which this sort of work can fall – not quite yet commercially credible, but still appearing too “applied” to be accepted by some mainstream academic journals. This tension was reflected for example by a project interviewee who had been a “next generation researcher” during the project describing a slight sense of uncertainty as to what should be driving the work he was doing – academic or commercial aims.

*Interdisciplinarity* itself posed a related tension, described in this way by an overview interviewee: “The RAE did not help encourage people to work at the boundary. The low risk strategy for an academic is to produce papers in the middle of their own research community, where you’d been successful (and which would count well toward the RAE 5\*); so there is a cost to working with each other in different disciplines. This programme supported people working toward the boundary but there was still some inertia; there were still multiple pulls on people. Yes, two Research Councils providing funding helped, but still—it’s a riskier path”. This risk is particularly dangerous for academics in the early stages of their career, as described with feeling by a project interviewee who felt strongly that interdisciplinary working is highly regarded in theory but in practice it can make it difficult for early career researchers to position themselves within existing disciplinary and institutional structures or to generate further research funding.

### ***Practical difficulties***

*Bureaucratic burdens* (e.g. tracking) were seen to comprise an obstacle. (Overview interviewees also saw this burden, with many appreciative of the work the Director had to take on. “This must have been one of the most complex programmes to manage.” In part this was due to multiple funders, with DTI requirements and ESRC requirements not well-hybridised. Not only academic partners, but also small and even large company partners found DTI’s paperwork “over-zealous for the size of the project”. For example, one non-academic SME partner interviewee noted angrily that his firm had had to pay an accountant specifically to fulfil DTI’s paperwork requirements and that this was not deemed to be an allowable expense against the grant. Not just the accounting, but even the regulations concerning match funding can be problematic, as another partner interviewee noted: “Commercial match is a dark science and needs to be simplified, particularly for SMEs”.

*Legal and commercial difficulties*, including risk aversion, can pose problems in working with companies. Despite DTI’s insistence on upfront IP agreements, some tensions arose.



Another problem was continuous corporate change: “Changes in personnel and/or corporate reorganisation made sustaining links difficult beyond the end of the project.” While noting that the formal LINK contracts helped to keep things going, overview interviewees also raised this transitory element as one of many external factors (like the marketplace) over which academics can have no control. “At times a project could really want to be a good citizen and try to do everything right, but still other factors kept them from commercial fruition.”

## Possible solutions to challenges and good practice suggestions

As another way of looking at facilitating factors, survey respondents also offered possible solutions to obstacles and issues raised. *Extra resource*, in person time or money, could provide solutions to several obstacles:

- Pursuit of other funding such as Knowledge Transfer grants for collaboration with non-academics.
- “Dedicated resources for full time project management getting SME / non academic parties at an early stage on what the SME can contribute and benefit.”
- “An extra pot of funds to support collaboration with practitioners may have been useful. For example, we could have paid a temporary member of staff to help with the organisation of colloquia and other networking events.”
- “Provide some level of funding for contract researchers to enable better dissemination and other follow-up work following the end of the 'active' project.”

*Communication and development of effective relationships* were recommended as ways of addressing some problems inherent in these multi-partite efforts:

- “Cross disciplinary/cross party project have problems in that they need to negotiate different constructions of world, frames of reference and terms, criteria for success and failure, perceived rewards and penalties for particular approaches.”
- “Essentially greater dialogue is required between stakeholders at all levels to ensure that the obstacles are overcome. Also, (you) need to recognise when you are flogging a dead horse. For example, because of radical staff changes within an SME partner, it became apparent that any further exploitation of the project results within this partner was infeasible.”
- “We were most successful when we were able to target problems identified by companies. The need to offer tangible benefits to companies was a major problem and limited the range of possible non-academic partners.”
- “Maintain a strong collaboration with a key player in the target sector.”

Some reminders were given as to academic core business, e.g. “publication of findings”:

- “In truth, our solution was to focus on the basic research since in our case that was clearly the best way to achieve a long-term impact for the work”.

Overview and case study interviewees, as well as survey respondents, offered a variety of “lessons learned” and recommendations of good practice for those involved in ambitious PACCIT-like programmes in the future. Detailed integration of overview and case study interview and survey input on good practice is provided as a resource in [Annex H](#). These suggestions fell into the clusters indicated for:

- **leaders/steering groups of Programmes**
  - Positives & Negatives
  - Duration
  - Practicalities
- **academic project leaders and researchers**
  - Project Management
  - People Management

- Managing Approaches & Resources
- Planning for Change
- Postproject Activity
- **nonacademic collaborators**
  - Management & Collaboration
  - Challenges faced by Nonacademic Partners
  - Communication
- **funders**
  - Priority: PostProject Support to Transform Research into Impact
  - Practical Points
  - Evaluation
  - Good Practice.

Rather than recapitulate this detailed Annex, just a few illustrative highlights will be noted here.

Not surprisingly, a great many process-based lessons learned had to do with *practicalities of project and people management*, including handling challenges of communication across disciplines and across academic/non-academic partners.

Given the importance of the “post-project chasm” that was often highlighted by case study interviewees as an obstacle in the path of impact generation, it is worth re-emphasising that two-thirds of survey respondents commended as the most important actions for funding bodies: “*Follow-on funding* for knowledge exchange/dissemination or further research collaboration” and “Help with follow-up”. From across different methods, therefore, this would seem to be participants’ strongest recommendation to future funding bodies interested in generating impacts from research.

Recognition of *the importance of intangible impacts* or stages of development over time was encouraged by interviewees and survey respondents. For example, an interviewee asked: “Do the funding bodies really recognise the power of this sort of intangible change and how to encourage it further?” Appreciation of the *long-term nature of impact manifestation* raised suggestions regarding sensitive evaluation of impacts, such as: “Take a longer term look, trawl for examples of benefits of this kind of mechanism, this style of interaction.... Expect to evaluate the Programme in a slightly different way, rather than just a judgement at the end... the funder looks at outputs too quickly, now.”

### Usefulness of proxy indicators in capturing processes that take place over time

Even beyond looking at types of impacts, a fine-tuned appreciation of developmental dynamics can illuminate *progress toward* various sorts of impacts, not just “finalised” impacts. This is particularly useful given that impact assessment inevitably takes place before all impacts have materialised. There are thus implications for impact evaluation and indeed perhaps also understanding of how key aspects of developmental processes might be enhanced. Findings from PACCIT may thus be useful in other impact assessments.

Both academic and industry interviewees with an overview perspective were well-aware that many impacts may be a long time coming and that when ESRC or others look for impacts at the end of a programme it is too soon. An example of a specific suggestion for finding more subtle impacts was to look at what sorts of proposals, with what sorts of collaborators, project participants submit to funders even 5-10 years after the end of the project.

Case Study interviewees were also aware of the long-term nature of many impacts, with one academic emphasising, for example, that while the project findings were not finished into

“These things are slowly won”.

(Academic overview interviewee, considering culture/attitude changes in both academic and non-academic partners, also stressed length of time scale)

“There is a ‘slow burn’ effect I am noticing and I think the project is likely to have a greater impact in the next few years than in the time immediately after it officially finished”

“It’s too early to say it hasn’t happened”

actual products, that could still happen. Many Case Study interviewees, both academic and non-academic, lamented the absence of funding that could have taken PACCIT research further toward commercialisation, perhaps particularly a problem for SMEs. While many researchers are still involved in collaborative research, even directly follow-on research, there is no guaranteed short path to definitive impacts. Increased awareness can take a long time among policymakers, for instance, and depending on the nature of externally influenced “windows” of opportunity and interest, research may have to wait a long time before impact. One researcher illustrated this point with current attempts to weave project findings into current policymaking, two and a half years after the project’s end, when a policy window is invitingly open. This interviewee felt better positioned to influence policymakers due to the PACCIT project and related reputation-enhancement.

In general, interviewees appeared comfortable with the idea of impacts developing over time, through stages. The observation was made that the earlier Cognitive Engineering programme was necessary as a precursor stage for PACCIT, as it helped different disciplines come together and build interdisciplinary capacity and communication, paving the way for the PACCIT funders to work together on the interesting gap between Human Computer Interaction and social science/psychology.

For purposes of this study, in particular stimulating and gathering insights from survey respondents, it is helpful to think in terms of stages of development of impacts, but of course this is an ideal. In reality, processes are messy and uneven. It is useful, however, to get an indicative sense of the topology of impact development, even knowing that things do not need to proceed neatly in a linear fashion through each of these stages in order. Survey respondents were asked about five “stages of development”<sup>6</sup> representing different intensities of connectivity between research/researchers and non-academics. These were:

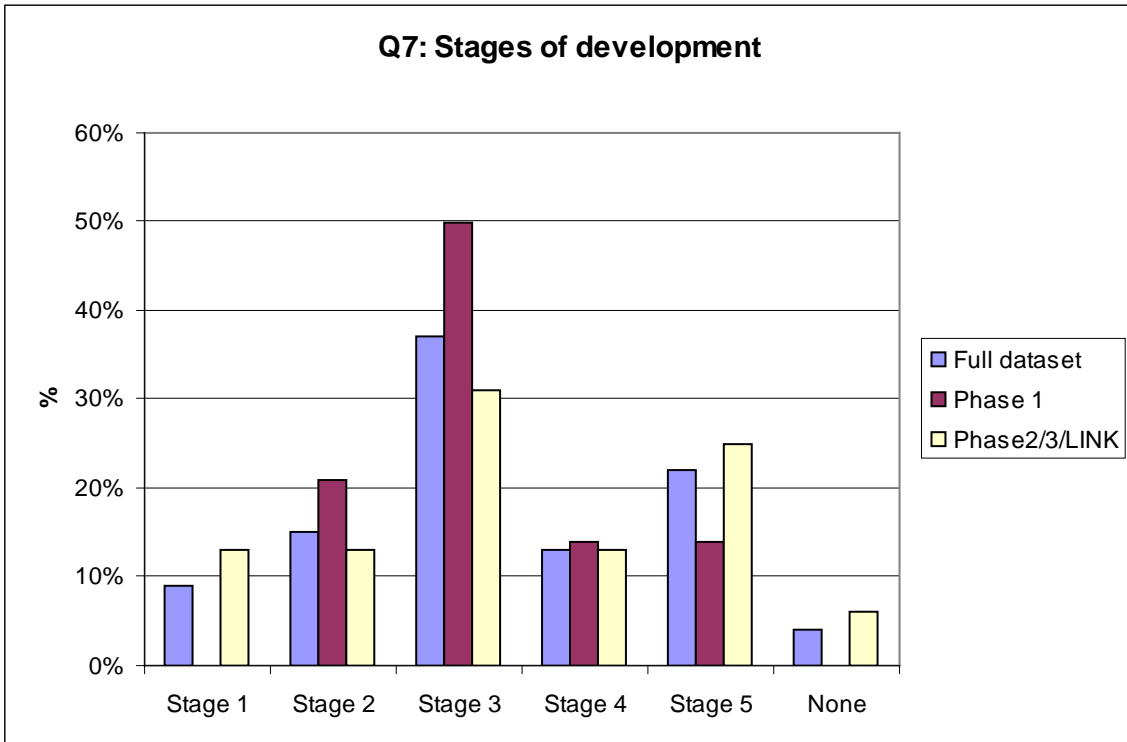
- Stage 1 (Dialogue/networking between academics/non-academics)
- Stage 2 (Joint knowledge exchange activities (e.g. workshops, training, reciprocal visits) between academics/non-academics)
- Stage 3: Active ongoing collaboration (e.g. follow-on research, new pilot projects)
- Stage 4: Utilisation of research IDEAS (e.g. informing new policies or company research strategies)
- Stage 5: Utilisation of research FINDINGS (e.g. impact on policy/practice, or use in development of new products)
- None of the above.

When survey respondents provided their view of the *overall* level of post-project impact, in terms of “stages of development” achieved so far, PACCIT makes a strong showing (**Figure 12**). Over a third cite one or the other of the two “utilisation” stages (Stages 4 and 5) and slightly more cite Stage 3, “active ongoing collaboration”. This would seem to bode well for future impacts.

It is interesting to compare stages of development from the earlier Phase 1 with the subsequent Phases 2/3/LINK which, while finishing more recently, had taken place within a context of more emphasis placed on knowledge exchange. Perhaps not surprisingly, a noticeably higher percentage of the individuals in Phases 2/3/LINK than in Phase 1 felt their project had reached Stage 5, with Stage 4 selected by about the same percentage of each Phase.

“PACCIT was an important initiative that may have some of its most significant impacts over the longer-term.”  
(Survey respondent)

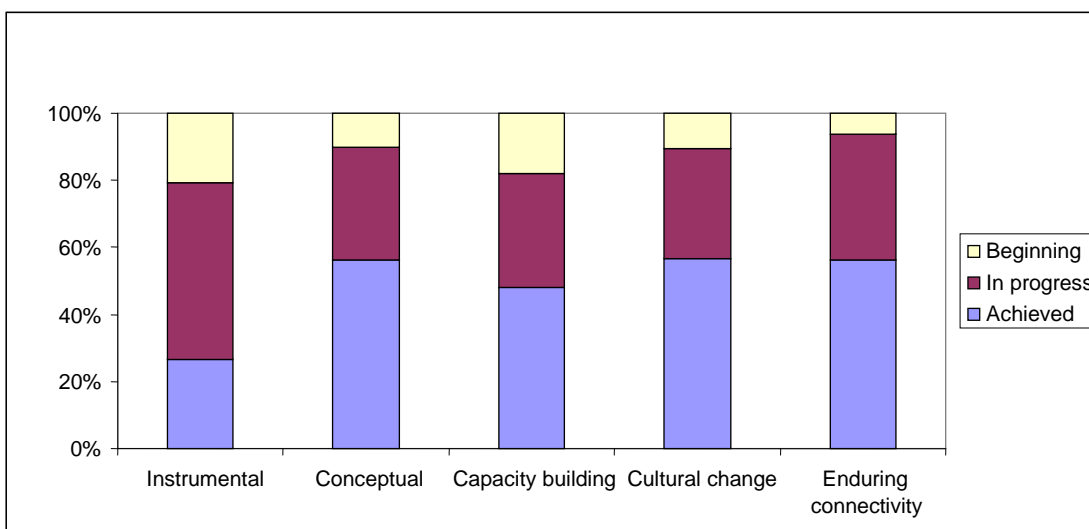
<sup>6</sup> By using the term “stages of development” we are not implying hard-and-fast linearity, but these are the elements we identified, which often although not always are sequential.



**Figure 12: Stages of Development**

Stage 1= Dialogue/networking between academics/non-academics  
 Stage 2= Joint knowledge exchange activities  
 Stage 3= Active ongoing collaboration  
 Stage 4= Utilisation of research IDEAS  
 Stage 5= Utilisation of research FINDINGS

From these survey results we can also analyse respondents' assessment of what types of impacts they have been able to achieve and whether that impact had been "Achieved", was "In Progress" or was "Just Beginning" (**Figure 13**).



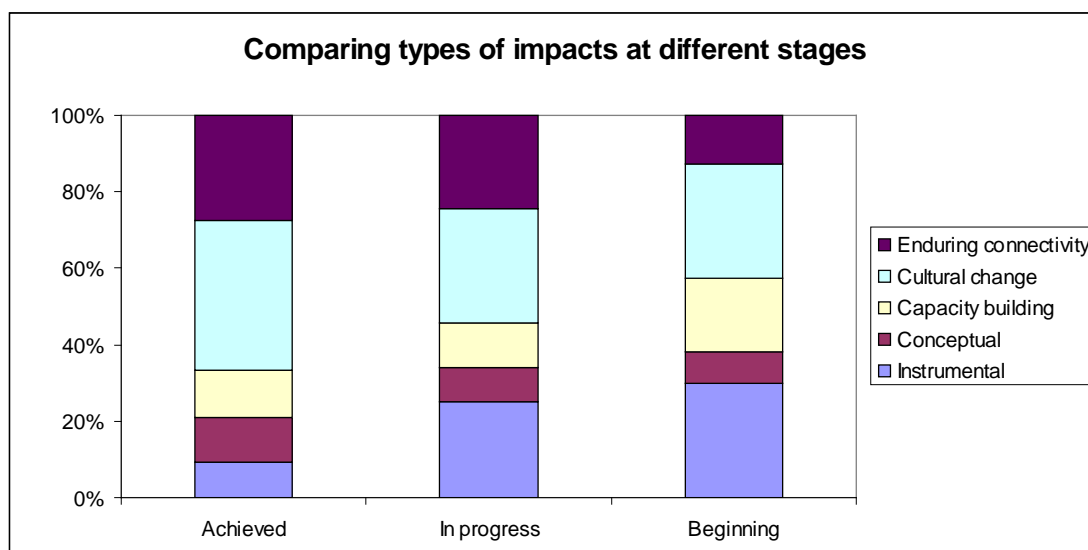
**Figure 13: Comparing types of impacts achieved<sup>7</sup>**

<sup>7</sup> Percentages for a category calculated based on number of respondents for that category.

The type of impact with the most striking divergence between the percentage Achieved and Just Beginning are Instrumental Impacts, coming in at only 9% of Achieved Impacts, but 29% of Just Beginning Impacts (and 25% of Impacts in Progress). In contrast, Conceptual Impacts represent a stable –and low-- proportion at all stages (11% Achieved, 9% of both In Progress and Just Beginning Impacts). While it is possible that these Conceptual impacts are not occurring, it might also be possible that they are so elusively intangible as to make individuals unwilling to “claim” them formally. Capacity Building too is relatively stable, although at a higher level, and with a slightly higher percentage of Just Beginning Impacts (13% of Achieved, 12% of In Progress, 19% of Just Beginning).

The more subtle impacts of Cultural Change and Enduring Connectivity actually emerge as proportionately very significant at each stage, together ranging from 43% (of Just Beginning Impacts) to 54% (of In Progress) to a full two-thirds, 67% (of Achieved Impacts). Cultural change, toward attitudes conducive to future collaborative knowledge exchange processes, represents 39% of Achieved Impacts, and 30% of each of In Progress and Just Beginning Impacts. Enduring Connectivity, various ongoing interactions between academics and non-academics, appears as quite a high percentage of Achieved Impacts (28%) and of In Progress Impacts (25%), and (therefore, perhaps) less of Just Beginning Impacts (13%). These two sorts of impacts bear strong implications for future manifestation of perhaps even more tangible impacts stemming to some degree from the PACCIT Programme.

When considering the three stages (Figure 14) it is possible to see this same pattern slightly differently, particularly noticeable is the high percentage of Achieved Impacts that are Cultural Change or Enduring Connectivity.



**Figure 14: Comparing Types of Impacts at Different Stages**

In short, a fine-grained examination of PACCIT impacts at various stages of development may provide helpful insights in framing realistic expectations for what might be found in other impact assessments taking place soon after the end of funded research. Indeed the confidence with which involved individuals attribute causality to shorter-term impacts falling under the rubric of Cultural Change and Enduring Connectivity suggests that such path-paving impacts may be particularly useful as proxy indicators of an enhanced likelihood of other, longer-term impacts.



## 6. CONCLUSIONS, RECOMMENDATIONS & ASSESSMENT OF EVALUATION APPROACH

### Conclusions

A substantive set of impacts has been achieved by PACCIT, reaching across multiple sectors in industry, policy and practice<sup>8</sup>. Multiple types of impacts were generated and even those that are recorded as still just beginning or in progress are, nonetheless, important:

- Instrumental
- Conceptual
- Capacity-building
- Cultural Change
- Enduring Connectivity.

The 30 projects are highly individual, varying not only in subject but also as to the sorts of impacts (if any) each generated and the extent to which those impacts were fully achieved by the time of this evaluation. Five detailed Case Studies were employed to convey the heterogeneity of projects and impacts. Just the highlighted non-academic impacts (let alone the numerous other non-academic impacts captured in the Case Studies) ranged from:

- the development of a working software product by Making Games, that is now used in over 200 schools
- the spinout of Decision Technology, a company with some 10 employees, by E-Advice
- the development of a working prototype showing the impact of e-drama in schools, by E-Drama
- Ongoing collaboration, including a CASE studentship and absorption of new understanding, between the lead academic and the private sector knowledge intermediary involved in ROLLOUT
- Raising awareness and movement toward influencing policy on education technology, in the case of HOMEWORK.

Survey responses were particularly helpful in gaining understanding of the varying degrees to which different impacts have manifested themselves across the Programme. This has implications for approaches to impact assessment; for example, since Cultural Change Impacts and Enduring Connectivity Impacts appear to be visible and attributable to the projects relatively early, they may be useful as proxy indicators of healthy processes, attitudes and connectivity likely to lead to other impacts in the longer-term.

Given that the conventional wisdom regarding even the highly targeted investments of extremely goal-oriented venture capitalists is that, when good luck and conducive external factors combine with informed investment, still only one out of ten is likely to succeed --- the number of successes afforded particularly by the 17 later Phase, LINK and LINK-like projects (which involved some 41 non-academic collaborators) represent a successful portfolio.

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<sup>8</sup> Purely "public" awareness, for example in terms of media coverage, appears to have been limited.



Thus we would affirm that the Programme has indeed contributed to the following two of its stated objectives:

- “To encourage the application and exploitation of new research insights in the development of more effective IT systems and products, by supporting projects which involve commercial or industrial collaborators. Better-designed IT products should lead to a growth in the market and increased uptake by wider constituencies of users.”
- “To disseminate new understandings to users and choosers of systems. By increasing public and professional awareness of cognitive and social factors that are at the centre of design problems and what can (and cannot) be achieved by good cognitive design practices, demand for better systems will be stimulated. This would reflect a shift from judgements of IT systems based on the number of features of the system to judgements based on the effectiveness for the user(s) requirements.”

Evaluation of the PACCIT Programme illustrates clearly the importance of capturing diverse sorts of non-academic impacts, beyond the obvious tangible Instrumental Impacts. The Programme has also led to Capacity-building Impacts, including the ability to work across the academic/non-academic boundary. Indeed, connectivity between academics and non-academics has been the hallmark of the later Phases of PACCIT. Broad networks and direct personal connections have indeed been stimulated and grown by the Programme, through its funding, orientation and activities. Very importantly, positive attitudes toward academic/non-academic collaborations have been fostered in many of the participants (including some next-generation researchers) within and beyond academia. Universities and other organisations have in many cases become more appreciative and sometimes even more facilitative regarding such collaborations. Culture and attitude changes, while intangible, are vital for the generation of longer-term impacts.

The reservoir of “willingness” -- as well as experience-- is itself a compelling impact of the Programme, as it can be drawn upon to enable generation of impacts in the future. In the later Phases, participants “self-selected” to some degree based on willingness to try out academic/non-academic collaborations. Among many of even these participants, however, the Programme helped to bring about not only an enhanced experience base but also an increased willingness to embark on similar collaborations in the future. We see this as a resource for the future, an important impact of PACCIT.

Thus we would suggest that the Programme has not only met but surpassed the third of its stated non-academic objectives:

- “To expand the network of research collaborations in the people and IT domain between the research base and the commercial and public sectors.”

## Recommendations

When looking for non-academic impacts, we would advise that:

- Not all research nor indeed even all academic-non-academic collaborations will lead to nicely tangible impacts, so a “portfolio approach” to evaluating impacts from investments makes sense. Expectations for evaluation can thus be managed. (Generation of non-academic impacts is a difficult, messy process often dependent upon uncontrollable external factors; there may thus be a sensible analogy with

venture capitalists limited expectations for successes over a portfolio of investments - conventionally captured as one successful company out of ten investments).

- Conceptual and Capacity-building, even Culture Change and Enduring Connectivity Impacts should be recognised and valued, along with Instrumental Impacts.
- Many impacts develop over time, through various processes and stages.
- Many impacts are long-term in nature, they will not manifest themselves until long after a project-end evaluation.
- Even when manifested, many impacts will have been influenced by so many factors that attribution to a body of research will be difficult at best and attribution to a specific funded research project, or even a programme, may well be impossible.

We would recommend in particular that future programmes hoping to facilitate the emergence of non-academic impacts would:

- Support collaborative efforts in which academics and non-academics have the scope and time to build connections as they work together
- Enhance explicitly the understanding of both academic and non-academic partners as to the roles, obstacles, good practices and stages involved in the generation of impacts
- Provide opportunities for follow-on funding (e.g., as in ESRC's Impact Grant scheme) – in particular, perhaps, making available funds to support commercialisation-- in order to create bridges between the findings of projects such as those of PACCIT and the next steps in research utilisation by non-academics
- Place explicit value upon the full range of types of impacts that might be generated, with sensitivity as to when such impacts might realistically be expected to manifest themselves.

### Assessment of the Evaluation Approach

As an overview of the approach taken, employing a multi-method approach to evaluation was clearly an advantage, as it enabled triangulation and a richness that no one method could have provided alone. While the overall evaluation did not lend itself to quantification, the use of a survey provided some ability to aggregate views and qualitative insights across multiple projects. These findings were then fleshed out through deeper reflection during interviews. Case studies made it possible to illuminate more fully examples of key impacts and to dig still deeper into understanding as to how impacts come about. We continue to find that our use of a Framework of Core Questions allows us to bring together input from across methods to target key aims of the evaluation. We also find that our depth of experience with this sort of question, including our understanding of flows of knowledge and appreciation of development over time, allowed us to pick up readily nuances that may be quite important as understanding of connectivity between research and impacts grows.

We would single out as particularly useful the following methods:

- The survey gave us a great deal of information, despite the disadvantage of evident survey fatigue existing among the population surveyed. We would recommend this sort of very carefully designed survey to future impact evaluations, as it can pick up not only examples of impacts or indicators of impacts-in-progress but also understanding as to developmental stages, sectors reached and so on. Incidentally, we found Survey Monkey to be useful in that it was accessible to us as evaluators and to respondents.
- We would also recommend development of case studies as a key approach in elucidating impacts from research, along with many others (including, for example,

PA Consulting & SQW in the Excellence with Impacts report to RCUK, also ESRC Workshops on this issue).

- Gathering multiple perspectives through semi-structured interviews was also particularly useful, including not only academics but also non-academic collaborators and knowledge intermediaries; we found it valuable also to seek out interviewees with a broad overview of the Programme.

Less important as methods, but still making some contribution to the overall study, were:

- Document analysis Since materials were not uniformly oriented to our particular questions, and since they did not provide post-project information or insights, their primary use was to orient us in the beginning of the project and to aid in the selection of case studies.
- Media analysis In the case of the PACCIT Programme, the primary use of this analysis was to provide “negative” information; very few of the projects achieved this sort of attention, indicating a relatively low effectiveness of this sort of dissemination channel.
- Direct observation While the recent workshop provided an unusual opportunity to see the Director in action –and to see that she handled the academic/non-academic audience very ably --- this method was of necessity limited, because the workshop took place after the end of the PACCIT programme, so that not all PACCIT participants were present, by any means, nor making project presentations.

Attribution of causality is a perennial *bête noire* of impact studies<sup>9</sup> and we would not purport to have succeeded where others cannot. Factors undermining such attribution are many, including but not limited to: multiplicity of causes underlying any one impact; subtlety of processes involved; long-term nature of impact development (in many cases) and idiosyncratic or even dim memories. Nonetheless, given the necessarily constrained “snapshot” in time afforded by this evaluation, we have been able to identify what we believe to be strong connections (if not necessarily sole causality) between the work of some PACCIT projects and specific changes in the outside world. The Case Studies are perhaps the best approach to identifying with some degree of confidence this sort of relationship.

Perhaps counter-intuitively, it may be some of the most subtle sorts of impacts (e.g. Culture Change in attitudes and Enduring Connectivity interactions) that lend themselves most readily to quite firm attributions of causality, with individuals seeing a direct connection between these and PACCIT. This ability to attribute causality may lend some weight to our suggested employment of these impacts as useful “proxy indicators” that robust processes enhancing the likelihood of other sorts of long-term impacts may be taking place.

When we explored our conceptual approach about impact development over time with PACCIT participants, via surveys and interviews, we were able to gather illuminating input lending weight to the validity of this view of staging. Furthermore, those reflecting on this challenge appeared comfortable with short-term proxy indicators capturing processes (including attitudes and interactions) as useful in the face of waiting for long-term impacts.

We judge important the extent to which many PACCIT interactions persist and many PACCIT participants are still willing to work in academic/non-academic collaborations more generally. Thus the indicators we elicited as to attitudes and ongoing connectivity underscore both the “living legacy” bequeathed by PACCIT and, we would argue, the related likelihood that healthy processes are taking place which are likely to lead in the longer-term to additional PACCIT impacts.

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<sup>9</sup> See for example: Davies et al. (2005); Meagher and Lyall (2007); Nutley et al. (2007); RCUK (PA Consulting Group & SQW Consulting) (2007).

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## ACKNOWLEDGEMENTS

The author would like to thank her Advisors Dr Heather Alexander, Dr Catherine Lyall and Professor Sandra Nutley, whose efforts and insights have contributed greatly to this study. Thanks go also to the many individuals, academics and non-academics alike, who took the time to provide vital input into the key questions of this study. The thoughtful project management provided by Margaret Macadam of the ESRC was much appreciated.

