Mediation in New Media Production: Representation and Involvement of Audiences/Users at *NESTA Futurelab*

by

Philippe Ross

Thesis submitted in partial fulfillment of
the requirements for the degree of
Ph.D. Media and Communications

in the

Department of Media and Communications
London School of Economics
and Political Science

October 2005

ABSTRACT

This thesis addresses the interface between producers of new media and their audiences/users as it manifests itself in production. It is based on a case study of *NESTA Futurelab* (a production-research laboratory in educational new media) conducted in its first year of existence, as its staff sought to define the endeavour – 'what it is for' and, more importantly, 'whom it is for'. Drawing on science and technology studies (STS) and media theory, this study challenges models of the producer-user interface which endorse 'technical mediation' in proposing alternatives to its three components – the use bias, overstated co-design and the ontological divide between producers and users.

In response to the use bias, the study of Futurelab demonstrates that the producers' perceptions of their audiences (both users and partners) determine from the outset decisions as to the organization's purpose, structure, methodology and outputs. Overstated co-design is countered by uncovering the producers' downplaying of direct user involvement and any pretension to scientific methodology through which they engage the users. This study stresses the more pervasive practice of mediation whereby they represent the absent users. This is further conceptualized through their portrayal as 'experience-based experts' – the producers claim the ability to contribute substantively to production by virtue of their social experience, while minimizing their technical competence.

Lastly, the presumed ontological divide between producers and users is contested by illustrating that the spheres of production and reception overlap in the producers' experience, which is reactivated on an *ad hoc* basis in production. Through notions such as 'reflexivity', 'prior feedback', 'producer-user overlap', 'mediated quasi-interaction' and 'experience-based expertise', the producer-user interface is thus inscribed in the continuity of producers' social experience rather than being seen as an interaction purposely and strategically instated at a discrete moment. The most notable instances of continuity are captured by the producers' playing of the synthetic role of producer-user, which rests on the claimed proximity between production and other relevant social situations.

TABLE OF CONTENTS

LIST OF TABLES

FREQUENTLY USED ACRONYMS

ANT: Actor-Network Theory
BAFTA: British Academy of Film and Television Arts
BBC: British Broadcasting Corporation
CFI : Call For Ideas
CSCW: Computer-Supported Cooperative Work
DfES: Department for Education and Skills
DVD : Digital Versatile Disk
FL: Futurelab
HCI: Human-Computer Interaction
HP: Hewlett-Packard
IS: Information Systems
ICT: Information and Communication Technology
IT: Information Technology
NESTA: National Endowment for Science, Technology and the Arts
PBS: Public Broadcasting Service
PR: Public Relations
R&D: Research and Development
RD&D: Research Development and Demonstration
SCOT: Social Construction of Technology
SST: Social Shaping of Technology
STS: Science and Technology Studies (or Science, Technology and Society)
UAD: 'Users-as-designers'

Futurelab staff acronyms:

CEO: Chief Executive Officer
DCE: Deputy Chief Executive
DD: Development Director
DL: Director of Learning
FM: Futurelab Manager
HD: Head of Design
HLR: Head of Learning Research
HP: Head of Production
HT: Head of Technology
PM: Projects Manager

ACKNOWLEDGEMENTS

I wish to record my gratitude to those who provided me with guidance and support over the course of my degree at the London School of Economics.

First and foremost, I wish to thank my supervisor, Professor Robin Mansell. Whether in discussing the sharp end of theory and substantive issues or taking a step back to contemplate 'the big picture' of life in Academia, over the last four years Robin has enabled me to keep things in perspective and build my confidence. With her, you always know exactly where you stand and what your options are. That is an extraordinary asset indeed and I cannot imagine what more could be expected of a supervisor. I also wish to thank Professor Roger Silverstone, Professor Sonia Livingstone and Dr. Terhi Rantanen for their comments on various iterations of my research.

I extend my warmest thanks to all at NESTA Futurelab for accepting my intrusion and for sharing with me their intelligent and insightful thoughts on their work. I especially want to thank the (ex) CEO for granting me access to Futurelab, and DL, HLR and CEO for making me feel welcome on my visits to Bristol.

My thanks go to friends, colleagues and staff at the London School of Economics for providing the conditions conducive to intellectual growth as well as the occasional release of tension: Sebastian, Elizabeth, Henrik, Terhi, Evangelia, Joëlle, Ana, Olugbenga, Yasmin, Shani, Tamar, Jean, Kathy, Vanessa and Cath.

I wish to express my gratitude to Professor Pierre C. Bélanger for being a true mentor, coach and friend, and for being there from the very beginning to the very end.

I thank my parents for their unfailing love and support.

Enfin, merci à Émilie. Pour tes encouragements, tes sacrifices et ton esprit d'aventure. Pour ton amitié et ton amour. Pour tout.

For Oscar

CHAPTER 1

INTRODUCTION

This is a study of technological innovation in which technology as such is afforded limited space. It focuses on the people involved in the process of new media production, rather than on the material outcome of their actions. The key actors here are producers and their audiences/users. Although situated in a specific site of production (*NESTA Futurelab*) at a particular point in time (its first year of existence), this study is not constrained to the 'here and now' of production. It seeks to conceptualize the breadth of the interface between producers and their audiences/users and to account for its ostensible consequences with regard to both the endeavour's general development and the status of the producers, that is, the nature of their work and expertise.

The origins of this investigation are threefold. The first impetus lies in the call for greater public involvement in the spheres of scientific and technical decision-making originating in some sections of civil society and echoed in fields of academic research such as the social studies of science and technology. The second is an empirical opportunity, namely, the proliferation of collective technological initiatives geared to so-called 'socially-relevant' innovation in various fields. The third impetus lies in the potential contribution of media and communications studies to the understanding of such production practices.

1.1. The call for increased involvement in production

Social theorists and social policy scholars have for some time grappled with the issue of participation in the production of science and technology, raising questions to do with the authority and legitimacy of both institutions and individuals in the public sphere. One enduring question has been: who should have a say in the technical decision-making process and on what grounds? Responses to this question have tended to emphasize a dichotomy between expert and layperson – the access and contribution of individuals to science and technology have been, and continue to be, linked to specialist knowledge as attested, most typically, by professional accreditation. Only

certified experts, as one version of the argument goes, are legitimate contributors to the technical decision-making process.

The expert-layperson dichotomy becomes blurred when science and technology meet the public, that is, when the developments they foster are deemed to have direct implications in the public sphere, and thus become the object of public debate. For instance, Science and Technology Studies (STS) theorists have addressed the role of so-called 'experience-based experts' in matters of public concern such as farming and agriculture (Wynne, 1993), the management of toxic waste, the production of genetically-modified food and so on. These scholars have argued that theoretical knowledge and formal expertise are legitimately challenged by the first-hand experience of non-experts in such fields. As such, Collins and Evans (2002) want to make the Study of Experience and Expertise the next key object of STS. Similarly, Callon (2001; Callon et al. 2001) is interested in the conditions of what he terms a 'technical democracy', built on the involvement and interaction of experts and members of the lay population.

Thus, in recent developments in STS, sociological considerations meet with ethical concerns in an attempt to broaden the criteria of participation in technical decision-making. Analogous claims are made in the Technology Assessment (TA) literature (e.g. Akrich, 1995; Schot, 1998). These approaches share a common statement – of a normative nature – of the need to take account of lay knowledge, and indeed to include laypeople, in the technical decision-making process. In sum, they make the direct involvement of members of the (lay) public in production a necessary condition of ethical, socially responsible and relevant science and technology.

What of instances of technology production in which the most valuable knowledge to be produced is not technical as such, but rather social/cultural, i.e. pertaining to the public's wants and needs? What are the implications of such activities for one's conception of the relationship between (expert) producers and (lay) public, and the specialist skills and knowledge of the latter?

The call for direct public involvement is echoed in the disparate field of 'innovation studies', which comprises Information Systems (IS), industrial innovation

management, organizational innovation, Human-Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW), amongst others. Here the involvement of users in the design stage of technology is variously termed 'user-led design', 'user-centred design' or 'co-design'. While the calls for direct involvement originating in STS and TA are best understood as normative in nature, here direct involvement is defined, in more practical terms, as the key to uncovering user wants and needs, and hence to successful design. It aims to ensure the adoption/appropriation of a given artefact by a majority of its intended users in order to engender commercial benefits and/or increased efficiency in specific (typically work-related) fields of practice.

In these approaches, the useful knowledge contributed by the intended users far outweighs, in terms of value and capacity to ensure success, any technical or theoretical knowledge the producers may possess. Indeed, the users are deemed to hold knowledge that is inaccessible to the former – hence the need to involve them in the process. Therefore, the expert-layperson dichotomy is ill-suited to explain or bridge the producer-user divide. If anything, the users are the experts when it comes to user wants and needs. Here, the holders of specialist knowledge (the future users) and its substantive object (the future users) are conflated.

These approaches to technology production raise a different set of questions: are the users involved from the outset and consistently throughout the process? Do they enjoy equal standing with the producers in terms of authority and effective contributions?

On the whole, the direct involvement of the public and/or users in production is deemed necessary in both 'critical research' programmes of technology, as well as more 'administrative' approaches (cf. Lazarsfeld, 1944). In both cases it is they – the intended audiences/users of technologies – who bridge the gap between the social contexts of production and use. In resonance with the questions posed with respect to either approach, I wondered whether perhaps the paradigm of direct interaction, in technology production, between (expert) producers and the (lay) public ultimately concerned and engaged by their work, is overstated. That is the starting point of this study.

I do not mean to question the normative motivations of the critical approaches, nor the practical arguments of the administrative approaches. Rather, my interrogation stems from the following suppositions: 1) perhaps direct interaction is not strictly possible or even desirable in the eyes of producers in some circumstances, i.e. in some kinds of activities at certain times; 2) conversely, perhaps in such circumstances the lay public *already is involved* through means other than direct interaction, but which by and large serve the same normative and practical function – to ensure the development of technologies based on perceived social needs and guard against the excess of innovation for its own sake.

Hence, the main theoretical question addressed in this thesis is: How can one account for the producer-user interface as it manifests itself in production, without positing the direct involvement of users? It is accompanied by the following sub-questions: 1) What (social) mechanisms take the place of direct user/audience involvement in the absence of actual audiences/users and how do these mechanisms shape a technological endeavour? 2) What do these mechanisms tell us about the claimed specialist knowledge of producers and prevailing notions of expertise?

The relevance of such questions is underlined by the second impetus of this study: the proliferation of organizations designed to foster cross-disciplinary, 'socially relevant' innovation, in the UK and elsewhere.

1.2. A research opportunity

In recent years there has been an emergence of what Nowotny et al. (2001) call 'novel knowledge institutions'. These institutions are built on the 'enlargement of the number of participants in research and the widening of what is defined as research' (Nowotny et al., 2001: 15-16); the knowledge they generate is grounded 'in the context of application' (ibid: 1) and is thus deemed inseparable from 'the social'. In a related vein, Century (1999) terms as 'studio-laboratory', those sites of technology production 'within and through which artists, scientists, technologists and theorists commingle' in creative practices 'grounded in development of new technologies' (1999: 7). All display 'a strong vocation to serve as a bridge between social needs (...) and the

technology development process' (Century, 1999: 7), typically invoking the changing societal landscape and the pervasive influence of technologies to justify the need for such an enterprise.

These endeavours claim to be transdisciplinary by virtue of the variety of people involved and they range in form from action-research laboratories and think-tank organizations, to publicly-financed research programmes and funding schemes. Some are affiliated with private firms, others with academic or public institutions. Though not a new phenomenon as such, they now seem rather commonplace. In Britain, some recently established examples include the Proboscis/Social Matrices research laboratory, to which the London School of Economics Department of Media and Communications is a contributing partner; the Collaborative Arts Unit of the Arts Council of England; the Cambridge-MIT Institute; the PACCIT (People at the Centre of Communication and Information Technologies) research programme set-up under the LINK scheme, the British Government's principal mechanism for the promotion of collaborations between industry and the research base.

Such initiatives are indicative of what Callon (2001; 2004) terms 'hybrid forums' in the field of technology production, i.e. spaces where technical experts and 'non-experts' collaborate in the production of new artefacts. For me, they offer a means of exploring the extent to which technologies may be 'socially charged' from the outset of conception, as producers set out to develop artefacts on the basis of pre-existing knowledge of more or less defined social groups. On the whole, they provide an opportunity to address empirically how the producer-user interface plays out in a context which pre-exists actual users and in which producers attempt to encode social relations into technologies and thus establish their expertise as producers.

One such endeavour was selected as a case study for this thesis: NESTA Futurelab, a production-research laboratory in educational technology set up by the National Endowment for Science, Technology and the Arts (NESTA) in 2001. In addition to its stated objective of bringing about change in the field of education and learning through the production of new technologies, Futurelab was deemed a suitable site for the investigation of involvement and expertise in technology production, in that: 1) it was a nascent enterprise at the outset of this investigation with no product to

its name and whose production processes were yet to be stabilized; 2) its staff comprised individuals from ostensibly diverse backgrounds, including experience in both technical and 'non-technical' fields (production, design, education, academia, etc.); and 3) it set out to produce educational technologies for a large and varied cross-section of the general population, i.e. children and/or learners.

In order to carry out the theoretical investigation, in this study I ask the following empirical question: who is involved in the technical decision-making process in new media production (at Futurelab) and in what capacity? This extends the theoretical questions formulated in section 1.1 by grounding them empirically in the activities of the actors involved in the decision-making process at Futurelab and the resources they draw upon in order to give meaning and direction to their work. More specifically, this empirical question can be read to address both the modes of involvement (direct or otherwise) of actors in production (cf. theoretical sub-question 1); as well as the substantive contributions of these actors and the specialist knowledge and expertise that may be said to accrue from these (cf. theoretical sub-question 2).

The third impetus (and suggested way forward) of this study is my long-standing interest in, and experience of, mass media production theory and practice.

1.3. Media and communications

Media production is largely absent from social studies of science and technology, the focus of relativist scholars having been on the workings of 'hard science' and technological hardware rather than on the cultural and symbolic, content-driven activities of production associated with the mass media. In addition, the 'users' in relativist accounts tend to be restricted to exclusive, specialist groups such as scientists, the military, etc.; they seldom consist of a large cross-section of the lay population – what might be termed a general or 'mass' audience, or public. Both remarks equally apply to 'innovation studies' which focus on artefacts meant for restricted communities, indeed, artefacts created for, or commissioned by, strictly

circumscribed groups of intended users, such as the medical community, businesses, etc.[1]

The absence of media from social studies of technology is a blind spot in the context of a study on the producer-user interface and the emergence of socially-driven innovation initiatives in that, first, STS and innovation studies largely fail to address new media (or Information and Communication Technologies) such as mobile telephony, video games, digital broadcasting, the Internet and so on, which arguably are a central feature of the technological landscape and certainly among the most visible form of innovation to the general public. Innovation in new media is also the object of much hype, subsumed as it often is under popular discourse on the promise of the so-called 'Information' or 'Knowledge Society'. Its topical relevance alone makes it a curious oversight.

It is a blind spot in a second, more important respect: STS and innovation studies tend to preclude the breadth of means whereby producers gain knowledge of the (lay) public for which they create artefacts. In those studies that do consider new media, these are seldom meant for general consumption. Rather, the producers and users are ostensibly part of the same 'epistemic community' (cf. Knorr-Cetina, 1999). This inherently constrains the scope of the producer-user interface to direct and co-present interactions arranged at the producers' discretion, such as in focus groups, usability trials, etc.

In this thesis it is argued that media and communications theory is amenable to the investigation of the social processes which bind the producers of new technologies and the putative social groups – audiences or users – which they can never really know or observe but with whom they must nonetheless engage in order to bring about new artefacts. These social processes are termed 'mediation', of which more is said below.

With regard to the first blind spot, the features which digitization affords new media – many-to-many communication, virtuality, interactivity and the

[1] By and large, the study of content-rich artefacts (e.g. computer software) and those meant for a general audience (e.g. Bijker's (1995) bicycle or Callon's (1986b) electric vehicle) are mutually exclusive in STS. Studies of new media production, such as web pages, tend to be carried out by media scholars (e.g. Hine, 2001).

individualization of content (Livingstone, 1999; Silverstone, 1999b), among others – underline the need to expand the STS research agenda to address the production of such artefacts in order to uncover its specificity, if any, with regard to the producer-user interface. For these features suggest that user involvement, user-related knowledge and the authoritative status of producers are affected in significant ways.

Nowhere is the promise of new media felt and debated more keenly than in the field of education and learning, which is a focal point of society's hopes for evolution and progress. Throughout the last century, the fate of education has been tied in with emergent means of mass communication such as radio, television, computers and, more recently, the Internet; the increased circulation of knowledge and ideas each time fuelling hopes of cultural democratization and economic growth. In the present context, the new digital media are invested with hopes and caution as their features are consistent with the trend, in the UK and elsewhere, towards a 'learner-centric' or 'utilitarian' model of education based on the individualization of learning patterns, as well as autonomous learning and learning outside school (Bélanger and Ross, 1997). Indeed, new digital media such as interactive video games, the World Wide Web, multimedia educational software, interactive museum exhibits and so on enable the growth of distance and 'continuous' education, whilst bringing about changes in traditional, 'place-bound' education and learning practices.

This thesis is not a contribution to the vast literature on learning and educational technology (e.g. Darking, 2004). That is, it is not concerned with the assessment of technology for the improvement of learning and pedagogy as such. Rather, it is a thesis on the production of new media broadly speaking which for a number of reasons (see foregoing, but also section 2.2) is set in this specific field of production. However, because the production of new educational technologies sheds light on the social processes whereby specific technical affordances may be harnessed to enhance a key field of human activity; because many technologies emblematic of new digital media (the Internet, interactive multimedia software, video games, etc.) occupy an ever-increasing role in education; and because new media and education have a history of interdependent fates, the production of educational technologies was deemed an apt object for this study.

If the aforementioned technical features of new media suggest that these are 'underdetermined' at the point of production (Poster, 1999) – that is, their shape and effects are yet to be defined – then it is crucial to examine the relationship between producers and audiences/users. Indeed, one need not endorse the view that new media fundamentally alter the balance of symbolic power between producers and audiences, to recognize that trends such as interactivity and the individualization of content make a truism of the relativist argument that technologies are socially-constructed and their meaning constituted through use. As Poster (1999) argues, new media by their very nature 'enabl[e] the simultaneous reception, alteration and redistribution of cultural objects' (1999: 15). If one accepts that surely the producers of new media themselves assume that their artefacts are underdetermined, the challenge is then to account for how such 'underdetermination' of potential uses and users is actually managed upstream in the production process.

As for the second blind spot, it raises the matter of how producers gain knowledge of a putative mass of intended recipients which they can never really *know* or fully observe. Here, media and communications theory is useful in its concern with the process of mediation of which the media are a crucial agent.

In communications studies, the term 'mediation' refers to the media's role – as a powerful purveyor of cultural products – in bridging the audience member's personal, subjective experience of the world with that of the wider community of which s/he is a part, which thus takes on the status of objective reality.[2] In the context of this study, the social process of mediation applies not to the macro-level media-as-institution, nor to the cognitive implications for the receivers. Rather, it applies to the individual producers who mediate between their own personal experience in various social contexts, on the one hand, and the context of production in which the 'reality' of audiences/users is collectively discussed and debated, on the other.

This leads to a further point in support of my approach, regarding the definition of novelty in innovation. When discussing technological innovation, one prevalent

[2] One illustration is provided by the influential work of Benedict Anderson (1983), who confers to media such as print a crucial role in the formation of nationalism and the 'imagined communities' that are nation-states.

view, borrowed from Schumpeter (1934), attributes novelty to recombinant technical features, i.e. new combinations of existing objects or processes. In the light of the foregoing arguments, it is pertinent to address novelty from the producers' perspective in social rather than technical terms and to conceive of the production of new technologies as involving (new) combinations of social groups of which the producers have prior or concomitant experience. Such an approach draws attention to the social activities, indeed the history, of the individuals involved in production without constraining the focus to engineers and technical experts, and without crediting a 'genius inventor' model of innovation. Rather, it endeavours to take social experience seriously (cf. Silverstone, 1999a) by investigating its diverse manifestations in production.

There is a more banal reason for this approach as well. Considering that many producers of new media artefacts such as interactive web content have made the transition from careers in the so-called traditional media (cf. Hine, 2001; Roscoe, 1999), it is doubtful that their engagement with their putative audiences is, in epistemological terms, radically changed as they make the shift from traditional to new media. For producers hoping to reach important cross-sections of the population, the narrowing down or fragmentation of audiences/users is a problem to be worked out, not a given that guides their work from the outset.

Raymond Williams claimed that there are no masses, 'only ways of seeing people as masses' (1961: 289, in McQuail, 1987). Arguably this holds true as far as the producers are concerned. My sense is that their work always requires some measure of inductive reasoning as they reconcile the familiar and the unknown, making generalizations about, and lumping together, those putative individuals they envisage as their intended audience/users. Therefore, claims of the 'death of the mass audience' prompted by new media would seem to be of little relevance to the producer-user interface as it plays out in production. Indeed such claims concern audiences as revealed by their acts of consumption. In contrast, the audiences/users of a technology in development always have some features of a mass, i.e. a subset of broader society whose size, shape and behaviour cannot be directly observed. Mediation, arguably, is critical in the process of coming to grips with this putative group.

Flichy (1999) argues: '(...) the forms chosen for new media are not based on the technology; they correspond to the designers' representation of uses, and to the strategies they perceive to be most effective for marketing [a] product. In other words, these choices are social rather than technical.' (Flichy, 1999: 34) On the whole, this study seeks to divert the meaning of 'technical decision-making' from the mechanical, teleological motivations of engineering, to the more ambiguous stuff of production that is traditionally the province of media studies.

The media are a field of cultural production which Bourdieu has called 'a bastard space' (Bourdieu, 1979), in reference to the lack of formal criteria of access (or rules of entry) it imposes upon would-be producers, and their correspondingly vague professional status. Yet, as McQuail and other media theorists suggest, a practice common to media practitioners, regardless of their technical competence, is precisely that of bridging the gap between themselves and their audiences by instating and sustaining a form of relationship with them. McQuail has argued that the key media skill is the ability to 'attract attention and arouse interest; assess public taste; be understood; "communicate"; be liked; and know the media business' (1987: 149). These are vague descriptions to be sure, but they are conceptually useful.

Audience or user response can never be wholly predicted. At the moment of conception, the audience or end-users are just a hypothesis, not a given whose wants and needs one can actually *know*. Yet, anyone who has ever taken part in, or observed, mass media or technology production will have remarked on a pervasive practice: the producers speak of the end users or audiences of the artefacts they are creating in the present tense and with sometimes great sincerity, invoking them to justify production decisions even though they can never verify that they do, or indeed ever will, exist. The grounds for such sincerity and belief are a sociological reality worth investigating, for they have real consequences in production.

On this count media theory too has its shortcomings. Indeed, this study is also rooted in a dissatisfaction with theories of media that assert the need to consider the complex conditions of production *and* reception of media products, yet seldom employ micro-level conceptions of production to balance the wealth of ethnographies and

situated approaches of reception. While it is acknowledged that media products are appropriated by individuals in socially and culturally embedded contexts, rather than passively absorbed by a monolithic entity – the mass –, media texts are still widely seen as the product of institutions, rather than the result of collaboration amongst the individuals acting within them. In short, there is no unitary 'sociology of production' to match the canonical sociology of reception largely based on British Cultural Studies.

In both social studies of technology and media studies, it is as though the social spheres of production and reception are distinct and populated by individuals unable to cross the boundary between the two. These individuals may eventually be seen to interact, but only via technical artefacts, or when producers carry out market research with known socio-demographic groups. Similarly, relativist theories of technological innovation claim that Technology and Society are inextricable, yet most endorse essentialist, rather neat conceptions of producers and users – here again, the two groups are seen to interact, if at all, exclusively via technological artefacts (either during usability trials or in the diffusion stage proper), or during market research. Taken separately, both inhibit the investigation of how interaction and expertise play out in a context of production which pre-exists both a specific artefact and its actual users.

In this thesis it is argued that it is necessary to treat producers not merely as producers but to consider them as social beings involved in social experiences that stretch beyond the laboratories in which they work, and which have some bearing on their activities of production. If those involved in production are mediators of social relations, interpreting the social world outside the laboratory in order to make sense of, and give direction to, their activities as producers, what are the implications for one's conception of the expertise of producers? In the light of the conceptual notions outlined in the foregoing, it would appear that 'experience-based expertise' may be a more appropriate label for producers involved in creating artefacts meant for a putative mass of intended recipients which they can never fully observe.

1.4. Towards a sociology of new media production

In the fields of technology production and media practice, neither 'technologists' nor 'media practitioners' are strictly defined professions in the way biologists, architects or engineers are, for instance. Despite their widespread use in the literature, these are umbrella terms that cover many areas of expertise such as engineering, journalism, graphic design, programming and so on, thus making it difficult to identify a distinct professional skill-set.

Yet, scholars in both STS and media studies have underscored the crucial importance of prefiguring the audience/users. Allor (1996) calls this 'the politics of producing audiences', and Woolgar (1991) recounts the process of 'black-boxing the user'. Dornfeld (1998) argues that media producers act as 'popular anthropologists' in claiming detailed knowledge of their audience's preferences, cultural understandings, and so on. Similarly, in STS Bardini (1996) labels the cognitive and political resources mobilized by the producers of technology as a form of 'implicit sociology', that is, a set of more or less formalized conceptions of the users.

In all these cases, the settings of production and use are mediated by the producers in the absence of a specific technology and its users. This form of mediation (Hennion, 1989; Schot and de la Bruheze, 2003) consists of representations of the users, both cognitive and political – though physically absent from production, the users' presence is mediated, indeed simulated, by the producers. It is a pervasive activity rather than a strictly purposive and strategic one enacted in market research or usability trials. In media studies, Gans (1957) calls this 'prior feedback' – the producers have audience images in mind that inform their work from the outset. These images, he argues, allow the audience to 'follow the producers' into the sites of production. Such a perspective entails, as McQuail (1987) has put it, regarding the audience as both the cause and consequence of production. This circular reasoning is central to my undertaking as it forms the basis of the producers' experience-based expertise and my conception of mediation *within* production rather than *through* media products.

This study employed a qualitative methodology designed to elicit the individual actors' perceptions in relation to the issues at hand. Futurelab's activities were monitored over the course of roughly eight months using a field research design which comprised individual interviews with staff members (including most producers and all executives), non-participant observation of key strategic and team meetings, and a selective analysis of primary source documents. The fieldwork was carried out in the first year of Futurelab's existence as the organization sought to define more clearly its activities of new media production. This period was the scene of fundamental considerations about the endeavour's purpose – 'what it is for' and 'whom it is for' – which proved decisive in shaping the fledgling organization's structure, outputs and methodology. The gathered data was the subject of thematic analysis.

This study's findings challenge prevailing models of the producer-user interface found in social studies of science and technology which endorse 'technical mediation'. It proposes and illustrates alternatives to the three components of technical mediation, namely, the use bias, overstated co-design and ontological divide. First, in response to the **use bias** which implies that the producer-user interface can be verified only in use, the study of Futurelab focuses on the timeframe of problematization and demonstrates that all the stakeholders/audiences concerned by the endeavour – most notably its projected users – have a hand in its shaping from the outset. Indeed, the producers' perceptions of their audiences ('users-as-stakeholders' and 'partners-as-stakeholders') pre-exist any specific artefact and their will to serve the interests of one group over the other determines the decisions that are made as to the organization's purpose, structure, methodology and outputs.

Second, the **overstated co-design** endemic to 'users-as-designers' approaches is countered by uncovering the producers' downplaying of the usefulness of direct user involvement in production and any pretension to scientific methodology through which to engage the users. Instead, it stresses the more pervasive practice of mediation whereby they speak on behalf of the absent users in order to give sense and direction to their work. This is further conceptualized through their portrayal as 'experience-based experts' – the producers claim the ability to contribute substantively to production by virtue of their social experience with groups they perceive to be relevant to the

endeavour, indeed their experience as learners in various contexts. This is set against their self-proclaimed lack of technical competence.

Third and in a related vein, the presumed **ontological divide** between producers and users is contested by illustrating that the spheres of production and reception overlap in the producers' experience, which is reactivated on an *ad hoc* basis in production (reflexivity). The most notable instances of overlap are captured by the producers' playing of the synthetic role of producer-user, which rests precisely on the claimed proximity between the social situation of production and other relevant social situations in which they can be said to be users.

1.5. Overview of the thesis

This thesis is structured as follows. *Chapter 2 – Grounding this study in space and time*, outlines the empirical criteria for selecting NESTA Futurelab as a case study and provides a preliminary overview of theories which conceptualize the producer-user interface, assessing their relevance with respect to this particular site of production, at this particular time. *Chapter 3 – Conceptualizing production and the producer-user interface*, reviews key theoretical approaches to technology and media production and proposes a synthetic conceptual framework which envisages production as the legitimization of experience-based expertise following recent developments in STS and as a 'social situation' which is dependent upon the producers' social experience at large. *Chapter 4 – Methodology and research design*, gives a detailed account of the methodological approach and methods employed in this study as well as the coding and analysis procedures.

Chapter 5 – Problematization in action: the role of audiences in early production, is the first – and more diachronic – of two empirical chapters based on the gathered data. It recounts the first year of Futurelab's existence in the words of those involved, stressing the crucial role of audience perceptions and mediation in shaping the endeavour. *Chapter 6 – On the involvement of stakeholders in production and the expertise of producers*, considers in more depth topics such as the forms and uses of producer-user interaction and the experience and expertise of producers. *Chapter 7 – Analyzing problematization and experience-based expertise*, examines the empirical

data in the light of the empirical and theoretical questions posed at the outset of the study. It makes a case for the crucial importance of mediation and experience-based expertise to our appreciation of the complexity of the producer-user interface and, hence, our understanding of processes of new media production.

Lastly, *Chapter 8 – Conclusions*, restates some of the key claims made in this thesis and its overall contribution to scholarship. It comprises a self-assessment, examines such issues as replicability and generalizability and considers avenues for further research.

CHAPTER 2

GROUNDING THIS STUDY IN SPACE AND TIME

2.1 Introduction

This chapter provides the grounding for the study by locating it in space and time and by stating its theoretical and empirical research questions.

Section 2.2 outlines some of the empirical criteria for selecting NESTA Futurelab as a case study,[3] while section 2.3 provides a description of the organization based on a number of its official publications. Section 2.4 gives a preliminary overview of theories which conceptualize the producer-user interface, assessing their relevance with respect to this particular site of production, at this particular time. Section 2.5 contains the main criticisms I address to these theoretical approaches ('use bias', 'overstated co-design' and 'ontological divide between producers and users'). Lastly, these criticisms are summarized in section 2.6, which then states this study's theoretical and empirical questions.

2.2. Selecting a case study

In tandem with the establishment of the conceptual grounds for this research, prospective fieldwork was carried out between February and September 2002 in order to identify potential sites of investigation. The process recounted here may be likened to Miller and Glaser's (1967) 'grounded theory' approach in that empirical matters evolved alongside conceptual considerations from the outset, in a process of dialectical formation (Mason, 1996: 141).

NESTA Futurelab first came to my attention in March 2002.[4] I monitored its development from afar for the following months and in August 2002, after having gained a clearer sense of my research objectives, I approached Futurelab's Chief

[3] A cursory overview of these reasons is presented here. Methodology is discussed in full in Chapter 4.
[4] It was brought to my attention by Professor Roger Silverstone, as its CEO had been the focus of an in-depth case study of Professor Silverstone's while a producer at the BBC (cf. Silverstone, 1985).

Executive. The matter of my involvement was passed on to the lab's Director of Learning, with whom it was provisionally established, over the course of several email exchanges, that Futurelab would indeed be amenable to my research and conversely, that my involvement fit with the lab's academic research objectives.

In line with grounded theory, this study used a theoretical, as opposed to representative, sampling strategy (Mason, 1996: 94). That is, Futurelab was selected for its suitability with regard to three main requirements designed to yield a 'best-case scenario' that would allow my hypotheses to be explored and tested in a meaningful way, rather than to provide rigid prescriptions. (Accordingly, the subsequent analysis was inductive rather than deductive; cf. section 4.5)

The first requirement for a case study was to focus on the production, in a group setting, of new media intended for 'external' users/audiences, that is, groups which may include, but are not limited to, those people directly involved in the production process. This stemmed from my interest in the ways in which mediation allows social groups perhaps separated by time and space effectively to 'have a say' in the technical decision-making process. Moreover, as I was interested in how mediation shapes a technological endeavour and how it bears on the perceived status of the producers, it was necessary to address the negotiation of representations in a collective setting.

The second requirement was to maximize the variety of people involved in the production process, so as to address the largest possible range of experience that participants may draw upon in making and supporting knowledge claims relating to intended users. So as to make the requirement of (nominal) diversity operational, it was determined that attention should be given to practices explicitly involving participants from various backgrounds – i.e. groups that openly display this feature as constitutive of their activities.

The third requirement was to address the decision-making process from the earliest possible moment, i.e. where artefacts and their users are but a set of ideas, if not earlier. Two different decision-making mechanisms were thought to be suitable means to this end: technological projects undertaken by ad hoc peer-groups or

'independent' research laboratories; and institutional instances, or funding schemes, intended to support such initiatives. The former were deemed conducive to the study of the experience project originators draw upon in order to reach consensus (or otherwise) amongst themselves, and then as they attempt to convince/enrol others (most likely institutions offering funding). Conversely, the latter offered the opportunity to address the power of one organization to grant access or otherwise to the production process.

Despite its cautionary purpose, the first email sent to me by the Futurelab Director of Learning in response to my enquiry, held promise on all three counts:

> Dear Philippe, Futurelab could well be a suitable site for your research, however you should note we are "inventing" ourselves as we proceed. Secondly you should note that part of this invention is in developing and arguing over methodology as the actors in Futurelab come from diverse backgrounds and many have no explicit theoretical perspective on their methodology. This may well make the site "muddy" from the tractability of your research. (Email to author, 21 August 2002).

2.3. Description of NESTA Futurelab

Futurelab was launched in December 2001 by NESTA, the National Endowment for Science, Technology and the Arts, itself established by Act of Parliament in 1998. It is a not-for-profit organization operating on guaranteed core-funding from the Department for Education and Skills (DfES) in the amount of £3 million for its first three years. However it does not rely entirely on public funding; it also derives financial resources from collaborations with commercial partners (in the form of cash support or in-kind benefits such as content, concessions on software licences, technology, etc.), as well as (modest) revenues from hosted events and published documents.

Futurelab is not a fully-fledged public service institution: upon its inauguration it was expected that by the end of the initial three-year period in which it received funding from the DfES, it would sustain itself through the revenues generated by the development of prototypes. That is, the organization would collect royalties from commercially successful educational technologies, the prototypes of which will have been developed for, or in partnership with, commercial partners, leaving the latter with the task of bringing them to market.

The organization spent the first six months of its existence housed in temporary offices in Bristol before moving into its current building on the city's Harbourside. Bristol was selected by an independent committee through a bidding competition involving a handful of candidate sites. This decision was made on the basis of several factors. Most notably, the city offered proximity to a hub of successful organizations in the field of technology, media and the arts, as well as reputed research facilities such as Bristol University's School of Education and its Department of Computer Science.

Futurelab is best described as a research and production laboratory in digital technologies and education. Its promotional literature and founding documents (i.e. proposals submitted to NESTA and the DfES) outline the organization's activities and aim as follows:

> NESTA Futurelab is transforming the way people learn. We're using new and emerging technologies to create educational resources that are involving, interactive and imaginative. Above all, we want learning for people of all ages and abilities to be an enriching and satisfying experience. Our aim is to equip people with the skills they need to enjoy life in an increasingly complex world and to raise educational standards by focusing on the learning needs and aspirations of the individual' (NESTA Futurelab, 2002b).

Beyond the slightly inflationist language such promotional discourse inevitably employs, social concerns – i.e. the improvement or transformation of education and learning – are clearly stated as the lab's priority. To be sure, technology is constitutive of Futurelab's remit but it appears as a set of means in the service of educational practice rather than an end in and of itself, or the object of a strict commercial endeavour. Futurelab's stated strategic aims convey a commitment to achieving its social objectives through collaborative research and development practices involving its core staff, public and private sector partners, as well as other stakeholder groups. Specifically, its aims were to:

> 1. Create compelling educational prototypes that are interactive, involving and imaginative;
> 2. Research the potential of ICT in learning and teaching, liaising closely with teachers, students and parents;
> 3. Bring together diverse communities to explore how new technologies can be creatively and effectively applied to education;
> 4. Establish a knowledge hub identifying and sharing the latest developments in technology, the media and education;
> 5. Secure our long-term viability by working closely with a wide range of partners in the private and public sectors.
>
> (NESTA Futurelab, 2002a)

These aims were to be attained through three main activities, which on the whole would make Futurelab a key actor in the field of educational technologies in Britain: prototype development, learning research and communications/events. The three activities are intertwined. Prototype development and learning research are combined in the carrying out of projects generated either outside the lab by partner institutions or individuals (solicited through the Call for Ideas process, for instance), or generated in-house by Futurelab's staff. Communications activities are geared towards 'community-building', bringing together a diverse range of potential stakeholders through events such as seminars and conferences and disseminating knowledge and findings via research publications both on the lab's website and in hardcopy.[5]

Futurelab is geared to developing and assessing the viability of projects generated either in-house or by external parties. An overview of the promotional literature highlights the breadth of Futurelab's ambition with regard to both technology and the social groups relevant to the endeavour. The technological component of the lab's activities nominally qualify as new media: from the general ('digital technologies', 'content', 'educational prototypes', 'educational ICT'), to the slightly more specific ('broadband', 'software', 'games', 'learning resources').

As for the relevant social groups acknowledged as audiences, they comprise stakeholders, potential partners, end users or a combination thereof. Specifically they cover an equally wide range that includes, in no particular order: 'people', 'people with good ideas but no resources', 'end users', 'learners', 'students', 'teachers', 'education professionals', 'parents', 'trainers', 'Europe', 'the UK', 'the government', 'the creative industry', 'the media', 'private and public sector partners', etc., as well as specific, named organizations.

From the outset, what made Futurelab an enticing site for investigation was the genuine openness it seemed to display with respect to both the technological artefacts it set out to produce, as well as the individual and institutional actors it would involve in the production process. In its promotional literature the organization was presented as:

---

[5] As is demonstrated in Chapter 5, a key issue in Futurelab's first year was the prioritizing and ordering of these activities so as to allow the lab to enrol partners and carry out its social remit successfully.

> **A creative incubator** providing R&D support for those who might not otherwise have the resources to develop their ideas.
> **A learning research programme** that assesses how technology can impact on learning and teaching, and also evaluates and publishes the learning outcomes of new educational prototypes.
> **A brokerage, networking and information service** that links those in education, the media and technology who are interested in collaborating on the development of educational software.
> **A structured series of events** staged across the UK to share innovative practice and latest thinking.
> **An online service** that acts as a hub for those seeking information about the future of interactive educational software.
> **A physical showcase** for teachers, students and parents to test the latest technology, software and content applications.
> **A strategic think tank** at the heart of government, offering insights into how new technologies can stimulate new patterns of learning and teaching.
> (NESTA Futurelab, 2002b. Emphasis in original)

The range of Futurelab's ambitions and its commitment to educational objectives are reflected in the structure and composition of its core team. As of November 2002, Futurelab employed 17 full-time staff, spread across three departments (or teams): Management and Communications, Production, and Learning and Assessment.[6] I was cautious not to read too much into the organizational structure as it provided no indication – aside from common-sense assumptions – as to the decision-making dynamics with regard to the issues at the heart of this study.

The same applied to specific posts: it was not clear what each entailed specifically, i.e. to what extent they signalled involvement in the production process, and in what capacity (i.e. as technical specialist or otherwise). However, as Futurelab's research and development activities appeared to be shared between a team of media practitioners/designers/technologists and a team of educational professionals/academics, it was deemed likely to yield insightful discussions. Moreover, the 'blurb' on each member's past experience (available in its promotional literature) provided promising information in respect to my research question. Overall, the staff had a vast range of backgrounds mixing experience in education, technology, both or neither; in the public and private sectors; spanning traditional media and ICT; in start-ups and well-established institutions; in liberal arts and academia; based upon specialist training (and formal qualifications) or not; in the UK and abroad.

[6] Several changes, some major, were made over the course of my fieldwork. They are reported in Chapter 5.

Further, the comparatively modest number of staff (and proportionately high number of department directors or heads) assembled to produce educational technologies also suggested a dynamic environment driven by the hands-on involvement of all individuals – a situation confirmed by my first visits to the organization.

Lastly, the fact that Futurelab had been launched just months before my fieldwork began and that it had yet to produce an educational artefact, meant that I could investigate the very early stages of production. (This particular point raises the issue of time which is discussed in the following section.)

In sum, Futurelab was deemed a suitable and promising setting for this study.

2.4. The producer-user interface and the time dimension

This section discusses models of the interface between producers and users which consider the contributions of both kinds of actors in the light of the requirements formulated in the previous section. Here a number of approaches – which I label 'users as designers' approaches – are criticized on the grounds that the models of interaction which they enforce seem to preclude consideration of the very earliest stages of innovation, when no specific artefact can be said to exist. In other words, they are ill-suited to my research objectives in the context of Futurelab's fledgling status at the time of undertaking this study. Hence, this critique enables a conceptual justification of this study's relevance.

Studies of technology are broadly categorized according to the timeframe they consider in technology's so-called 'life cycle': either production/design, or usage/diffusion/implementation (Bardini, 1996; Flichy, 1995; Lievrouw, 2002; Livingstone, 1999; Schot and de la Bruheze, 2003). The two main temporal phases of innovation are distinguished by a discrete event – the 'birth' of a technology which can be understood in material terms as the instantiation of an artefact (e.g. in prototype form), and/or in commercial terms, as its introduction to its intended market or social system. Many approaches transgress this distinction and address the grey area where

the two phases overlap, considering the contributions of both producers and users to the shaping of technology.

One influential body of literature that tackles the technology-society relationship at a micro-social level is the Diffusion of Innovations paradigm. It aims to account for diffusion, that is, the trajectory of an innovation within a given social system, from its first contact with a potential adopter to its adoption by a majority of individuals (Burt, 1999; Rogers, 1995; Valente and Davis, 1999; Valente, 1995; Valente and Rogers, 1995).

Diffusion is 'the process by which an innovation is communicated through certain channels over time among the members of a social system' (Rogers, 1995: 5). Rogers' definition of innovation suggests that technology and society are interwoven entities. He argued that innovation must be appreciated in light of the specific context(s) in which it is situated: 'An innovation is an idea, practice or object that is perceived as new by an individual or another unit of adoption' (1995: 11). By foregrounding the importance of perception, Rogers rejects essentialism, stating that one cannot consider innovation independently of those people who are engaged with the artefact, as it is their perceptions and knowledge that inform the innovation process.[7]

The main interest of diffusionist scholars lies in the timeframe following the material instantiation of an artefact deemed fit to be put to market (Coleman et al., 1957; 1966). However, diffusionists have linked design and usage by introducing the notion of 'reinvention', defined as 'the degree to which an innovation is changed or modified by a user' during adoption (Rogers, 1995: 17). Here users act as designers, in that their using a technology in unanticipated ways leads to a subsequent revision of that technology. But no postulate of direct designer-user interaction is made in diffusion studies; at least, designers are not seen to solicit the users in order to cater to their demands or needs. Rather, re-invention is the stabilization of an unanticipated use

[7] Such ideas have been developed extensively in network models of diffusion (Burt, 1999; Valente and Davis, 1999; Valente, 1995; Valente and Rogers, 1995), in which individual actors are seen through the lens of structural or sociometric analysis, and their relationships are thought of in terms of 'network position', 'network homophily', etc. See Granovetter (1973, 1976) and Burt (1992) for pioneering works in this respect.

at the scale of the social group and it comes to the designers' attention through unspecified channels.

In sum, producers and users are involved with the artefact through a turn-taking process: the designers create a artefact, then it is in the hands of users who use it in an unanticipated way, then the designers observe this and make changes to the artefact, and so on. In the words of its critics, the diffusionist paradigm treats production as a 'black box' (Bardini, 1996; Bijker and Law, 1992; Bouiller, 1989; Flichy, 1995; Latour, 1995; Livingstone, 1999). That is, the ins and outs of the process culminating in the materialisation of an artefact – its first iteration or any subsequent version – are unaccounted for. They are assumed as a given.

The Diffusion of Innovations paradigm is not alone in this respect: the same can be said of audience reception studies in the Cultural Studies tradition. Here, the members of the audience are conceived of as relatively autonomous, 'active' individuals involved in the decoding of media texts, most notably television productions (e.g. Hall, 1980; Morley 1980; Ang 1996; Livingstone 1998). The Cultural Studies agenda has extended to the study of (new) media technologies, or ICTs (Livingstone, 2002; Miller and Slater, 2000; Silverstone et al., 1992), sometimes combining the study of media old and new (Livingstone, 1999). In this context technologies are integrated into the existing symbolic economy and the everyday practices of the individual, family or household – a process termed 'appropriation'.

The focus of this strand of research is on the symbolic attributes of technologies, i.e. the meaning they have for those who come into contact with them. Following Hall's (1980) encoding/decoding model, the decoded meaning is seen as dominant, oppositional or negotiated. Thus, unlike in the Diffusion of Innovations approach, no claim is made that technological form, i.e. the material shape of a technology, is informed by users – at least not in a direct way. For all their conceptual richness, however, Cultural Studies-inspired approaches tend to consider media texts as given entities. Such approaches claim to address the encoding of technologies, yet in these cases encoding almost invariably designates a product rather than the process through which it was engendered.

Some STS-influenced approaches do claim that users directly inform the material shape of technology. Arguably, social constructionists have largely equated the 'social shaping of technology' with 'shaping through usage' in investigating implementation, a phase which blurs the boundaries between design and use. Here an overlap of sorts between designers and users exists in the guise of 'users-as-designers'.

Some refer to the phase of implementation as 'design-in-use' (Lievrouw, 2002: 184), thereby signalling that the material shaping of technology does not end once a technology is introduced to its users, that it continues in use (Brown and Duguid, 1994; Century, 1999; Suchman, 1987; Star and Bowker, 2002). For instance, Brown and Duguid argue that 'design and use mutually shape one another in iterative, social processes' (1994: 29). In their discussion of the design and development of the Internet as 'infrastructure', Star and Bowker (2002: 159) maintain that 'the work of design is in many ways secondary to the work of modification', thereby suggesting it is the users who, in the last instance, determine the shape and the fate of a technology.

In other instances, the concept of 'users-as-designers' is to be taken literally: the users *are* the designers. Such is broadly the case in the literature concerned with 'user-centred', 'user-driven' or 'user-led' design within fields such as Innovation Systems, Human-Computer Interaction or Computer Supported Cooperative Work (recent examples include Alvarez, 2001; Beirne et al., 1998; Mackay et al., 2000; Parker and Sinclair, 2001). By and large, these approaches are concerned with how innovative processes as such or technological systems are developed within particular organizations or firms.

In the field of organization science/management, studies of organizational innovation (or change) consider how organizations design and/or implement innovations for their own use. This process bears some resemblance to diffusionist studies to the extent that both are concerned with the adoption or otherwise of new ideas, practices, or objects within a pre-defined social system – in this case either one organization (Fulk and DeSanctis, 1995; Monge et al., 1992) or several collaborating organizations (e.g. Monge et al., 1998).

Rather like the appropriation of technologies in the household, the impacts of technology here are not unidirectional. Indeed some observers describe innovation and organizational form as mutually defined, or 'negotiated' (Fulk and DeSanctis, 1995: 338), through the implementation phase of new systems or software. This has also been called the 'co-evolution of technology and organization' (Leonard-Barton, 1988; Orlikowski, 1992; in Flichy, 2002).

On the whole, in studies of implementation, 'users-as-designers' contribute to the technology's shape directly by making their preferences known throughout the design process. As designers and users form a pre-defined, finite group, the direct interaction of producers and users is assumed as the best possible way forward.

Some scholars have undertaken systematically to sort, group and classify the major bodies of literature dealing with technology (including those discussed in the foregoing), in order to federate research carried out in disparate and often mutually isolated fields. One such enterprise, labelled 'social informatics' (Kling, 2000; Sawyer and Rosenbaum, 2000; Sawyer and Eschenfelder, 2002) is useful here in helping me to articulate a criticism of the theories reviewed in the foregoing. Namely, that in the aforementioned studies the notion of 'social context of technology' seems divorced from the dimension of time. It is as though time (i.e. design, use, implementation), *as one point in the broader life cycle of technology*, is a layer of analysis accessible only to the analyst; as though these studies assume that the direct access to users is the only means of gaining relevant user-related knowledge.

2.5. Critique of 'users-as-designers'

The social informatics agenda is driven by 'problems that arise from the bi-directional relationship between social context and ICT design, implementation and use' (Sawyer and Eschenfelder, 2002: 430). These problems and the studies that address them are catalogued according to two discriminating factors: how they conceptualise 'social context' and its impact on, or its conditioning by, technology; and what phase of development provides the setting for the research.

Here, 'social context' is understood as the combination of: 1) the level of analysis and the links drawn between various levels (individual, group, organization, institution, etc.); and 2) the qualitative forces (or factors) that come into play at these various levels (social, cultural, economic, political, etc.). The emerging conception is one of social context as 'a holistic sense of interaction among levels of analysis and the particular characteristics that help to define any given level of analysis.' (Sawyer and Eschenfelder, 2002: 435).

The shape and meaning of technology are subject to a variety of factors and forces. Exactly how such contextual forces combine and play out in specific contexts is (then) described by considering design, implementation or use.[8] The vast majority of works reviewed by Sawyer and Eschenfelder (2002) deal with either implementation or use, thereby overlooking design proper, that is, the steps culminating in the material or commercial birth of a technology (R&D or RD&D, pre-production in media terms). This reflects the sample of approaches discussed in the foregoing and, indeed, the state of social studies of technology as a whole.

2.5.1. Producers and users as distinct ontological categories

Although social studies of technology scholars often state their aversion to binary oppositions between 'the social' and 'the technical', implicit in their research is a binary opposition of a different kind which may be seen to be just as prejudicial to the idea that technology and society are inextricably linked: the opposition between designers and users, brought to the surface by empirical choices of what phase of innovation to study. In short, built into the studies catalogued by social informatics is a fracture between 'social context (of technology)', on the one hand, and 'design, implementation and use (of technology)', on the other. That is, a divorce between those forces acting on different levels of analysis and the state of the technology whose design, implementation or use one seeks to account for. The former (social context) seems to be used to explain the latter (state of the technology).

[8] Sawyer and Eschenfelder (2002: 436): 'the characterization of, and factors of interest within, context will vary and the researcher must set out the levels of analysis and factors through either *a priori* or *post hoc* description.'

Therefore, regardless of how broadly or specifically social context is defined, no matter how the actors within it are characterized in terms of their role in the construction of the original artefact, they are either designers (in design) or users (in use). And as this original construction is either bracketed out of the accounts or is devoid of users, the distinction has an ontological status. That is, it is a given, an unproblematic premise. Another way of summarizing the problem is to see it as the divorce of social context from the dimension of time.

In the same way that 'the social' and 'the technical' should be seen as the result of analysis rather than its starting point, can the same not be applicable to producers and users? This thesis construes the producers' activities in a context which pre-exists a specific artefact and its actual users, as indicative of the ambiguity and inadequacy of the ontological distinction between producers and users. Hence the main theoretical question stated in the introduction: how may one conceptualize the producer-user interface as it manifests itself in production, without positing the direct involvement of users?

2.5.2. The 'use bias' and 'overstated co-design'

Two further features of the approaches reviewed in this chapter are what might be called a 'use bias' and 'overstated co-design'. These approaches demonstrate that consensus on a given technology emerges through the interaction of the technology and its *actual* users, whether in diffusion, appropriation, use or implementation.

In the Diffusion of Innovations approach, the concept of re-invention might be seen as an avatar of technological determinism: designers and users 'meet' only via an existing artefact which has been pushed, somehow, onto the users. Indeed, the first iteration of a technology is not accounted for. The actors who are the focus of diffusionist studies – the users – are seen to interact not with producers, but with their artefacts (and other users). Much the same can be said of (new) media appropriation studies in the Cultural Studies tradition. In these cases the link between social actors involved in production and social actors involved in usage is embodied by the technology which serves as a proxy for the producers' intentions, ideas,

preconceptions, and so on. In short, the technology exists as a distinct object. It is a black-box.

In the other 'users-as-designers' approaches considered, both analyst and actors acknowledge the shared responsibility of producers and users in the stabilization of technology. That is, the need to interact with the intended users of a technology is acknowledged by the designers themselves, and this leads them to solicit user representatives such as 'ambassador users' (MacKay et al, 2000), 'lead users' (von Hippel, 1986) and others in order to produce what amounts to a form of bespoke technology. In implementation studies, what is called the 'development' or 'design' of technology is more akin to the appropriation of innovation in pre-determined settings than it is to a process of material instantiation as such.

2.6. Summary

Many sub-fields of the study of production make user involvement the key to success in design. I term these 'users-as-designers' approaches, for they share the assumption that users may be *directly* involved in design in order to shape artefacts in accordance with their needs, expectations and so on. However, 'users-as-designers' approaches begin their analyses at the point when an artefact effectively exists in distinct form (project, prototype, etc.), and/or they address processes whereby producers design technologies for a finite group of users (e.g. an organization). Thus, they may be criticized for enforcing a model of the producer-user interface premised upon **technical mediation**.

Technical mediation implies that the producers and users of *artefact x* can only be seen to interact once *artefact x* ostensibly exists, whether in provisional form (prototype) or as a finished product. Thus, it entails three related constraints in terms of the producer-user interface. First, it depicts producers and users as ontological categories, that is, as *essentially* distinct people – what I call an **ontological divide**. Second, it entails that their relationship is verifiable only in use (whether usability trials or use proper), hence the **use bias**. Third, technical mediation suggests that direct, co-present interaction between producer and user is the paradigm or ideal-type of interaction in production; concurrently, by applying the label of 'design/production'

to producer-user interactions in implementation or usability trials, it leads to the conflation of social construction ('meaning') with material construction ('shaping'). This in turn implies, through some form of logical ellipsis, that producers and users enjoy equal footing in the process. This is the criticism of **'overstated co-design'**. In essence, 'users-as-designers' approaches rule out the investigation of the stages of production that precede the material instantiation of an artefact, however partial.

My concern is with the limitations such approaches impose on our conception of both the producer-user interface and the activities of producers. I want to question technical mediation and its components – the ontological divide, use bias and overstated co-design – through two objections. The first is straightforward: the use bias and overstated co-design fly in the face of common conceptions of innovation as a market-driven activity, but one conducted by interested parties. To overcome this limitation it is necessary to account conceptually for the involvement of users in the stages of production, without positing that they exercise power in the same capacity that producers do.

The second objection is that the notion of ontological divide implies that production and reception are mutually isolated social spheres which only come together at the producers' express initiative, i.e. in a *purposive context* engineered by them in order to solicit the collaboration of users. To move beyond this assumption it is necessary, I shall argue, to consider producers as more than just producers – they are social actors involved in activities outside the sites of production which may impact upon their work in this particular setting.

This thesis investigates the producer-user interface without overstating the equality of producers and users, or indeed endorsing technological determinism by removing the users from the equation altogether. Its main theoretical question is: *How can one account for the producer-user interface as it manifests itself in production, without positing the direct involvement of users?* It is accompanied by the following sub-questions: 1) *What (social) mechanisms take the place of direct user/audience involvement in the absence of actual audiences/users and how do these mechanisms shape a technological endeavour?* 2) *What do these mechanisms tell us about the claimed specialist knowledge of producers and prevailing notions of expertise?* The

following chapter presents a conceptual framework designed to address these questions.

In order to carry out this theoretical investigation, the following empirical question is posed in the light of the chosen case study: *who is involved the technical decision-making process in new media production (at Futurelab) and in what capacity?* This empirical question can be read to address both the modes of involvement (direct or otherwise) of actors in production (cf. theoretical sub-question 1); as well as the substantive contributions of these actors and the specialist knowledge and expertise that may be said to accrue from these (cf. theoretical sub-question 2).

CHAPTER 3

CONCEPTUALIZING PRODUCTION AND THE PRODUCER-USER INTERFACE

3.1 Introduction

This chapter discusses existing theoretical debates in the social studies of technology and media studies that are relevant to this study and culminates in a synthetic conceptual framework for addressing the producer-user interface without positing the direct involvement of actual users in production. To this end, it proceeds from the empirical question stated in section 2.6: *who is involved in the technical decision-making process in new media production (at Futurelab) and in what capacity?*

This empirical question signals my interest in the modes of involvement of both producers and audiences/users in production (either direct or mediated), as well as the substance of their contributions and how it reflects on the specialist knowledge of producers and their status as experts. On the whole, it evokes the way in which one new media endeavour is given shape as its producers come to grips with the complex relationship that binds them to their audiences/users.

Technical decision-making is understood as the actions of (human) actors which contribute to the shaping of technology, the outcome of which is uncertain. I attend to the social and epistemological dimensions of decision-making in the technological realm, considering both the relationship between producers and users and the status the former accrue from their knowledge of the former, in production (sections 3.2 and 3.3). In a later section (section 3.4) both are woven together in conceptualizing producers as 'experience-based experts' with regard to the users. The result is a model of technical decision-making driven by a dynamic conception of the interface between producers and users/audiences, that is, one which does not posit an essential distinction between both types of actors, nor a symmetry in terms of their contributions to the process.

3.2. Key concepts in social studies of technology

The first theoretical section provides a characterization of who takes part in technical decision-making and in what capacity, in terms of the categories of actors typically considered in situated approaches to the production of science and technology, namely, producers/designers and users/audience. The aim is to tease out the assumptions which underpin these theories and to discuss their implications with respect to such notions as involvement and expertise in technical decision-making.

A large body of scholarship has taken root at the crossroads of several disciplines, whose object is the set of human activities organized around the production and/or propagation of ideas, processes and artefacts. In its broadest interpretation the field is referred to interchangeably as 'social studies of (science) and technology' (Wajcman, 2002: 348), 'constructivist studies of technology' (Bijker, 1995: 6), 'social shaping of technology' (Lievrouw, 2002; Williams and Edge, 1996) or the study of 'technology in context' (Slack and Wise, 2002: 485). These labels signal a commitment to linking the micro-social level of human agency with the macro-social level of social structures in processes of science and technology production.

In these approaches, particular attention is given to the dynamics whereby actors ascribe meaning to, and interpret, technology. Scholars working in this field theorize, and/or untangle analytically, the complex interplay of technological and social/cultural elements in specific social settings, at a specific time. In other words, they offer different ways of conceptualizing the context within which technology can be said to exist.

Among the most influential are approaches that deal with technology broadly defined: Science, Technology and Society (STS)[9] (Cutcliffe and Mitcham, 2001; Bijker et al., 1987; Bijker and Law, 1992), Social Shaping of Technology (SST) (MacKenzie and Wacjman, 1999; MacKay and Gillespie, 1992), Social Construction of Technology (SCOT) (Bijker, 1995; Pinch and Bijker, 1984; Pinch, 1996), Actor-Network Theory (ANT) (Callon, 1991, 1986; Law and Hassard, 1999). Others still

[9] STS is often taken to stand for Science and Technology Studies.

have a somewhat sharper empirical object – computers or computer-based technologies. These include: Information Systems (IS) (Ciborra, 2002), Computer Mediated Communication (CMC) (Etzioni and Etzioni, 1999), Human-Computer Interaction (HCI), Computer Supported Cooperative Work (CSCW) (Button and Sharrock, 1998).

Some of the most influential theoretical constructs used in this body of literature originate in the work of social constructionist[10] scholars associated with the STS paradigm or its offshoots (SCOT, ANT and SST). Most notably, these include terms that speak to the relationship between technological and social forces: 'heterogeneity', the 'seamless web' of technology and society, 'contingency' and the 'interpretative flexibility' of artefacts. In what follows, these key notions are employed to conceptualize the involvement of producers and users in the production stage of technology.

3.2.1. Macro-level concepts: 'heterogeneity' and the 'seamless web'

One fundamental principle of Science and Technology Studies (STS), and echoed elsewhere, is the imperative of avoiding *a priori* distinctions between Technology and Society, that is, between elements deemed social in nature ('the social') and elements considered essentially technical ('the technical'). Bijker and Law (1992b) call this the 'postulate of heterogeneity'.

In lieu of an essential distinction between Technology and Society, one may envisage an overlap between the two. The postulate of heterogeneity is usually given currency through one (or both) of its conceptual avatars: the 'seamless web' of technology and society (Hughes, 1986; Bijker and Law, 1992a; Bijker, 1995) and/or the 'interpretative flexibility of technology' (Pinch and Bijker, 1984; Bijker, 1992;

[10] The terms 'constructionist', 'constructivist' and 'relativist' are used interchangeably in the literature. However, following Hacking (2001), I use the term 'constructionist' rather than 'constructivist' to refer to relativist sociologists; the latter term was originally devised for and in mathematics.

Law and Callon, 1992). The former can be viewed as a macro-level concept to do with structures and the latter as a micro-level concept that evokes agency.[11]

It is one thing to claim that Technology and Society – macro-level entities – are inextricable; it is quite another to carry over such an assumption into specific contexts. For specific technologies result from the actions of specific people. Raymond Williams (1974: 10) has argued along these lines in stating that the study of technology requires one to consider real practices and real decisions. In a related vein, Langdon Winner (1995) calls 'political ergonomics' the process whereby designers encode social and power relations into technological systems, while Mansell (1993; Mansell and Silverstone, 1996) has addressed the design of telecommunications networks from a similar perspective.

3.2.2. Micro-level concepts: 'interpretative flexibility' and the role of actors

In STS, the micro-level counterpart of the seamless web is 'interpretative flexibility', a term that binds technological form and meaning (the perceptions and interests of actors) in one whole, the configuration of which may evolve in space and time. Pinch and Bijker (1984) first imported the concept into the Social Construction of Technology (SCOT) from the relativist sociology of scientific knowledge, where the term served to underscore the intrinsic social nature of science.

In the SCOT framework, 'interpretative flexibility' is shorthand for 'the demonstration that technological artefacts are culturally constructed and interpreted' (Pinch and Bijker, 1984: 421). Similarly, Law and Callon (1992) use the concept to suggest that technological projects (i.e. specific technologies) 'represen[t] different things to different actors' (Law and Callon, 1992: 24). More specifically, interpretative flexibility is key to both a technology's design and its usage. Indeed, following Pinch and Bijker, it means 'not only that there is flexibility in how people think of, or interpret, artefacts, but also that there is flexibility in how artefacts are *designed* (Pinch and Bijker, 1984: 421; emphasis in original).

---

[11] Following the macro-micro distinction made by numerous social theorists (e.g. Coleman, 1990; Giddens, 1984; Cicourel and Knorr-Cetina, 1981).

Interpretative flexibility refers to the interplay between a specific technological innovation and the meaning it is ascribed by various actors before and after the artefact is actually materialized in discernable form. The constructionist argument states that the shape of a technology is a result of this interplay, or rather, of its 'closure' or 'stabilization'. That is, 'if technologies are stabilized, this is because the networks of relations in which they are involved, together with the various strategies that drive and give shape to the network, reach some kind of accommodation (Bijker and Law, 1992a: 10). In short, the artefact somehow embodies the consensus reached on its meaning by the members of a given social group. In this respect interpretative flexibility is a micro-level expression of the principle of heterogeneity: technologies are neither pure technical assemblage, nor a fabric of social relations – they are always both at once. However, lest technologies be seen as autonomous socio-technical formations, 'interpretative flexibility' makes clear that it is actors (or agents) that hold them together.

How, then, are actors characterized? Lievrouw (2002: 193) offers a broad definition of the agents of technological shaping: 'actors include anyone who makes choices that affect the subsequent uses or forms of the technology, including professionally trained specialists'.[12] Nominally, they may be 'entrepreneurs, industrial or commercial organizations, government bureaucracies, customers or consumers, designers, inventors, or professional practitioners' (Bijker and Law, 1992a: 9); or researchers, technologists, engineers, users, industrialists (Callon, 1991).

As for the role they play in constructionist accounts of production, actors are protagonists who strive to impose a dominant conception of socio-technical relations, if only for a brief time – until an alternative emerges and becomes more widely endorsed. Actors 'seek to establish or maintain a particular technology or set of technological arrangements, and with this a set of social, scientific, economic, and organizational relations' (Bijker and Law, 1992a: 9). Law (1987) has captured the

[12] There is an ongoing debate in the social studies of science and technology between theorists who claim that actors may be either human or non-human entities – this is the principle of 'general symmetry' defended by Callon (1986), Latour (1991; 1993), Law (1991), Law and Hassard (1999) – and those who claim agency as the preserve of human actors (Collins and Yearley, 1992; Gingras, 1995; Lievrouw, 2002; Lenoir, 1994). For reasons which will become clear with my argument, I side with the latter.

socio-technical nature of producers' work by labelling them 'heterogeneous engineers'.[13] Their effectiveness as producers lies largely in the deployment of strategies designed 'to box in the opposition – to stop it acting otherwise, going elsewhere, or successfully stabilizing its own alternative version of technological and social relations' (Bijker and Law, 1992a: 9).

The foregoing constitutes the first iteration in response to my main research questions: who is involved in the technical decision-making process and in what capacity? Answer: actors whose perceptions and actions affect the subsequent uses or forms of technology. But, although STS theories were originally devised to account for the construction, shaping or production of technology in a material sense (i.e. 'instantiation'), exactly what such terms have come to mean – and concurrently, how actors are depicted in the process – has shifted with the varying uses to which constructionist principles and theories have been put.

Both SCOT and the Sociology of Translation offer frameworks for analyzing the stabilization of socio-technical ensembles, but stabilization is measured differently in each case.

In SCOT, stabilization is appreciated in a broad context spread in space and time, as it is achieved through a system-wide consensus among designers and users on the meaning and material shape of a technology. In contrast, in the Sociology of Translation this broad spatio-temporal context is compressed and contained in the provisional formulations in which both the technological project and its stakeholders are defined. Here, the technology exists as a potential artefact and aside from the originators of a given project, all other actors exist as potential partners in production or projected users of the resulting artefact.

3.2.4. SCOT: relevant social groups and closure

Like most paradigms under the STS umbrella, the Social Construction of Technology (SCOT) research agenda draws heavily on the relativist Sociology of Scientific

[13] Hughes' (1983) notion of 'system-builders' was an earlier iteration of a similar idea.

Knowledge (SSK). By and large, the purpose of SSK is to account for the closure of scientific controversies, that is, the social, cultural and rhetorical mechanisms whereby knowledge claims come to be accepted as true by the members of a given community, thereby instating new scientific facts (Collins, 1981; Knorr-Cetina, 1999; Latour and Woolgar, 1979; Latour, 1989; Lynch, 1993; Pickering, 1995).[14] The first clear – and still influential – articulation of such ideas is attributed to the 'strong programme' in the sociology of knowledge outlined by Bloor (1976).

The strong programme argues that no knowledge can be detached from the circumstances of its production. In so far as it is the product of human activity, all knowledge is social through and through (Bloor, 1976: 3). The 'four tenets' for the sociology of scientific knowledge – causality, impartiality, symmetry and reflexivity – were laid as methodological tools to enable accounts of how individual and idiosyncratic beliefs become collectively endorsed beliefs, i.e. knowledge in wider society, scientific facts in science (Bloor, 1976: 7). It is argued that the consensus around a knowledge claim reached within a given group cannot be explained by the fact the claim is an accurate reflection of nature/reality. For in scientific controversies, the claim's status with regard to truth is not given to the actors involved – it is argued, demonstrated, debated. Therefore, for the sociologist of science, 'truth' is a product of science and it is *to be explained*; it is not a criterion used *to explain* the development of science. A claim's success or failure in achieving the status of 'scientific fact' depends not on its inherent qualities, but on social processes. As Latour has put it, 'nature is the outcome of consensus, not its cause'.[15]

In the SCOT framework, the dismissal of *a priori* distinctions between true and false beliefs is carried over in the form of the requirement of symmetry which in effect conflates Bloor's original tenets of symmetry and impartiality (Pinch and Bijker, 1984: 406).

---

[14] The adaptation of theories originally devised to deal with the production of science to the study of technology has been explicitly addressed by several relativist theorists (e.g. Barnes, 1982; Hughes, 1986; Ziman, 1984, 1978). See Ziman (1984) for a concise discussion of this.

[15] Such arguments are interpreted by positivist critics as a claim that science has no grounding in 'reality', that it is a fictional construction and that 'anything goes'. These criticisms overlook the key point made by relativists such as Bloor, Latour and others: the production of facts and artefacts must be understood *by focussing on the process, not its products.*

The aim of SCOT scholars is to explain the working of technology in the development phase in terms that do not presuppose its subsequent success or failure. In the study of technology, the question 'does technology x work?' is the heuristic equivalent of the question 'is knowledge claim x true?' in science studies. 'Working' is not understood, in an absolute sense, to mean strictly mechanical or technical functioning. Rather, it hinges on both an artefact's technical features and the actors' perceptions – it means 'useful functioning' (Bijker, 1995: 13). In this sense, working is a 'socially constructed assessment' (Bijker, 1995: 75). These notions are crucial in the context of this study, for they suggest that in order for an artefact to be considered a success it must be seen to be working for and by the actors involved with it at any given time. Who takes part in this assessment?

SCOT studies typically attend to the broad timeframe of 'development', following an artefact's movements between contexts of design and use – hence the actors that take part in its iterative shaping are, at least in theory, both producers and potential users. In practice, however, SCOT focuses on the latter: the potential users whose perceptions and actions somehow contribute to the shaping of an artefact over time. Bijker calls these potential users 'relevant social groups'. It is they who have the last word in the closure of technologies:

> Closure, in the analysis of technology, means that the interpretative flexibility of an artefact diminishes. Consensus among the relevant social groups about the dominant meaning of an artefact emerges and the 'pluralism of artefacts' disappears. (Bijker, 1995: 86)

If, as Bijker puts it, working 'is an achievement rather than a given', then it is the collective achievement of relevant social groups (Pinch and Bijker, 1984; Bijker, 1995). Crucially, Bijker conflates designers and users under the label 'relevant social groups'. This evokes the problem of 'overstated co-design' described in Chapter 2.

I want to argue that the social interactions of designers and the social interactions of users do not have the same implications for a given technology's existence. Bijker's (1995) account is a useful illustration. In saying that the bicycle would not exist without the interactions of designers, existence means material form, full stop. In saying that the bicycle would not exist without the interactions of users, existence means material form as it is now, as it has evolved or become. Arguably, the

terms of the negotiation of the existence of the bicycle are set out by the designers of the original artefact.

In line with this study's main theoretical question – how can one conceptualize the producer-user interface as it manifests itself in production, without positing the direct involvement of users? – what of the anticipation of success or failure by producers in the absence of actual users? Do producers not ask themselves *will technology x work*? – where working is understood, in Bijker's sense, as useful functioning? Their prospective assessments must somehow involve considerations of the projected users.

One can address the producer-user interface from the moment the idea of an innovation is formulated. Some scholars point to this line of reasoning in suggesting that what instates a relationship between producers and users is a **technological project**, if not a specific artefact (Akrich, 1992; Bardini, 2000; Cooper and Woolgar, 1993; Pacey, 1980; 1999; Pinch 1996, Woolgar, 1991). Clearly such an approach is appropriate to the study of endeavours such as Futurelab, which sets out to address perceived social needs.

Callon (1986) would suggest that the above questions are amenable to his 'sociology of translation'. Indeed a key distinction between his conception of technological production and that of SCOT hinges on the definition of people – actors in his model, relevant social groups in SCOT. He explains:

> '(...) the definition of groups, their identities and their wishes are all constantly negotiated during the process of translation. Therefore, these are not pre-given data but take the form of an hypothesis (a problematization) that is introduced by certain actors and is subsequently weakened, confirmed, or transformed.' (Callon, 1986: 82 [note 4])

Although Callon does not explicitly include the end-users of technologies in his description of 'actors as a hypothesis'[16] his conception fits the purpose of this study, as it allows one to address the assessment of functioning and success in a prospective manner, thus avoiding the 'use bias' criticized in the previous chapter. For this reason,

[16] In STS this shortcoming is corrected by Akrich (1992, 1995) and Hennion (1989).

it is one component of this study's conceptual framework and, accordingly, it is discussed in depth in section 3.4.1.

If the notion of problematization allows one to sidestep the 'use bias' and 'overstated co-design', it leaves unresolved the issue of the ontological divide, that is, the mutual isolation between the social contexts of production and use which is implied in most social studies of technology. The following sections attend to this matter by focussing on the resources the producers draw upon in their work within the laboratory and how these resources reveal production's embeddedness in broader social relations. In order to move forward, STS theories are articulated with elements of media and communication theory in what follows.

The argument underlying the conceptual discussion in section 3.3 is that producers and users may be seen as actor categories which come to be occupied by individuals, rather than ontological categories *per se*, that is, properties of individuals. Broadly speaking, producers and users occupy overlapping social spaces, and this overlap manifests itself in the former's knowledge claims with regard to the latter.

3.3. 'Designers and users are to technology what producers and receivers are to (mass) communication'

For media scholars, the distinction between designers and users evokes a relationship of communication in which senders and receivers are joined by a content/channel of communication.[17] But developments in media and communication theory are seldom acknowledged or systematically explored in scholarly work on the production of science and technology. When the relationship is explicitly thought of in relation to communication, it most often draws upon semiotics (i.e. structuralist, meta-level analyses) rather than interaction in a pragmatic sense. That is, the producer-user relationship is an artefact of analysis in much the same way that semiotics imputes meaning to macro-social phenomena and infers from these, the actions of individuals.

[17] Pacey (1999) is one of the few theorists of technology from outside the field of media/cultural studies to highlight this. Like many others, he later endorses a perspective influenced by semiotics.

This thesis adopts a pragmatic perspective[18] on the designer-user interface, that is, one which considers how this interface is experienced by the individuals themselves in production. Such a perspective speaks directly to the postulate, implicit in much social theory, of a fracture between the social world of producers of science and technology, on the one hand, and the people whose life is affected as a result of innovation, on the other. Arguably, this postulate is a variant of technological determinism: artefacts are produced in a context that is seen to afford one a privileged vantage point from which to analyse the social world, including the wants and needs of people. Subsequently, these artefacts are offered to society in the form of a technological solution. It is as though producers of science and technology acted solely with a technological purpose, *as producers* of science and technology, irrespective of their cultural background or other concomitant social activities. By considering the ways in which the relationship or interactions between senders/designers and receiver/users has been characterized in both studies of technology production and media and communication, a less restrictive conception can be envisaged.

The dynamics of this relationship pose a challenge both to media and communication theory and STS. In the former, the 'projected' or 'implied audience' remains a marginal notion discussed in fragmented works and it is undertheorized when measured against some recent developments in STS which treat user-related knowledge as any other kind of knowledge – they are claims that become validated as 'fact'. Conversely, from a media and communications perspective, STS has yet to take fully into account the nature of media and, more importantly for this study, the *social process of mediation* of which it is a crucial agent.

My aim is not to develop a dedicated model of new media production based on the argued specificity of media as opposed to science or technology. Rather, as the very existence of mass media (especially broadcasting and its expanded forms, such as the Internet) involves the continuous production of material for an absent third-party, media producers are engaged in an ongoing relationship with their audience(s), the dynamics of which can shed light on the production of technology broadly speaking. The audience is crucial to both the activities and identity of media institutions: the

[18] In line with Goffman (1959) and Meyrowitz (1985), this perspective is later labelled 'situationist' – production is envisaged as a particular type of social situation. See section 3.4.2.2.

uncertainty of audience response, as well as the mechanisms put in place in order to manage it, are built-in features of media practice. As McQuail (1987) has put it, the audience is both the cause and consequence of media production – the producer-audience relationship is a core feature of media theory, declined in a variety of ways.

In sum, if an argument is made concerning the specificity of (new) media in respect to other forms of technology, it will be in terms of the conceptions of the audience as mobilized by practitioners – what Livingstone (1998, 2004) calls 'the implied audience.'

3.3.1. Media theory: mediation and the origins of symbolic power

Much like the proponents of science and technology studies, scholars considering the media from a sociological perspective have attended to the ways in which media shape, and are shaped by, the social relations in which they are embedded.[19] For some, the study of mass communication or the media is prompted by the desire to understand the broader process of mediation within which the media are seen as a central agent (Couldry, 2003a, 2003b; Martin-Barbero, 1993; McQuail, 1987; Silverstone, 1999a, 2005; Thompson, 1995). As Silverstone (2005) remarks, the process of mediation can be understood as a necessary complement to the study of media and communication, yet in its explicit form it remains a marginal strand of inquiry.

Silverstone argues: '[m]ediation (...) requires us to understand how processes of communication change the social and cultural environments that support them as well as the relationships that participants, both individual and institutional, have to that environment and to each other' (Silverstone, 2005: 190). Thompson foregrounds the media's mediating role when he asserts that their use 'involves the creation of new forms of action and interaction in the social world, new kinds of social relationship and new ways of relating to others and to oneself.' (Thompson, 1995: 4). In a similar vein, McQuail builds a general framework for understanding the processes and relations of mass communication on two key propositions: 'First, the media institution is engaged in the production, reproduction and distribution of *knowledge* in the widest sense of

[19] This has also been brought to light, in a historical perspective, by Innis (1999), McLuhan (1962), Eisenstein (1993), Goody (1987). I am concerned more with 'situated', sociological accounts.

sets of symbols which have meaningful reference to experience in the social world' (McQuail, 1987: 51, italics in original). Second, 'mass media have, as one meaning of the word connotes, a mediating role, between objective social reality and personal experience' (ibid.: 52).

Thus conceived, the mediation of social relations through mass communication appears to fit the social constructionist agenda outlined in the previous sections, in so far as both attend to the connections between individual experience and a broader, collectively-endorsed reality. For Couldry, Thompson and Silverstone, this entails the framing of mediation in terms of power, more specifically symbolic power. Following Bourdieu (1991), Couldry defines symbolic power as the capacity to construct one's own reality, as well as that of others (2003a: 1). He argues that 'in contemporary mediated societies, [...] symbolic power is concentrated particularly, although not of course exclusively, in media institutions' (ibid.).

Thompson describes symbolic power as the 'capacity to intervene in the course of events, to influence the actions of others, and indeed to create events, by means of the production and transmission of symbolic forms' (Thompson, 1995: 17), and he argues that its key depositories are religious institutions, educational institutions and the media. Similarly, Silverstone suggests that mass/mediated communication both produces, and is a product of, a specific social order, making it essentially political: it seeks 'to persuade, seeking to define one reality as opposed to another, including and excluding while at the same time informing and entertaining' (Silverstone, 2005: 192). Thompson (1995: 29) argues that mass communication instates a 'structured break' between production and reception of media.

One notes an affiliation with the British Cultural Studies tradition, which traditionally has tackled the very question of symbolic power as it is negotiated through the media. In the process of symbolic exchange that binds producers and receivers of media products, the latter are conceived of as relatively autonomous, 'active' individuals involved in the decoding of media texts, most notably television productions (e.g. Ang 1995; Hall, 1980; Livingstone 1998; Morley, 1992).[20] For all

[20] For instance, Morley's seminal study of the differential readings of news programme *Nationwide* by various constituencies within the UK audience mobilized Hall's encoding-decoding model to great

their conceptual richness, however, Cultural Studies approaches tend to consider media texts as given entities – what Cultural Studies mean by 'encoding' is effectively a product, not a process. Indeed, regardless of whether specific contents are subsequently accepted, rejected or negotiated by the audience, symbolic power is seen to have institutional origins, and the media institution is treated as a black-box – it is reified and its inner, intrinsically social workings are seldom questioned.

This is true in both Thompson (1995) and Silverstone (1999a, 2005).[21] The problem here is not the neglect of production *per se* (the study of reception is a rich and complex field in its own right), but its exclusion from what are, in essence, theoretical attempts at outlining nothing less than a new sociology – of mediation, or mass communication – and its implications for social relations at large.

Arguably, the persisting imbalance between, on the one hand, the media-as-institutions and, on the other, the audience-as-individuals, is in need of redress. For the notion of mediation as it has heretofore been theorized – it is the exercise of symbolic power by individuals and institutions – largely fails to acknowledge that those media/technology institutions which presumably hold symbolic power are made up of individuals. More to the point, they overlook the fact that the experiences and perceptions upon which these individuals draw in the encoding process do not consist of a monolithic whole. Furthermore, some individuals may occupy both the social spaces of production and reception (all producers do, arguably), thus enabling meanings to bridge this divide in more complex ways than the one-way flow from the media to its audiences.[22]

As Pacey (1980; 1999) and Dornfeld (1998) argue, one must abandon the idea that 'producers' are monolithic and over-powering institutions ('the media'), to

---

effect. Ang's conceptions of the 'active audience' have been very influential. Buckingham (2000) has written extensively from a cultural studies perspective on the young audience specifically.

[21] This often involves an ellipsis in argumentation whereby production and reception are acknowledged as equally important, but the former is subtly dropped in favour of the latter, with no suggestion as to the conceptual implications for production. Examples are found in both Thomspon (1995) and Silverstone (2005).

[22] To be fair, Silverstone, for one, does not consider production as a simple or uninteresting activity, nor does he suggest that meanings have a unidirectional or unproblematic flow from media to audiences. However, I take issue with his equation of 'complexity of meanings' with 'reception' exclusively, at the expense of production. One might argue that 'producers have an everyday life, too'; that the whole of their social and cultural experience is not limited to, or defined by, their status 'as producers'.

consider instead the contributions of individuals acting within them. One might want to ask in what ways new media incite individuals to create content, to express themselves for the benefit of 'distant others'. From a sociological perspective a fruitful set of questions is: 'if mediated quasi-interaction is made possible by technical media which bridge the spatio-temporal gaps between dispersed groups or communities, can this form of interaction be accounted for in production?' The suggestion here is that the willingness or capability to act as a producer of technology or media content may have as much to do with social relations quite independent from technology, than with technology itself (Mansell, 2002). As Pacey argues in his outline of a 'humanist approach to technology', 'personal experience is significant, and something we ought to acknowledge' (1999: 11).

If one conceives of an ongoing relationship of mediation amongst three types of actors – broader society, the media (producers) and an audience –, the approaches outlined above really only address 'how broader society is mediated for an audience, by the media'.[23] In terms of symbolic exchange, mediation thus appears as a one-way flow from broader society to an audience, *qua* the media (producers) – the latter deriving symbolic power from its role of hinge, gatekeeper or agenda-setter. In contrast, the perspective I want to develop addresses 'how broader society (including audiences) is mediated by producers, amongst themselves and for audiences.'

In sum, although the symbolic power of media institutions is undeniable, there is a layer of individual experience and action in production that must be accounted for – mediation within production rather than through media products. The source of the symbolic power which leads to, and makes up, new media technologies, must be reconsidered.

As a way forward, I propose a broader understanding of the nature of audiences. As argued earlier, the distinction between 'broader society' and specific audiences is an artefact of theory, not an objective empirical reality. For some scholars, audience conceptions are held, negotiated and validated by the producers of media,

[23] Actually, given the focus on the reception of media products rather than production per se, it might be more accurate to say the focus is on 'how the audience responds to the way in which broader society is mediated for them, by the media.'

both 'traditional' (Allor, 1996; Ang, 1991; Esquenazi, 2003; Hartley, 1992; McQuail, 1987, 1997) and new (Hine, 2001; Livingstone, 1998, 2004). Ang has argued that 'the audience is not the innocent reflection of a given reality' (1991: 35); that it is constructed by media institutions 'as an objectified category of others to be controlled' (1991: 154). Similarly, according to Allor (1996), media producers enact a 'politics of producing audiences'. An understanding of this process thus affords insight into the relationship that binds producers and audiences, and the (symbolic) resources mobilized by the former in the course of their work.

3.3.2. The nature of audiences: 'media origination' and 'society origination'

McQuail conceives of the relationship between senders and receivers by referring to canonical models of (interpersonal) communication, and then considers how such conceptions translate to contexts of practice within media institutions, that is, how media practitioners relate and interact with their audiences.

McQuail asserts the audience's 'dual character': 'audiences are both a cause of, and a response to, a supply of messages' (McQuail, 1987: 215). His typology of audience formation reflects this dual character in separating audience conceptions into two groups, according to their impetus: 'society as source' and 'media as source'. These correspond, respectively, to a view of the audience as 'a collectivity which is formed either in response to media (channels and content) or out of independently existing social forces' (McQuail, 1987: 215). Beyond the typology derived from these considerations, it is their implications with regard to the producer-user interface, and the possibilities of interaction, which I want to stress here.

McQuail captures such an impetus in indicating seven specific contexts in which a sender-receiver interaction may be said to occur. These are: the vicarious relationships audience members entertain with media content; the influence of critics and fans on content; institutionalised accountability; the working of the market (i.e. the exercise of free choice by audiences); direct 'feedback' from the audience; audience research; and the use of 'audience images' by media practitioners (McQuail, 1987).

McQuail's brief outline of 'the use of audience images' expands his concept of 'society origination' in the direction I call for above.

A limited but distinguished number of authors in the media studies tradition have discussed 'audience images'. In their treatment, conceptions of audience images range from the psychological (the producers' fantasy) to the sociological (the producers' social experience).

3.3.3. Audience images: between fantasy and experience

The concept of audience images rests on the assumption that media practitioners are influenced by social experience that is prior or concomitant to the current production endeavour. The notion in its various guises emerged in the few years immediately following Katz and Lazarsfeld's (1955; Katz, 1957) seminal work on the two-step flow of communication, which revealed the role of personal influence in the diffusion and reception of mass media products. Katz and Lazarasfeld's major contribution was the idea that the flow (thus the influence) of media messages from its producers to the audience is best seen as an indirect, or rather two- (and later multi-) stepped process: from the producers to opinion leaders, and from opinion leaders to the wider public.

I want to suggest that the notion of audience images describes a similar process, but in reverse: information about the audience can be gathered by the producers through means of direct and purposive interaction such as audience research, but it may also make its way into production through indirect channels, i.e. audience images.

Audience images designate 'the practice by media sources of constructing "images" of the audiences or anticipated audiences for which they shape their messages' (Bauer, 1958; Pool and Schulman, 1959 in McQuail, 1987: 245; Schramm and Danielson, 1958). The earliest formulation of the concept may be attributed to the psychologists Zimmerman and Bauer (1956), who demonstrated that 'the anticipation of communicating to an audience of which one has a definite image can affect what an individual will remember of new information to which he is exposed' (1956: 245). Conversely, they argued the following: 'It might well be that the audience, by

influencing the way in which an individual organizes the presentation that he makes to it, would in effect cause him to play a role' (Zimmerman and Bauer, 1956: 239).

The origins of Zimmerman's and Bauer's study are highly relevant in their allusions to what might be aptly described as a 'pre-purposive' context of interaction between sender and receiver:

> We were studying mechanisms whereby foreign travel might affect the attitudes of an American traveller. (...) It seemed quite possible that a returning traveller often did not formulate his impressions of his experiences abroad until a friend asked him for these impressions or until he was asked to give a speech. While abroad, he had been absorbed in the business of living. (...) His overall impression, we suspected, he would produce for the first time when confronted (in fact or in thought) with an audience back home for whom he had to make a synthesis. If that were so, the audience, as much as the experience, might prove decisive for what the travel experience meant.' (Zimmerman and Bauer, 1956: 239).

In sum, individuals involved in production may not articulate their ideas of certain groups before being put in a situation where something is to be produced – this may trigger or *reactivate* certain parts of their social experience.

In a related vein and in the same period (yet there is no explicit connection between the studies), Gans' (1957) exploration of what he terms the 'creator-audience relationship' takes 'audience images' from a psychological conception to a more sociological one. Like Zimmerman and Bauer, Gans (1957) moves beyond simple feedback mechanisms whereby the creators of movies come into contact with their audiences, to conceptualise the '*prior feedback* which operates within the movie-making process itself' (Gans, 1957: 315; my italics). He argues that moviemakers (producers, directors, writers, actors and others) may rely on hard data on the consumption habits of audiences or, indeed, use market research to make inferences on the future behaviour of audiences, but ultimately creators are left with an inevitable uncertainty as to the success or failure of any given production.

The prior feedback mechanism is the use of audience images by the creators. Hence Gans' model can be seen as a refinement of McQuail's notion of the 'dual character' of the audience as cause and consequence of media products. Moreover, Gans' description of the process makes it amenable to the conception of a proper

relationship between sender and receiver, prior to the existence of a particular technology:

> Every creator is engaged to some extent in a process of communication between himself [sic] and an audience, that is, he is creating *something* for *somebody*. This somebody may be the creator himself, other people, or even a nonexistent stereotype, but it becomes an *image* of an audience which the creator develops as part of every creative process. For analytical purposes this *audience image* can be isolated from the creative process as a whole. This image, though projected by the creator, functions as an external observer-judge against which he unconsciously tests his products even while he is creating it. As a result, the creation of any product may be described as a series of steps in which the creator selects one solution out of several possible ones, partly on the basis of the supposed judgement of this audience image. Obviously, the literary and other requirements [e.g. the technical possibilities or options] of the product to be communicated are also involved in the selection between alternatives, but in the mass media product, these are often less important than the expectations of the audience image. (Gans, 1957: 316; italics in original)

Gans stresses that 'audience images' are not a unitary concept. They have an inherent variety which is owed to two factors. First, media creation is a collective enterprise and all those involved in production may have different conceptions of the audience(s). Second, as the success of media products is usually assessed in terms of quantitative response, creators seek to attract a wide, and therefore diverse, public within the general population.

In addressing more generally the creator's capacity to work 'as a creator' in a given field (in this case, filmmaking), Gans argues: 'his image changes somewhat from movie to movie, but it can do so only within limits which are imposed on his sensitivity and skill by the familiarity he has with the social, cultural and psychological experiences of the total audience' (Gans, 1957: 319). Thus, the work of creating media products presupposes some (rather intimate) knowledge of society broadly speaking.

It is worth recalling Zimmerman and Bauer's (1957) finding that in a situation of communication, the new information one will remember – let alone see as relevant – is a function of the audience one has in mind. Thus, through a form of circular reasoning one is led back to the creators' experience which, in essence, is a fabric of social relations somewhat independent of the production activity at hand, but whose relevance is (re)activated within the specific context of this activity.

However, the early models of audience images reviewed so far are limited in that they provide no means of interrogating the settings in which the producers' social experience takes shape and how this affects negotiations within the sites of production. For this, I now turn to Dornfeld's (1998) model of the overlap between activities of production and consumption. In Dornfeld's conception, participants in the technical decision-making process make contributions that can be partly explained by their 'status' as media professionals, specialists or experts, and the corresponding forms of knowledge they bring to bear on the negotiation process (professional, specialist, expert). Perhaps more fundamentally, these forms of knowledge are intertwined with social experience which is dislocated from the sites of production, both spatially and temporally, and which may have little to do with specialist training or certifications of any kind.

3.3.4. Media production: audience images and social experience

Dornfeld's (1998) work on the production of the PBS documentary *Childhood*, aired in the early 1990s, sheds light on the ways in which the media-audience relationship plays out in production. From a theoretical perspective, Dornfeld seeks to restore producers to a more central place in media theory, by consolidating audience and production studies. He argues that the reach of cultural mediation can only be grasped by attending to not only 'the representations produced by media organizations, but more fundamentally the practices of media production that drive the creation of those representations' (Dornfeld, 1998: 10). This does not involve treating producers as the agents of a dominating influence on audiences. Rather his point is a sociological one: that production and reception should be seen as intertwined processes (Dornfeld, 1998: 188).

Dornfeld characterizes the people involved in the making of the PBS documentary *Childhood* as 'popular anthropologists'. That is, they are producers of more or less formalized knowledge – assumptions, surmises, intuitive understandings, first-hand observations – pertaining to cultural conceptions of childhood which they then inscribe and impart to the American viewing audience.

The producers' activities within the sites of production arguably are another instance of popular anthropology: one whose object is the audience. As Dornfeld demonstrates, the producers' practice of this activity is not limited to the filmmakers' engagement with the 'subjects' of their productions, i.e. those who appear on-camera. It extends to the activities through which the filmmakers engage with a third party – the projected audience of the final product. The filmmakers also mobilize a set of assumptions, surmises, intuitive knowledge and first-hand experience pertaining to what they believe to be the PBS audience. Dornfeld subverts the PBS slogan, 'Viewers like You', to mirror the reflexivity of producers, who think in terms of 'Viewers like Us'. These devices form what Dornfeld calls 'prefiguring the audience' and they engage a combination of the producers' professional training, cultural background, aesthetic conceptions, and personal contact with cross-sections of the total audience.

In terms of the audience's role in the process, Dornfeld notes:

> It became clear in these discussions that both sides of this debate defend their positions by invoking audiences, either empirical ("I have not heard that response from anybody that has seen the footage"; "I have") or presumed ("Every parent knows it", but it is "interesting for the audience"; "it's totally familiar knowledge"). (...) Following the lead of recent audience research, it is illuminating to consider how the social and personal backgrounds of various staff members might condition their interpretative frameworks. Although most of the staff members came from a similar class segment (...) significant variations existed in cultural background, advanced degrees, and types of production experience that influenced their work. (Dornfeld, 1998: 66-67).

Although he does not systematically pursue the investigation of his respondents' backgrounds in his study, Dornfeld recognizes the need to address the frameworks individuals use in the encoding of cultural productions in the widest possible way, including their concomitant social activities and their previous, professional and non-professional social experience. Such a broad conception is not meant to ignore or deny the specialist occupational practices and knowledge that may accrue form the position of media practitioners within specific media institutions and the training that may have led them there. Rather, it situates these very skills, knowledge and social positions in the broader context of social relations:

> The abundance of acts of evaluation and interpretation that cultural producers engage in as a necessary and formative dimension of their productive work and as a self-defining activity in other dimensions of their lives. It allows us to see producers, not only in their specialized institutions, but as agents grounded in the same types of interpretative worlds in which their audiences are (...). (Dornfeld, 1998: 16; italics in original)

As one can glean from a survey of the literature dealing with media production broadly conceived, there is no unitary sociology of production, that is, no equivalent of the theoretical canon that exists, for instance, with respect to media reception or consumption – one largely derived form British Cultural Studies (Livingstone, 1998). Studies of media production in which some of the ideas discussed above may be found are thin on the ground and,[24] as has been suggested, they are in large part fragmented. Even the most recent and accomplished contributions towards an eventual sociology of production omit the groundwork laid by the reputed media scholars that are Pool, Schramm and McQuail. Most are conducted within a theoretical framework at least partly inspired by the sociology of work/professions, and few make the relationship between media practitioners and their audience(s) a key concern. This is true of Burns' (1977) *The BBC: Public Institution and Private World*; Schlesinger's (1978) study of the making of BBC News; Silverstone's (1985) *Framing Science*; Negus' (1992) investigation of the popular music industry and Glevarec's (2001) study of radio production at *France Culture.*

In order to address how the negotiation of audiences/users is effectively carried out in a context of production, a conceptual framework drawing together elements from STS and media studies is needed.

3.4. Elements for a sociology of production: synthetic conceptual framework

This section sets out the conceptual framework for this study, which aims to account for the producer-user interface as it manifests itself in production, without positing the direct involvement of users. Based on the foregoing discussion, it builds upon a number of observations and positions with respect to the existing debates about the modes of involvement of actors in the life-cycle of technology and the (social, cognitive) resources drawn upon by the producers in the course of production.

---

[24] Livingstone and Lunt (1994) have discussed how the home audience can be represented/embodied by a studio audience, and the implications of this for the critical reception of media contents (in this case, public-debate programmes). In his study of the public radio broadcaster *France Culture*, Glevarec (2001: 381) argues that the audience is a third party in the production of media content, but one which, in the everyday activities of producers, is implicit, i.e. whose 'presence is signified rather than directly addressed.' (author's translation)

3.4.1. The pre-history of artefacts: problematization and mediation

The discussion of the key concepts in Science and Technology Studies presented in section 3.2 shed theoretical light on the question: *who is involved in the technical decision-making process in new media production and in what capacity?* Both the Social Construction of Technology (SCOT) and the Sociology of Translation suggest that accommodation or compromise in the shaping of technology involves all concerned parties and that technologies can only be considered once some degree of stabilization is achieved. Both these assumptions are taken onboard, as they attribute the closure of technology to human agency first and foremost. However, SCOT and translation differ in the manner in which they define the modalities of actor involvement, as well as in the outcomes that are engendered in the process.

The evolutionary model of technological development proposed by SCOT establishes a link between the closure/stabilization of artefacts and the relevant social groups, which are the 'carriers of the process of technological development' (Bijker, 1995: 48) by virtue of their engagement with the artefact and its overall effect on the shaping of a technology. SCOT's inclusion of actors/relevant social groups – 'anyone who makes choices that affect the subsequent uses or forms of the technology' (Lievrouw, 2002: 193) from both sides of the design-use divide makes it difficult to address the 'here and now' context of production in the manner proposed by this study.

In contrast, translation holds that actual users need not be involved in production for the 'useful functioning' of artefacts to be established. This is especially true in the first stage of translation: problematization/interessement. Indeed, the broad context of technology development is compressed and contained in the provisional formulations in which both the technological project and its stakeholders are given shape – 'inscriptions' or 'intermediaries', following ANT terminology. The technology exists as a potential artefact and aside from the originators of a given project – who may be treated as 'producers' – all other actors exist as potential partners in production and/or projected users of the resulting artefact. This perspective allows for both producers and users to be seen as involved in stabilization within production, for both

are required in the persuasion of others and, ultimately, the attainment of a consensus. But only producers exercise agency. In this sense production may be conceived as epistemologically self-sufficient: only producers effectively take part in technical decision-making.

In the sociology of translation[25] (Callon, 1991; 1986) the principle of heterogeneity and the seamless web of technology and society, discussed in section 3.2.1, take the shape of 'socio-technical networks'. These networks bring together a diversity of human and non-human entities in the 'conception, elaboration, production and distribution-diffusion of production processes, goods and services' (Callon, 1991: 196). Translation bears a strong resemblance to SCOT studies in that it too is concerned with the ways in which socio-technical networks reach stabilization. The key difference is that here the focus of investigation is the creation of consensus in the stages leading to the production of scientific knowledge and/or indeed the original materialization of a technology.

The sociology of translation suggests that consensus – defined as the convergence of interests of all actors involved in production – is performed by actors rather than being a natural occurrence or, as within SCOT and the Diffusion of Innovations (cf. section 2.4), the result of negotiations held in the long-term of development. Though Callon's original model (1986) was developed in relation to the production of scientific knowledge rather than technology *per se*, it has been widely used in the study of technology precisely because it is located in very early negotiations, before black-boxes – whether facts or artefacts – are closed.

Translation is defined as a process 'during which the identity of actors, the possibility of interaction, and the margins of manoeuvre are negotiated and delimited' (Callon, 1986: 68). It comprises four key moments: problematization, interessement, enrolment and trials. Problematization is the phase in which the originators of a scientific or technological project set out their objectives and the key questions/problems to be tackled. For this reason it may be seen as the 'pre-history' of

[25] Although it evolved into Actor Network Theory, I find it more useful to use the term 'sociology of translation' so as to avoid the complications linked to the radicalisation of the semiotics programme and ANT.

a technology. It involves the definition of a set of questions on the state of the world to which the project originators seek answers (e.g. *do scallops of variety X attach themselves?* Or *is it technically possible to do X?*). Crucially, it also involves the designation of actors concerned by the project, as the originators perceive them. As Callon puts it,

> (...) in their different written documents the three researchers did not limit themselves to the simple formulation of the above questions. They determined a set of actors and defined their identities in such a way as to establish themselves an obligatory passage point in the network of relationships they were building. This double movement, which renders them indispensable in the network, is what I call problematization. (Callon, 1986: 69)

Problematization is not an exercise in description; it is a strategic, political endeavour in which the originators seek to produce convincing definitions of the concerned actors and their interests and, in so doing, to argue that these interests will be best served through the acceptance, by all concerned, of the proposed research programme or technical object. Elsewhere Callon refers to this process as the 'interdefinition of actors', to further stress that a successful problematization not only validates the identity and interests of the concerned actors, but also the identity of the project originators themselves – as obligatory passage points, that is, as the key actors without whom the enterprise would fall apart.

Problematization consists of the mapping of a hypothetical 'system of alliances, or associations, between entities, thereby defining their identity and what they "want"' (Callon, 1986: 70). In line with Callon, this thesis treats the timeframe under consideration – that which precedes materialization in technology's so-called life-cycle – as one of problematization. In this timeframe, the actors are concerned with the definition of a technological endeavour and of those people concerned by it, i.e. relevant social groups.

However, Callon's model does not address the intended users as such. The object of negotiations among actors is essentially an artefact (not users) and actors are conceived of essentially as potential partners (not users). For this reason I want to supplement translation with Akrich's (1992) 'inscription-description' model, which

was developed specifically for the analysis of technological artefacts, as opposed to scientific facts.

In her model of technological 'inscription-description', Akrich (1992) introduces the intended users of a technology in the problematization/interessement stage. She argues:

> (...) when technologists define the characteristics of their objects, they necessarily make hypotheses about the entities that make up the world into which the object is to be inserted. Designers thus define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of 'inscribing' this vision of (or prediction about) the world in the technical content of the new object. I will call the end product of this work a 'script' or a 'scenario'. (Akrich, 1992 : 208)

Inscription involves the assessment, in production, of whether or not a technology *works*, in the sense argued by SCOT (Bijker, 1995; Pinch and Bijker, 1984). However, here the artefact is conceived of in terms of its 'useful functioning' for the relevant social groups, but this is determined by the designers. That is, 'useful functioning' (cf. Bijker, 1995) is projected and 'closure' is rhetorical rather than material (cf. Pinch and Bijker, 1984) At the point where SCOT analyses typically begin, artefacts can indeed be said to have been previously adjudged to be working, having already been validated by the producers.

Nevertheless, Akrich is one step removed from focusing on the actual users of a specific technology (cf. 'users-as-designers'), considering instead social groups who may eventually become users (Akrich 1992, 1995). Here as in translation, it is the producers who first define the intended users, thereby establishing a set of constraints for the subsequent designer-user relationship – a scenario – which the users are free to accept or reject. Therefore, the users are conceded a key role in the process, in that their 'refusal' to accept the role defined for them threatens the stabilization of the technology. But Akrich rules out the necessity of intended users being physically present in the laboratory for them to count. In the initial stages of design, intended users are but a hypothesis, an object of mediation between designers – the users are 'treated as an instrument for building a relationship between [two sets of partners in production]' (Akrich, 1992: 220). The producers seek to validate cognitive

representations of the users in order to reduce the uncertainty of the technology's success in the subsequent development phase.

The conception of users as 'object of mediation' is a further component of this study's conceptual framework. In sum, intended users are given a crucial role in the process of initial design, but they are not granted agency in the design process, at least in the very early stages. Intended users are merely relevant social groups which must be identified and whose features (e.g. their wants and needs) must be agreed upon by producers.

Both Callon's and Akrich's models are driven by a dynamics of representation, which, like the 'users-as-designers' approaches reviewed in Chapter 2, involve all actors concerned by the technological project and grants them a say in the process of technological shaping. Also, both models show that in the very early stages of production, the producers define the identity and interests of others, be they potential partners, competitors or users. If translation means 'to express in one's own language what others say and want, why they act in the way they do and how they associate with each other: it is to establish oneself as a spokesman [sic]' (Callon, 1986: 81), then in science and technology production, this is the work of producers (and not users), who are thereby the prime movers of socio-technical networks. Moreover, both models argue that all interactions amongst actors follow from the first iteration of a project which is thus attributed a structuring effect[26] on all subsequent interactions.

At the heart of both translation and inscription-description are dynamics of representation.[27] Elsewhere in STS this is described as 'action-at-a-distance' (Latour, 1988), the 'attribution of causes' (Callon, 1991) or, more relevantly here, as 'mediation' (Hennion, 1989) – all are actions made possible by representation. Accordingly, and building on Akrich's model of inscription/description, Schot and de

[26] Here structure can be understood, loosely, in the sense it is given in institutional political economy. In this sense the structuring effect is analogous to Garnham's (1990) notion of determination, as used in his Political Economy of Communication and Culture (PECC): the structure does not rigorously dictate outcomes – it makes some outcomes more likely than others.

[27] This is not an entirely original viewpoint, as science has in the past been depicted in such terms (Lenoir, 1994). However, it is typically the 'cognitive' sense of representation that has been emphasized, i.e. the relation between scientific knowledge and reality, what Pickering (1995) amongst others calls 'the problem of correspondence'. Callon's model entwines the cognitive aspects of representation with sociological, or political/diplomatic, dynamics.

la Bruheze (2003) suggest that a useful addition to the concept of 'real user' and 'projected user' is that of 'represented user':

> The mediation process can now also be perceived as a process of articulation and negotiation of projected users [...]. In this process, we would like to argue, a third kind of user participates: the represented user, brought into the process by mediators who often claim to represent specific users. (Schot and de la Bruheze, 2003: 235)

Thus, in the early stages of innovation the producers do not merely inscribe their vision of a consensual set of 'projected users' into their artefacts; the representation of users takes place through negotiations amongst the producers:

> Implicated in the process of mediation is the contestation of these users and their demands, the quality of the projections (by designers), the legitimacy of the representations and the representers, and the acceptance of real users. (Schot and de la Bruheze, 2003: 235)

These considerations are crucial for this study as they indicate that one need not go beyond problematization and interessement in order to assess the role of all actors in production as perceived by the producers (cf. this study's pragmatic approach). In spite of the overlap of the key moments of translation, for the purposes of this conceptual framework a distinction is made between problematization and interessement, on the one hand, and the subsequent enrolment and trials. Problematization and interessement comprise the actions whereby translations are prepared and the argumentative means producers use to establish their credibility in determining who the relevant social groups are and what they want.[28] Enrolment and trials suggest, on the other hand, direct interaction with the object of translations, i.e. the actors whom producers attempt to represent. This study is mainly concerned with the former: problematization.[29]

Such an outlook does not preclude user involvement, for producers display an awareness and concern for the projected audiences/users of the artefacts they produce. In some instances this may be the key to negotiations, as Schot and de la Bruheze

[28] Henceforth the term 'problematization' will be taken to refer to problematization/interessement.

[29] In Callon's seminal study the three researchers' original motivation – the genesis of the project – stems from a voyage to Japan in which they discovered scallops were successfully being cultivated there. However, Callon asserts that 'where they [the researchers] came from and why they act is of little importance at this point of the investigation' (1986: 68). It is arguably as a result of not addressing the original formulation of projects that Callon introduces a conceptual distinction between problematization and interessement.

(2003) suggest. In a context of collective innovation, claims about relevant social groups are likely to be made and debated collectively prior to materialization. This being the case, the focus of investigation may be 'rhetorical closure' rather than the 'material closure'[30] dominant in SCOT studies. Accordingly, this study treats potential users as the content – rather than the agents – of mediation and eventually closure.

In line with Akrich, Hennion and Schot and de la Bruheze, this thesis is chiefly concerned with the mediations performed by one set of (human) actors – the producers – between their fellow producers within the laboratory and relevant social groups who are not present. These mediations are treated as manifestations of the producer-user interface in problematization. The first task of analysis is to show how mediation plays out in problematization, thus providing an answer to the first theoretical sub-question: What (social) mechanisms take the place of direct user/audience involvement in the absence of actual audiences/users and how do these mechanisms shape a technological endeavour?

In so doing, the use bias and overstated co-design between designers and users, stated at the outset of this chapter as key theoretical problems, are avoided. Indeed, the focus of the study is maintained on the timeframe of production – conceived of as problematization – and producers are envisaged as the only actors who exercise agency therein, by acting as mediators between the contexts of production and use.

But then, if at the outset of production the users are a hypothesis and all scripts are equally valid, what resources do producers draw upon and what makes some individuals more apt representatives of the users' wishes, needs, requirements and so on? These questions concern notions of specialist knowledge and expertise and they are subsumed by this study's second theoretical sub-question: What do these mechanisms [of mediation] tell us about the claimed specialist knowledge of producers and prevailing notions of expertise?

---

[30] In their seminal paper, Pinch and Bijker assert that '[c]losure in technology involves the stabilization of an artefact and the disappearance of problems' (1984: 426). They make a distinction between two kinds of closure: material and rhetorical. I believe rhetorical closure can do much work in the analysis of technology, especially in the production phase, pre-materialization. In other words, it is suitable to a context of anticipation. Pinch and Bijker's notion of rhetorical closure implies that a problem need not be solved as such in order to be accepted by relevant social groups; one need only be convinced that it is so. It is not fully addressed by Bijker and remains associated with the resolution of controversies in the realm of scientific, rather than technological, production.

3.4.2. Media/technology production as legitimization of 'experience-based expertise'

Scholars in both STS and media studies have underscored the importance of prefiguring the audience/users to the work of producers. In media studies, Allor (1996) calls this 'the politics of producing audiences'; Dornfeld (1998) argues that media producers act as 'popular anthropologists' in claiming detailed knowledge of their audience's preferences, cultural understandings, and so on. Similarly, in STS, Woolgar (1991) describes the process of 'black-boxing the user' which is central to technology production, while Bardini (1996) labels the cognitive and political resources mobilized by the producers within this process as a form of 'implicit sociology', that is, a set of more or less formalized conceptions of the users.

For the purposes of this study, both sets of concepts are apt characterizations of the resources mobilized by the actors involved in new media production, for they stress the central importance of user-related knowledge in production ('the politics of producing audiences'; 'black-boxing the user') whilst conveying the open-ended and relatively informal – or at least emergent – nature of mediation in epistemological terms ('popular anthropology'; 'implicit sociology'). The latter point deserves further discussion.

Dornfeld (1998) explores the social grounding of mediation in conceptualizing an 'overlap between the spheres of production and reception'. In his account, producers mobilize a set of assumptions, surmise, intuitive knowledge and first-hand experience pertaining to the social groups they believe to be the Public Service Broadcasting (PBS) audience. He illustrates this insight by subverting PBS's slogan, 'Viewers Like You', to mirror the reflexivity of producers, who think in terms of 'Viewers Like Us'. In STS, Bardini's (1996) notion of the 'reflexive user' describes a similar process. In both cases, producers make inferences from their interactions with people they can observe directly (whether themselves or others) to a putative group of people they hope will eventually make up the audience/user group of a given artefact.

The reflexivity of the producers entails, as McQuail (1987) has put it, that the audience is both the cause and consequence of production. Zimmerman and Bauer (1956) argued as much through the notion of 'reactivation of experience', while Gans (1957) captures this paradox in his notion of 'prior feedback' – the producers have audience images in mind that inform their work from the outset. These images, Gans argues, allow the audience to 'follow the producers' into the sites of production.

Such circular reasoning is central to my undertaking as it forms the basis of the producers' specialist knowledge, or expertise, thus suggesting an alternative view of producers of technology. In the study of technology, two opposed conceptions of producers may be distinguished. On the one hand, historical approaches have tended to portray them as technically gifted individuals working in a social vacuum. This is the case whether they are considered as 'inventors' or 'entrepreneurs', as in the influential work of Schumpeter (Schumpeter, 1934; Freeman, 1992). As a response to this, sociological approaches have depicted producers as 'heterogeneous engineers' (Law, 1987) adept at building socio-technical networks through political savvy. Here, it is as though producers of science and technology act solely with a technological or entrepreneurial purpose, *as producers* of science and technology, in isolation from their cultural background or other social activities.

In contrast, and in keeping with Dornfeld (1998), the conceptual framework outlined in this section is driven by the need to consider the social relations of producers as involving different kinds of knowledge (expert vs. general social/cultural or lay), and extending in both space and time. That is, it treats mediation as a process whereby individuals in one particular setting – a site of media production, a 'laboratory'– claim, share and sustain knowledge of groups which they may have gained in altogether different spatio-temporal settings.

This thesis argues that one must treat producers not merely as producers, but to consider them as individuals and social beings involved in social experiences that stretch beyond the laboratories in which they work, but which have some bearing on their activities of production. Only by doing so can one account for the producer-user interface as it manifests itself in production from the very outset. For the decisions made by actors in the spatio-temporal context of production hinge on the images they

have of the projected audience of the artefact. These images, in turn, are derived from information, impressions or knowledge gained through the producers' social interactions, which: involve people who may have an empirical or speculative link to the actual audience (this can only be revealed *ex post facto*); take place in physical settings within or outwith the sites of production; may or may not have anything to do with the production *per se*; engage producers as professionals or in other capacities which may be equally independent from the task at hand.

In this chapter I have drawn from theories which enable the argument that producers and users are roles occupied by individuals rather than ontological features; and that these individuals are best thought of as involved in a continuity of social relations, rather than as divided by the spatio-temporal fracture between production and use (the 'structured break' suggested by Thompson). However, although scholars such as Gans and Dornfeld argue for the need to consider social experience in all its guises, they also point to factors that go beyond the whim and fantasy of individual producers to issues of status and authority which play out in the settings in which they work.

Therefore, this conceptual framework still lacks a synthetic means of treating the contributions and status of individual actors within an activity of production that is conceived as both 1) a social context which is not isolated from, but rather is bound to, other social contexts that are part of the individual producers' experience; AND 2) a space in which producers attempt to gain legitimacy as contributors of useful and reliable knowledge upon which production decisions may be based. To this end, I now want to introduce one final conceptual thread which will enable me to account for the producer-user interface as it manifests itself from the outset of production: production as legitimization of 'experience-based expertise'.

3.4.2.1. Experience and expertise

Bardini's (1996) *implicit sociology* and Dornfeld's notions of *popular anthropology* and *metatheory of the audience* are in line with models of emergent expertise that seek to account for the legitimization of experts through the negotiation of knowledge claims. That is, how the acknowledgment by others of a specific competence or skill in

a given field establishes and sustains experts. The previous section suggested that experience with relevant groups, or as members of such groups, is key in production. Thus in problematization, one can examine how individuals attempt to establish themselves as experts with regard to users and/or the contexts of use. In this section it is argued that producers can be thought of as 'experience-based experts' with regard to their audiences or projected users. This is so especially in the timeframe of problematization in which they attempt to define a technological project and the people concerned by it.

Collins and Evans (2002) tackle the emergence and legitimization of experience-based expertise in a programmatic paper on the future of Science and Technology Studies. For them, such an investigation is the necessary extension of social studies of science and technology. Like Callon (2004; Callon et al. 2001), who has also been investigating in recent years the involvement of laypersons and 'concerned groups' in science and technology, and Wynne (1989), who was among the first to research 'experience-based expertise', Collins and Evans (2002) devise a normative theory of participation in such activities. They aim to expand the circle of relevant contributors to include those without formal qualifications as scientists and technologists – or experience-based experts. Their argument is that the distinction between experts and laypersons should be reconsidered, as the public is more and more involved in debates about the application of scientific developments, if not their substantive content as such.

By and large, the purpose of sociological studies of science is to account for the mechanisms whereby knowledge claims come to be accepted as fact by the members of a given community and, inversely, how these are contested, re-examined, overturned and eventually replaced by new ones. In science, controversies are ended and (re)opened by individuals with highly specialized knowledge and (material) means, that is to say, in essence, members of the scientific community.

Micro-level conceptions of expertise suggest that the expert status of actors is emergent in certain types of interactions and that it cannot be attributed entirely to the cognitive capacities of individuals. Following authors such as Bessy and Châteauraynaud (1995), Fleck (1998), Faulkner et al. (1998), Stehr (1994), and

Bereiter and Scardamalia (1993), individuals come to be recognized as experts by simultaneously defining what constitutes relevant knowledge in the context of their action, and displaying that which makes them experts in this respect, whether it has anything to do with specialist certifications or not. Turner (2001) proposes the following definition: 'Expertise is a kind of possession, certified or uncertified, of knowledge that is testified to be efficacious and in which this testimony is widely accepted by the relevant audience' (Turner, 2001: 130).

Such conceptions are consistent with Callon's definition of problematization as an emergent and iterative exercise and they echo Zimmerman and Bauers', Gans', McQuail's and Dornfled's points on the nature of the media producers' work. They also fit what Collins and Evans (2002: 252) call the 'expert's regress': the choice of what fields of experience are relevant to the accomplishment of a given activity precedes the choice of 'who is an expert within a field'. In other words, relevance is established prior to – or at least at the same time as – expertise. In the context of this thesis, this means that the producers' status as experts (with regard to the users) is subject to negotiation and thus is emergent in production.

As Collins and Evans further argue, experts are judged on factors such as their belonging to certain social networks, their trustworthiness, etc. In science these social networks remain within the scientific community. In media and technology, they spread beyond the community of producers/technologists, to the producers' social experience broadly conceived, which may involve the eventual users of their products.

If the early stages of design precisely consist of defining *whom relevant groups are*, then the process is open for all designers to claim expertise in a field of knowledge analogous to Bardini's (2000) *implicit sociology* or Dornfeld's (1998) notion of *popular anthropology*. That is, a set of more or less formalized understandings of specific social groups (children, teachers, etc.) and their needs, aptitudes, tastes and so on. Hine (2001: 184) has argued that by 'pay[ing] attention to the ways in which the developers of web sites think about what they aim to achieve and whom they aim to reach', one may address such new media as 'contextually

negotiated and socially meaningful interpretations of technological capacity'. This is especially relevant in fields or organizations where practices are not stabilized.[31]

Collins and Evans (2002) exclude so-called 'soft' kinds of social knowledge and experience from their model. They mainly consider expertise as referring to technical competence, whether formally certified or not. This is perhaps suitable to the study of science, but experience at large – or 'social knowledge' – should be given proper attention in cases of technological production, as it has some bearing on the early stages of innovation in which user or audience images are crucial.

In a relevant vein, Stehr (1994) calls for a situated approach whereby the value of knowledge is judged neither exclusively according to its content, nor only according to the formal qualifications of those making the claims. In Stehr's view, access to the spheres of technical decision-making does not guarantee that one's claims will be recognized as valid. Conversely, as no knowledge is endowed with universal validity one cannot presume that the criteria upon which access to decision-making processes is granted to an individual should rigorously dictate his/her substantive contributions.

Following Stehr, this thesis treats both access, and effective contribution, to the decision-making process as related but non-necessary issues. In other words, the formal certifications of an actor involved in production are not sufficient to make presumptions about his or her effective contributions. Likewise, an individual's contributions should not be interpreted solely in the light of his or her professional status.

On the whole, this thesis treats social knowledge (of relevant social groups) as the object of experience-based expertise, and producers as 'experience-based experts'. That is, their specialism or expertise is treated as resting upon claims made to their (pre-existing or concomitant) social experience broadly conceived, rather than exclusively on professional status, formal training or certifications. This involves conceptualizing the producers' synthetic role of 'producer-user'.

---

[31] Kotamraju (2002) has shown how website design expertise was contested between graphic designers and programmers in Silicon Valley in the mid 90s.

3.4.2.2. The synthetic role of producer/user

In his model of social interaction, Goffman (1959) conceives of the situations that make up social life as stages on which individuals perform various roles: they present different facets of themselves according to the settings in which they are and the others with whom they interact. He defines a 'performance' as 'all the activity of a given participant on a given occasion which serves to influence in any way any of the other participants' (Goffman, 1959: 26). By and large, the influence exerted by individuals through performances refers to the extent to which they control the impressions they let off and which allow others to gain an understanding of them – and thus 'define the situation' in which both take part.

Goffman expands his dramaturgical model by distinguishing two dimensions of social settings which, in turn, help to characterize the performers' behaviour within them: the 'back region', characterized by backstage behaviour; and the 'front region', characterized by onstage behaviour. The key to the distinction is that the back region involves performers and their teammates, whilst the front region confronts the performer with his/her audience. When onstage and in the presence of their audience, performers can ill-afford to relax and slip out of their assigned roles, for this undermines the participants' understanding of their respective roles, thus provoking a collapse in the mutual definition of the situation and the interaction.[32] For similar reasons, it is crucial that performers keep some measure of isolation between the various roles they play for different audiences in different settings.[33]

Conversely, when backstage, performers may show uncertainty and dissatisfaction in relation to the role they play onstage, concert with teammates and plan and rehearse the roles they put on for the benefit of audiences. The blurring of the distinction between front and back regions leads to confusion in the definition of roles – whether through accidental access of the audience to the backstage behaviour of the performers or, alternatively, through slippages in the onstage performance. In essence,

[32] Goffman uses the example of an interaction in a restaurant setting between waiter and customer, in which both have some expectations of the other and, in turn, both are aware of the expectations on them.
[33] For instance, when a lawyer who becomes the client of another lawyer for a legal case, this may lead to an awkward interaction, even though the former's competence might be seen to be an advantage overall.

the understanding of roles in a given situation hinges on the extent to which the front and back regions remain mutually isolated.

Goffman notes that the typical 'real life' dramaturgical representation on which his theory is based is an inadequate representation of social situations broadly speaking, in so far as it does not allow for the overlap of performers and audience:

> (...) on the stage one player presents himself in the guise of a character to characters projected by other players; the audience constitutes a third party to the interaction – one that is essential and yet, if the stage performance were real, one that would not be there. In real life, the three parties are compressed into two; the part one individual plays is tailored to the parts played by the others present, and yet these others also constitute the audience. (Goffman, 1959: 9)

This study's conceptual framework takes onboard Goffman's notion of performer-audience in order to address the status producers accrue from their user-related knowledge, as it sets out the conditions under which the 'performance' of one individual seeking to display his/her knowledge of the users in the laboratory can be seen as convincing by his/her colleagues and potential partners. Thus, it is useful for the analysis of the internal dynamics of production.

However, it is limited with respect to the producer-audience relationship that has been developed so far. When Goffman asserts that the three parties (emitter, receiver, audience) in a performance are 'compressed into two', he means the audience is integrated into the participant who acts 'as receiver' of information at any given point in the interaction. That is, all participants may be performer and audience in an ongoing relation of communication, but they take turns letting off information to others and gaining an impression of others on the basis of the information they, in turn, let off. This aptly describes the negotiations whereby participants put ideas forward and seek to establish themselves as adept producers in whatever capacity. However, it is but a partial description in the light of the foregoing characterizations of the producers.

My conceptual framework introduces another dimension for which Goffman's model makes no allowance, and which is crucial – and perhaps unique – to the social situation of production, in line with the foregoing section. As the whole 'situation' of production is oriented towards an audience – the projected users –, these are the object

of mediation (or negotiations) among performers, notably through audience images. In line with Goffman, this suggests that those people for whom one plays a role and of whose scrutiny one is aware, i.e. the audience, are indeed a third party to the performance. But in this case the third party is integrated in the participant who acts 'as sender' at any given point in the interaction (e.g. when a producer puts forward his/her conception of the end users/audience). This added dimension has implications for the applicability of the dramaturgical conception. Because crucially, the audience is part of the role of producer that is performed.

This calls into question Goffman's contention that the dynamics of social situations require a measure of isolation between the various spatial settings in which roles are played in order for performances (as legitimate representatives of the users, in this case) to be effective. Indeed, the notion of mutual isolation stands in contrast to the interdependency of social contexts described in sections 3.3.3 and 3.3.4.

Meyrowitz (1985) would perhaps treat the problem as a merger of previously distinct situations, prompted by the new possibilities in social interaction that accompany new media (cf. Thompson, 1995). Meyrowitz discusses the emergence of new 'middle regions' brought about by such mergers but, more relevantly, he extends Goffman's dramaturgical model by considering 'the interdependency of all performances and behavioural settings' (Meyrowitz, 1985: 50). This fits with a view of production and its relation to external social settings which may have some bearing on it.

Meyrowitz (1985) revisits Goffman's conception of social situations and his main argument rests on the bringing together of the dramaturgical model with the contribution of medium theorists (such as Innis and McLuhan): 'The situationists suggest how our particular actions and words are shaped by our knowledge of who has access to them, and the medium theorists suggest that new media change such patterns of access' (Meyrowitz, 1985: 33). His contention is that by altering individuals' faculties of perception, the media instate new 'stages' for the performance of social

relations that can no longer be defined in relation to their spatial location, as they are in 'situationist' sociology (of which Goffman is the emblematic figure).[34]

Thus, Meyrowitz frees social situations and interactions from place-boundedness by arguing that the key defining factor of social situations is not physical location *per se*, as in Goffman's framework, but that it is the types of behaviour that are available to other people's scrutiny and which inform the roles played by participants in a given setting:

> It is not physical setting itself that determines the nature of the interaction, but the patterns of information flow. Indeed, the discussion of the definition of the situation can be entirely removed from the issue of direct physical presence by focusing only on information access. (Meyrowitz, 1985: 36).

Accordingly, Meyrowitz defines social situations as 'information-systems', that is, 'a given pattern of access to social information, a given pattern of access to the behaviour of other people' (Meyrowitz, 1985: 37). If situations are defined as 'patterns of access to other people', this thesis explores the extent to which production is a social situation in which access to the users is the chief concern.

One consequence of this conception is that it allows mediated relationships to be included in the definition of situations, in addition to the face-to-face interactions on which Goffman's theories rest. Mediated interaction and face-to-face interaction correspond, respectively, to the two extremes of Meyrowitz's continuum: 'The concept of information-systems suggests that physical settings and media "settings" are part of a continuum rather than a dichotomy. Places and media both foster set patterns of interaction among people, set patterns of social information flow' (Meyrowitz, 1985: 38). Following Thompson (1995) one might add mediated quasi-interaction to the set patterns of interaction and consider the continuum in relation to production, rather than the contexts of use that are the focus of Meyrowitz's discussion (i.e. the new social situations brought about by the use of new media).

---

[34] Goffman defines a region as follows: 'A region may be defined as any place that is bounded to some degree by barriers to perception. Regions vary, of course, in the degree to which they are bounded and according to the media of communication in which the barriers of perception occur' (1959: 109). The examples of media cited do not go beyond the physical attributes of settings (walls, glass windows, etc.).

This may be further appreciated in the light of Meyrowitz's conception of the interdependency of performances and settings: 'An individual's front region behaviour in one role is, after all, an indirect back region to other roles. In a sense, each front region performance depends on a multiplicity of front and back regions' (Meyrowitz, 1985: 50). Perhaps the producers' social experience serves as the backstage to production, as much as production may be conceived as the backstage to the future contexts of reception.

Meyrowitz's suggestion implies that the interdependency of situations is important for the performer, whose 'efficiency' in playing a role is dependent upon past experience and performances in different settings.[35] But the 'audience' is also engaged by the interdependency of the performer's roles and situations, for the performer's efficiency in a current performance is inextricably linked to his/her 'convincingness' for the audience. Meyrowitz argues that roles are defined by what people know and the experience they have compared to other people present (1985: 53); and that status and authority accrue from the situation and who is present, i.e. with whom one must compete (1985: 63) in order to assert oneself in a particular role.

In thinking about the need for producers to bridge the gap with their projected users/audiences, it is useful to consider Meyrowitz's notion of 'synthetic roles', that is, roles that require the performer to reconcile seemingly opposed functions. One enlightening example is provided by the synthetic role typically played by postgraduate students, that of student-teacher:

> This 'student/teacher' must now play a role that is neither the role he played as student among his peers, nor the role played by the 'real' teacher. For if John played only his old student role while the teacher was away, he would have little or no effect on the class, and if he played a typical 'real' teacher, he would probably be mocked or resented by his classmates who know too much about him to accept him in that role. (Meyrowitz, 1985: 51)

The key to the successful performance of synthetic roles, Meyrowitz argues, lies in the spatio-temporal 'distance' between the two original situations that serve as the backgrounds to the current performance: '[t]he distance between situations

[35] Meyrowitz gives the example of a trial lawyer, whose role as such not only depends on his/her performance in the courtroom and backstage (preparation), but is also the upshot of his/her successfully performing the roles of student, taxpayer and so on in other, perhaps previous, settings.

contributes to the degree of separation in behavioural style. Such "distance" is determined by both time and space. All teachers, for example, were once students, but temporal insulation allows for these roles to be very different' (Meyrowitz, 1985: 51).

If one conceives of a synthetic role of producer-user as it is performed in contexts of problematization – where a key activity, as Pinch (1993) and MacKenzie (1988) have shown, is the judgement of similarity between contexts of testing and actual use –, clearly the performance of such a role will be more convincing to one's colleagues and potential partners if one can demonstrate a shorter distance between contexts of testing (in which one is a producer) and contexts of use (in which one is/was a user or in contact with relevant users).

3.5. Summary

In this chapter I have discussed, and then drawn together in a synthetic conceptual framework, theoretical elements which enable one to account for the producer-user interface as it manifests in production, without positing the direct involvement of users. Such is this study's main theoretical objective, which is pursued using the following empirical question as a thread for the conceptual framework: who is involved in the technical decision-making process in new media production and in what capacity?

The empirical question addresses both the modes of involvement (direct or otherwise) of actors in production, as well as the substantive contributions of these actors and the specialist knowledge and expertise that may be said to accrue from these. Both dimensions correspond respectively to the theoretical sub-questions stated at the outset: 1) What (social) mechanisms take the place of direct user/audience involvement in the absence of actual audiences/users and how do these mechanisms shape a technological endeavour? 2) What do these mechanisms tell us about the claimed specialist knowledge of producers and prevailing notions of expertise?

The conceptual framework constructed in the previous section comprises the following features or guiding propositions:

- In line with Callon, this framework treats the timeframe under consideration – that which precedes materialization in technology's so-called life-cycle – as one of problematization. In this timeframe, the actors are concerned with the definition of a technological endeavour and of those people concerned by it, i.e. relevant social groups.

- In line with Akrich (1992), Hennion (1989) and Schot and de la Bruheze (2003), this framework is chiefly concerned with the mediations performed by one set of (human) actors – the producers – between their fellow producers within the laboratory and relevant social groups who have the status of hypothesis. These mediations are treated as the locus of the producer-user interface in problematization. Here, 'useful functioning' (cf. Bijker, 1995) is projected and 'closure' is rhetorical rather than material (cf. Pinch and Bijker, 1984).

- Following McQuail (1987), this framework considers the audience as both the cause and consequence of production. Following Gans (1957), it captures this paradox with the notion of 'prior feedback' – the producers have audience images in mind that inform their work from the outset. These images are seen to allow the audience to 'follow the producers' into the sites of production.

The above elements converge in the following hypothesis in response to theoretical sub-question 1 (What social mechanisms take the place of direct user/audience involvement in the absence of actual audiences/users and how do these mechanisms shape a technological endeavour?):

***Hypothesis 1**: Producers and relevant social groups are involved in production; the former directly, the latter through representation/mediation. The producers' perceptions of relevant social groups shape the endeavour from the outset.*

The conceptual framework comprises a further set of features that lead to a second hypothesis. They are:

- Following authors such as Bessy and Châteauraynaud (1995), Collins and Evans (2002), Fleck (1998), Faulkner et al. (1998), Stehr (1994), and Bereiter and Scardamalia (1993), individuals come to be recognized as experts by simultaneously defining what constitutes relevant knowledge in the context of their action, and displaying that which makes them experts in this respect, whether it has anything to do with specialist certifications or not. In the context of this thesis, this means that the producers' status as experts is subject to negotiation and thus is emergent in production.

- This framework acknowledges the importance of the experience of producers by treating their social knowledge of relevant social groups as the object of (experience-based) expertise, and producers as 'experience-based experts' (cf. Collins and Evans, 2002). That is, the specialist nature of their work is treated as resting upon claims made to their (pre-existing or concomitant) social experience broadly conceived, rather than exclusively on professional status, formal training or certifications. This is an operationalization of Dornfeld's conception of the 'producer-user overlap.'

- Following Stehr, this framework considers both access, and effective contribution, to the decision-making process as related but non-necessary issues. In other words, the formal certifications of an actor involved in production are not sufficient to make presumptions about his or her effective contributions. Likewise, an individual's contributions should not be interpreted solely in the light of his or her professional status.

- In order to enable a pragmatic account of the interactions of actors within a laboratory, this study's conceptual framework takes onboard Goffman's notion of performer-audience in order to address the status producers accrue from their user-related knowledge, as it sets out the conditions under which the 'performance' of one individual seeking to display his/her knowledge of the users in the laboratory can be seen as convincing by his/her colleagues and potential partners.

- Following Meyrowitz (1985), who defines social situations as 'patterns of access to other people', this framework portrays production as a social situation in which access to the users is the chief concern. By doing so, this study enables mediated relationships to be included in the definition of situations, in addition to the face-to-face interactions on which Goffman's theories rest. Hence, producers and users can be seen as engaged in a proper relationship in spite of the ontological gap that separates them.

- Lastly, based on this framework it is argued that the credibility of individual producers as legitimate spokespersons for the users – i.e. as mediators – hinges on their perceived proximity to relevant social groups. In other words, the producers must be perceived as close to, indeed as a belonging to, the group of users. Therefore, as it is treated in this thesis, the experience-based expertise of producers calls into question Goffman's and Meyrowitz's suggestion that there must be a distance between one's roles in order for synthetic roles – in this case, that of producer-user – to be performed efficiently.

These features are distilled into the following hypothesis in response to theoretical sub-question 2 (What do these mechanisms tell us about the claimed specialist knowledge of producers and prevailing notions of expertise?):

Hypothesis 2: *Producers act in their capacity as 'experience-based experts' with regard to the projected users, which involves playing the synthetic role of 'producer-user'.*

The following chapter presents a table (Table 4.1) which rehearses the hypotheses and guiding propositions derived from the conceptual framework developed in this chapter. It also and outlines the attendant operational questions and the research design and methods employed in this study.

CHAPTER 4

METHODOLOGY AND RESEARCH DESIGN

4.1. Introduction

This chapter sets out the methodological principles and decisions that informed the research design and methods. It provides additional justifications for the choice of NESTA Futurelab as a case study to those outlined in Chapter 1.

In section 4.2 I describe how the hypotheses and guiding propositions of the previous chapter frame an initial set of methodological options, namely qualitative methods and an in-depth case study. Section 4.3 comprises the implications with regard to data collection techniques specifically, that arise from questions to do with individuals' experience and knowledge and the ways in which they are expressed in group dynamics. Then, in section 4.4 I account for the steps that were taken in order to devise a research design in line with both conceptual considerations and the empirical observations invoked throughout the foregoing. Lastly, section 4.5 presents the coding and analysis procedures that resulted in the narrative presented in chapters 5 and 6.

4.2. Qualitative methods and in-depth case study

Section 3.5 (Summary) of the previous chapter outlined this study's two main hypotheses and their attendant set of guiding propositions. In order to make them operational empirically, I distilled the guiding propositions into a set of questions formulated in a more prosaic (i.e. non-theoretical) manner. For purposes of clarity and the subsequent selection of research tools, each operational question is identified by a single topic label. A summary of the main hypotheses, guiding propositions and operational questions is presented in table 4.1.

Table 4.1. Hypotheses, guiding propositions and operational questions

MAIN HYPOTHESES	GUIDING PROPOSITIONS	OPERATIONAL QUESTIONS
Hypothesis 1: Producers and relevant social groups are involved in production; the former directly, the latter through representation/mediation. The producers' perceptions of relevant social groups shape the endeavour from the outset.	The timeframe under consideration is one of problematization. In this timeframe, the actors are concerned with the definition of a technological endeavour and of those people concerned by it, i.e. relevant social groups. This framework is chiefly concerned with the mediations performed by one set of (human) actors – the producers – between their fellow producers within the laboratory and relevant social groups who have the status of hypothesis. Here, 'useful functioning' is projected and 'closure' is rhetorical rather than material. The producers have audience images in mind that inform their work from the outset.	***Definition and purpose***: Why has the production facility been set-up? ***Seamless web***: How do technological and social considerations fit within the endeavour's general purpose and aims? ***Perceptions of audiences***: For whose benefit do producers feel they carry out their work, and/or of whose scrutiny are they aware? ***Outcomes/outputs***: What are the different outputs produced, what purpose do they serve and what audiences are they for? ***End-users/stakeholders relationship***: How does the three-way relationship between producers, end-users and (potential) partners take shape?
Hypothesis 2: Producers act in their capacity as 'experience-based experts' with regard to the projected users, which involves playing the synthetic role of 'producer-user'.	Individuals come to be recognized as experts by simultaneously defining what constitutes relevant knowledge in the context of their action, and displaying that which makes them experts in this respect, whether it has anything to do with specialist certifications or not. The producers' status as experts is subject to negotiation and thus is emergent in production. The producers' social knowledge of relevant social groups is seen as the object of (experience-based) expertise, and producers as 'experience-based experts'. That is, the specialist nature of their work is treated as resting upon claims made to their (pre-existing or concomitant) social experience broadly conceived, rather than exclusively on professional status, formal training or certifications. Both access, and effective contribution, to the decision-making process are seen as related but non-necessary issues. Production is seen as a social situation in which access to the users is the chief concern. Mediated relationships are included in the definition of situations, in addition to the face-to-face interaction. The credibility of individual producers as legitimate spokespersons for the users – i.e. as mediators – hinges on their perceived proximity to relevant social groups. In other words, the producers must be perceived as close to, indeed as a belonging to, the group of users.	***Defining relevance/importance***: How do producers argue a logical link between the endeavour's purpose and/or aims and their own knowledge and/or experience? ***Social and technical knowledge***: Do producers claim/display expertise with regards to both social and technical knowledge? ***Participation of others***: On what grounds are other (outside) people acknowledged or dismissed as potential contributors or otherwise to the decision-making process? ***Process***: How do producers attempt to make decision-making more effective and efficient, in line with stated purpose and aims? ***Access and contribution:*** Are the criteria of access and effective contribution of producers related in a necessary way? ***Producer-user interaction***: What are the modes of interaction between producers and users? ***Relevant experience:*** What relevant experience or knowledge do producers draw upon in order to better define the end-users? ***Producer-user overlap/reflexivity:*** What are concrete manifestations of the 'reflexive user' and 'producer-user'?

This research investigates how forms of knowledge are discussed, contested and shared – and perhaps given some recognition of validity – by those involved in the production of new technological artefacts. Thus, it is located squarely in the interpretive sociological tradition,[36] which is concerned 'with how the social world is interpreted, understood, experienced or produced' (Mason, 1996: 4). Accordingly, a qualitative research design was implemented. Such a stance is in line with both sociological studies of science and technology and those research traditions within media and communication studies concerned with the symbolic encoding (and decoding) of media texts.

In Science and Technology Studies (STS), the most widely acknowledged methodological approach is what has been interchangeably termed laboratory studies, anthropology of science or anthropology of the lab. Inspired by cultural anthropology, this approach suggests that sites of science and technology production be treated as foreign cultures to whose system of symbolic references the researcher is a 'stranger'. Ethnographic case studies of scientists and technologists have been acknowledged, since Latour and Woolgar's (1979) study of *Laboratory Life* provided an original and detailed empirical extension of the work of Kuhn (1970) and Bloor (1976), as a productive means of shedding light on the inherent complexity of institutionalized knowledge production. The ethnographic approach is used to gain insight into activities of symbolic exchange widely regarded, in the public opinion as well as by practitioners, as highly specialized, regimented and, perhaps more importantly, sheltered from public (or lay) scrutiny.

The speculative and contingent qualities of production – owing to the fundamental uncertainty of its outcome – are invoked by constructionists to justify in-depth investigations on a case-by-case basis. This is in keeping with cultural anthropology which tends to amalgamate the terms 'ethnography' and 'case study' (cf. Burgess, 1984; Marcus, 1998). In-depth case studies are meant to reveal the debates and controversies which activities of production precisely aim to contain and dissipate (Bijker and Law, 1992; Latour and Woolgar, 1979), eventually yielding the consensual 'black boxes' that are facts and artefacts.[37] The immersion in a host culture or

[36] As opposed to the positivist approach (Mason, 1996; Miller and Glassner, 1997).
[37] For a detailed discussion of related conceptual issues, see section 3.2.

laboratory for an extended period of time is thus an overarching principle, premised upon the need for the researcher to gain an intimate understanding of the laboratory's symbolic exchange mechanisms, both explicit and implicit.[38]

In the field of media and communications, much empirical investigation has mobilized ethnography-inspired methods, if not fully-fledged ethnographies *per se* (Couldry, 2003a, 2003b). By addressing media use and consumption within the household and the ways in which they tie-in to the broader mechanisms of everyday life, media researchers have sought to contextualize symbolic practices linked to the media within broader social processes – referred to as 'mediation' is some instances (Couldry, 2003a; Silverstone, 2005).

In appraising ethnography's pertinence in the globalized cultural landscape, Marcus (1998) identifies both STS and media studies as standing amongst a handful of disciplines that have contributed in recent years to the exploration of new avenues for ethnography. Specifically, he credits some research carried out under these banners with freeing ethnographic investigation from place-boundedness, thus favouring the emergence of 'multi-sited ethnography', which is a form of research...

> ... designed around chains, paths, threads, conjunctions, or juxtapositions of locations in which the ethnographer establishes some form of literal, physical presence, with an explicit, posited logic of association or connection among sites that in fact defines the argument of the ethnography. (Marcus, 1998: 90)

There are several ways one can implement a research design which presupposes the interconnectivity of sites and not all entail conducting fieldwork in various 'physical' locations. Marcus (1998: 90-98) suggests seven options: 'follow the people', 'follow the thing', 'follow the metaphor', 'follow the plot, story or allegory', 'follow the life or biography', and 'strategically situated (single-site) ethnography'. This last option was seen as the best suited to this study as it enables one to immerse oneself sufficiently in a single laboratory to gain an understanding of its particular activity, whilst explicitly acknowledging that this activity is embedded in a multi-sited context – the various cultural social across which producers move (and have moved). As Marcus states:

---

[38] In organizational studies, Monge and Contractor (1992) refer to these channels of communication as 'formal' and 'emergent', respectively.

> The strategically situated ethnography attempts to understand something broadly about the system in ethnographic terms as much as it does its local subjects: It is only local circumstantially, thus situating itself in a context or field quite differently than does other single-sited ethnography. (Marcus, 1998: 95)

Marcus offers a further indication of how one might operationalize the link between subjects in one particular site and the broader context (or system) in which their activities are embedded:

> Within a single site, the crucial issue concerns *the detectable system-awareness in the everyday consciousness and actions of subjects' lives*. This is not an abstract theoretical awareness such as social scientists might seek, but a sensed, partially articulated awareness of specific other sites and agents to which particular subjects have (not always tangible) relationships. (Marcus, 1998: 96. Emphasis added.)

Such conception resonate strongly with this study's conceptual framework. Thus, the in-depth study of a (strategically selected) single production endeavour was deemed the most appropriate methodological option for this investigation. As described in Chapter 2, NESTA Futurelab was selected as a case study.

The selection of a single case study is not meant to provide explanations valid for all production practices. Rather, a particular production endeavour was chosen in order to explore and illustrate the issues raised, on the grounds of its likelihood of yielding rich data and findings. These may then be used in subsequent research to make inferences about a larger population of comparable sites of production, based on specific substantive features (socially-driven innovation, new media production) and/or the temporal context considered (early innovation, pre-material context, etc.).

4.3. Data collection techniques

The data collection techniques chosen for this study were threefold: non-participant observation, semi-structured interviews and thematic analysis of primary documents. This section details the epistemological reasons for these choices. The following section describes how the field research was carried out.

One well-rehearsed social constructionist claim is that activities of science and technology production are by their very nature impenetrable to such traditional

methods of inquiry as the content analysis of secondary documents, or *ex post facto* interviews with practitioners. These techniques are seen to rely too heavily on retrospective interpretation, making simplistic distortion or embellishment inevitable. In line with the principle of immersion presented earlier, it was thought necessary to study processes of production as they happen, or 'innovation in action', to echo Latour's (1989) characterization of 'science in action'. The argument here is that only by following the actors' interactions, discussions and reflections in 'real time' can one hope to account for the complexity of such processes. More importantly, this forestalls the form of tautological reasoning whereby actors invoke the ultimate outcome of the process – its success or failure – in order to justify the very beliefs and/or decisions from which the outcome stems. In other words, it was crucial that I address what actors thought they knew, as well as why and how they knew it, 'at the time'. In this respect the study of innovation in action is an extension of the principle of symmetry, discussed in chapter 3 (section 3.2).

The fact that Futurelab was involved in the early pre-market stages of various projects (generated in-house or externally) and that it is not meant, in principle, to bring these to market, ensured that this study would consistently address 'innovation in action'.

4.3.1. Non-participant observation

Direct observation is consistent with the ethnographic tenet that one must make sense of subjects' interactions and manifested beliefs as they are enacted and expressed within their 'natural environment' – i.e. the setting where production is carried out. At the outset of the case study it was unclear whether I would be a non-participant observer of, or a participant in, Futurelab's activities. Both approaches were seen to entail advantages and limitations. The merits of participant observation in studies of production have been stressed by Dornfeld (1998), who became an active participant in the PBS documentary *Childhood*, partly on the basis of his previous experience in television production. These merits include increased and more sustained access to relevant processes and documentation as well as assistance in gaining the cooperation and trust of actors. In STS, Latour and Woolgar (1979) made similar remarks on the involvement of the former as an active participant in the laboratory under study, whilst

much of the empirical work of scholars such as Suchman (Suchman et al., 2002), von Hippel (1986) and Pickering (1992) is derived from their active participation, in various capacities, in production.

Although I shared with Futurelab (especially the Learning Team) the objective of exploring the producer-user interface, the epistemological difference between our approaches made non-participant observation the only tenable option. In short, I conceived of my position as being at one remove from their own: they are looking at the audiences/users; I am looking at them looking at the audiences/users.

4.3.2. Semi-structured interviews

My main research question and hypotheses (see table 4.1) highlight the need to go beyond the discourse at the institutional, macro-social level on the purpose and aims of new technologies, to focus on actors' experiences and interpretations. Interviews were selected as they enable one to access people's perceptions, even if through 'recounted' (Mason, 1996: 40) accounts that inevitably entail some degree of simplification and/or distortion. Qualitative interviewing has been described as 'conversations with a purpose' (Burgess, 1984; Mason, 1996). These conversations are best considered as thematic, topic-centred exchanges rather than a rigidly structured question-answer sequence. In an on-going case study, interviews can be used for two main purposes: to clarify and/or expand upon issues or topics uncovered through observation and documentary analysis; to explore topics and issues which may be altogether absent from 'naturally' occurring interactions, or which may simply be better addressed through direct probes.

Rather than provide the glossed-over, linear (success) stories typically associated with science and technology production, the actors' accounts may be relied upon 'to convey situated experiential realities in terms that are locally comprehensible' (Holstein and Gubrium, 1997: 117). That is, comprehensible within a spatio-temporal setting marked by the tentative nature of activities meant to control the uncertainty of the overall outcome. By conducting interviews during the production process rather than after its outcome is sealed, respondents do not benefit from the wisdom afforded by hindsight.

4.3.3. Thematic analysis of primary documents

Unlike their counterparts in science studies, relativist scholars of technological production have not strictly adhered to the principle of focusing on technological innovation as it occurs, using observation and interviews. Rather, retrospective techniques such as *ex post facto* interviews (e.g. Bardini, 2000) or more commonly, archival/documentary analysis (e.g. Bijker, 1995; Law and Callon, 1992), are widespread in this field of study. Conceivably, this is due to the researchers' legitimate desire to account for past innovations and/or the obvious deterrents of logistics and risk which accompany the exhaustive observation of a process whose outcome is uncertain.

However, the reliance upon retrospective data collection is perhaps also explained by the difficulty inherent in using 'inscriptions devices' to account for negotiations and agreements that are upstream from actual outcomes. Inscription devices are the favoured tool of STS researchers. They typically include texts, drawings, diagrams, charts, prototypes and instruments of all kinds. Because soft kinds of knowledge may be completely taken for granted by the actors themselves – at worst they may be considered a source of 'noise' – they are more often than not left unaccounted for by inscription devices, leading analysts to seek alternative means of collecting relevant data (e.g. retrospective interviews or archival analysis).

In the context of this study, inscription devices such as business plans and research papers or instruments were given some consideration as they were a concrete means of localizing provisional outcomes (intermediate steps) rather than a final, unified outcome (the artefact).

4.4. Field research design

In this section I recount how the field research was carried out, discussing the specific circumstances under which non-participant observation and interviews were undertaken, and how relevant documents were obtained and used. The

complementarity of the three techniques is also described, as are the logistical and ethical issues that arose over the course of my involvement at Futurelab.

The three selected data collection techniques were used to complement one another in an evolving manner through the duration of the fieldwork. For instance, direct observation yielded specific interview questions and suggested key documents to be requested; some documents – though not submitted to a formal thematic analysis – prompted focussed interview questions. The use of multiple data collection techniques is typically referred to as 'triangulation' (Burgess, 1984; Mason, 1996). However, the use of this term should be tempered in the context of ethnographic case studies such as this one – the whole of the data generated by *each* technique was not meant to be submitted to formal analysis in relation to *each* specific research question. Indeed, the data generated by the three techniques were not treated as part of one single, homogeneous dataset on which to apply the coding frame. Choices relating to analysis are presented in the next section.

4.4.1. Non-participant observation

I made my first visit to Futurelab's offices in Bristol on 29 November 2002. Much of the planning of my subsequent involvement hinged on this visit, the objective of which was to gain a sense of 'how things are done at Futurelab' in terms of both spatial arrangements (the lab's layout, who sits where, who works with whom, etc.) and process (meetings, discussions, events, etc.). Indeed, the initial visit was aimed at assessing whether it was necessary, to attain my research objectives, to immerse myself in the laboratory intensively (i.e. permanently for a determined period of time), or whether visits at regular intervals would yield the best results. This involved identifying instances of 'observable' interaction and discussion that would produce coherent data, whilst keeping to a minimum moments of unnecessary – i.e. unconstructive and perhaps disruptive – observation.[39]

[39] A balance needed to be struck between tracking Futurelab's activities as they evolved over a conceivably long period of time (anywhere between six months and one year), and attending to prior engagements (personal and professional) in London. Also, as Dornfeld (1998) remarks, there is a limit to what one can gain from observing people at their desks or talking on the phone.

For this purpose two kinds of activities were distinguished: everyday practices and planned events/meetings. Both provided the kinds of interactions I wished to monitor, but the latter proved to be the most manageable option.[40] Although discussions relevant to this study obviously occurred within the everyday practices of Futurelab staff, their largely *ad hoc* nature made them difficult to capture. Thus on my first visit a crucial decision was made: I would favour the observation of planned meetings and conduct additional observation of everyday activities around these (and the interviews). This choice involved a trade-off that resonates with the opposition Dornfeld (1998: 24) draws between 'the day-to-day labour of program construction' and 'the larger issues of series conceptualization' – the former affording insight into the technical minutiae of decision-making; the latter a clearer and more coherent overview of the process, as experienced by the producers. Focussing on planned meetings meant favouring the latter – a choice consistent with this study's objectives.

Additional visits were made in-between the monthly meetings, contingent upon the occurrence of other relevant and observable activities (workshops, demonstrations, etc.) and the availability of Futurelab staff for interviews. Generally visits were planned one week in advance through coordination with different people: the Personal Assistant to the Chief Executive, whose diary provided the most updated overview of key meetings; the Projects Manager, who kept track of activities relating to specific projects; the Learning Team (Director of Learning and Head of Learning Research), who proved very proactive both in establishing mechanisms to stimulate discussions with external stakeholders and within Futurelab, and bringing to my attention developments they felt would be of interest to me.

Over the course of eight months, data collection was conducted roughly on a fortnightly basis, with wider gaps occurring as a result of lulls in Futurelab's activities (e.g. in the Spring) and, in some cases, a breakdown in communications (last-minute rescheduling of meetings, lack of reply to my prospective emails, etc.). In total: approximately 15 days were spent doing direct observation of Futurelab's activities (including remote events such as the Science Simulation Lab, the Digital Childhoods

[40] In addition to what I could observe directly on my first visit, Futurelab staff, especially members of the Learning Team (who have extensive experience of academic research), were invaluable in helping me to establish a *modus operandi*.

conference, various workshops and Size Matters discussions and usability trials), interspersed with interviews and document gathering/analysis.

At the outset of my case study, three main kinds of planned meetings were held on a monthly basis: Strategic Directorate, Project Review, and Operational Management.[41] In consultation with my hosts it was agreed that I could attend the first two as I saw fit, whereas the third kind of meeting, Operational Management, was put 'off limits' on the grounds that it involved sensitive issues (e.g. matters to do with staff efficiency, personal matters, etc.).

The monthly Strategic Directorate Meeting was made my highest priority in terms of direct observation. It was the forum for discussing and debating Futurelab's purpose and aims as well as the resources it would mobilize to attain them. This included discussion ranging from such fundamental topics as Futurelab's cultural and business objectives and the perceived needs and expectations of its stakeholders – in essence, its *raison d'être* –, to more focussed ones such as the allocation of resources (human, financial, etc.) and, in many cases, the discussion of specific outputs, whether documents, events or prototypes. In essence, the Strategic Directorate Meeting is best described as the key instance in which Futurelab staff collectively and critically – and as it turned out, quite philosophically – reflect upon their practices and make crucial decisions on courses of future action. It was thus the ideal setting to address problematization from the earliest possible moment. In all but a few exceptional instances, participants in this meeting were: the Chief Executive, Deputy Chief Executive, Director of External Relations, Futurelab Manager, Director of Production, Director of Design, Director of Learning, Head of Learning Research and Director of Business and Finance.

Between 18 December 2002 and 1 July 2003, six such meetings were held, rather than the anticipated seven.[42] I attended four of these, having been asked not to

[41] This changed somewhat during my involvement. For instance, a fourth kind, Team meetings, was instated early in 2003. Its purpose was for all members of staff to present an outline of their monthly activities and accomplishments. I attended several of these, but it quickly became apparent that they offered a superficial account of issues addressed in more depth elsewhere, i.e. interviews and Strategy Meetings. Where relevant, changes are discussed in the analysis.

[42] This figure was based on the assumption that meetings would be held on a monthly basis, as planned. However, in January and February 2003, a doubt lingered as to the relevance of this kind of forum,

attend one session to which NESTA executives were invited.[43] Details of the observed Strategic Directorate Meetings are as follows:

- 18 December 2002: Futurelab Conference Room, 9.30-11.00 (approximately 90 minutes);
- 26 March 2003: Futurelab Conference Room, 12.00-13.30 (approximately 90 minutes);
- 30 April 2003: Futurelab Conference Room, 10.00-11.30 (approximately 90 minutes);
- 1 July 2003: Futurelab 'library', 9.30-11.00 (approximately 90 minutes).

The monthly Project Review Meeting was the forum in which the progress of ongoing projects (i.e. those leading to prototypes) was reviewed. Its attendance was variable, but typically included the Director of Production, Director of Design, Projects Manager, Director of Learning, Director of Learning Research, and Researcher. These meetings were slightly less interesting with regard to my research questions, as their focus on ongoing projects meant that I would capture fragments of a process initiated earlier and discussed in more depth elsewhere.[44] However, they were useful for keeping track of specific developments and getting insights into the production of prototypes. The attendance of these meetings proved difficult to plan, owing to its slightly more informal nature as compared to the Strategy Directorate Meeting. As it involved fewer participants (and, I would speculate, fewer executives), it was quite flexible, often being rescheduled at the last minute to a more convenient time, or cancelled altogether and dissolved into *ad hoc* discussions. As a consequence, despite the Project Manager's efforts to keep me updated, and my own probing emails, several potentially interesting meetings were missed. None the less I attended two Project

---

hence it was abandoned temporarily and/or merged with other meetings, notably the Operational Management Meeting. As for the meeting of 1 July, it was actually the planned meeting for June that had to be rescheduled.

[43] I was kindly asked to 'stay away' at the Chief Executive's request. In essence, and although my involvement had been approved by NESTA officials, it was simply deemed on this occasion that my presence could be conspicuous and/or potentially disruptive. I got a sense that it was more for the NESTA official's benefit than a question of hiding certain matters from me *per se*. In any case, I had to trust, and submit to, my host's judgement so as not to compromise the relationship.

[44] I had initially anticipated the opposite, i.e. that Project Review meetings would be the most important. However, as my research questions evolved dialectically with empirical considerations, the need rigorously to follow the evolution of specific projects form beginning to end was ruled out, in favour of gaining an appreciation of the complexity of problematization broadly conceived.

Review meetings proper, as well as a number of other meetings in which specific projects were discussed. Details of observed Project Review Meetings are as follows:

- 28 April 2003: Futurelab Conference Room, 10.00-11.30 (approximately 90 minutes);
- 1 July 2003: Futurelab Conference Room, 14.00-16.00 (approximately 2 hours).

Although I attended all meetings as an observer, I typically sat at the conference table rather than removed from it. The meetings were recorded in whole using an audiocassette recorder, with a conference microphone placed at the centre of the table. The recordings were supplemented by my own field notes and the agenda distributed to the participants, which was sent to me electronically in advance when possible. Lastly, the minutes from each meeting were sent to me by the Chief Executive's Personal Assistant.

In addition to Strategy Directorate and Project Review meetings, I observed workshops for one key project (*Tableaux*; see Appendix A) involving teachers and students; one major conference organized by Futurelab (*Digital Childhoods*; see Appendix A) featuring education specialists as well as industry representatives; and a product demonstration of the *Size Matters* project (see Appendix A) given to me by its originator, as well as usability trials for this same project involving children and their parents, conducted by Futurelab's learning specialists at the @Bristol Science Centre.

In all these instances, data was gathered through a combination of audio recordings[45] and field notes. Where relevant, I also obtained primary source documents (e.g. questionnaire developed by Futurelab for the usability trials, documents distributed at the conference) which could be used to supplement the generated data.

[45] In those instances involving children (workshops and usability trials), the recordings were of the producers' thoughts and comments, not those of the children, as this would have required the use of permission slips which had not been anticipated.

4.4.2. Individual interviews

Individual interviews with Futurelab (FL) staff took three forms. A sample of each set can be found in Appendix B.

A first set of interviews aimed to establish elements of staff background and perceptions. Specifically, this set probed the link between individual members' past experience and their activities at Futurelab (When did you first hear about FL? What led you here? What makes you the right person for the post? Etc.); their perceptions of the organization's purpose and role (Where does FL fit in the grand scheme of things? Who are its stakeholders? Etc.); their perceptions of internal/workplace dynamics (Who does what? Balance between 'technologists' and others? Sources of friction/disagreement? Etc.); lastly, their perceptions of outcomes, i.e. things that are produced by Futurelab (What would FL have to achieve to be a success? What progress has it made? Etc.).

These 'background' interviews were semi-structured: a standard set of themes/questions was designed, but the structure of the discussion varied following interviewee responses. If relevant topics were raised that were not part of the original interview guide, they were discussed and integrated into the 'conversation', then linked to the original topics. As a general rule, in preamble to the interview respondents were told that the focus was on their personal thoughts and interpretations, rather than on the 'official Futurelab policy'.

In addition to this, questions were intentionally open with regard to the definition of the key concepts evoked, rather than having rigid meanings built-in. For instance, questions such as 'what made you the right person for the post?' purposely left it up to the interviewee to respond in terms either of professional qualifications, personal characteristics, or both. In order to prompt them to consider both kinds of responses in a non-leading manner, the concluding question 'is there anything else about your background you feel would help me understand your contribution to FL?' was asked. With respect to Futurelab's purpose and activities, questions such as 'what is FL about?' and 'where does it fit in the grand scheme of things?' purposely left out specific references to the 'socio-cultural' or 'technological' context of Futurelab's

activities, leaving it to the interviewee to evoke either one, or both, in his/her own words. On the whole, it was thought that these kinds of open questions were more likely to elicit personal responses and thoughts rather than mere interpretations of the organization's official discourse.

The first set of interviews was conducted with 12 of Futurelab's original 17 full-time staff. Interviews varied in length from 40 to 65 minutes (depending on the interviewees responses), with most lasting roughly 45 minutes. The selection of interviewees was limited to those people who, from what I could gather through direct observation and discussions, had direct input into the decision-making process of production. That is, those members of staff who had a say in, and made substantive contributions to, determining the future direction of Futurelab, the activities it was becoming involved in, the partners with whom it was associating and the projects it was taking on. Therefore I only interviewed those people who also took part in the key meetings I observed, especially the Strategic Directorate and Project Review meetings. These decisions were consistent with the use of triangulation linking the observation of meetings with interviews.[46]

The second set of interviews (for reference: 'update interviews') was more focussed in terms both of questions and selection of interviewees. It was designed to further explore the relationship between Futurelab and its audiences, through questions pertaining to specific processes (usability trials, Call for ideas, or CFI, etc.), as well as a perhaps more rigorous intellectual exercise requiring interviewees to reflect upon the similarities between their practices and those they perceived to be typical of 'hard science' (To what extent is FL involved in 'paradigm shifting'? In what respect is FL a laboratory? Etc.). The opportunity to explore such questions arose from observation and the first set of interviews: it became apparent that a number of people had the experience – and natural inclination – to evoke and debate such issues, notably the science-technology relationship. These interviews, which spread over the duration of my fieldwork from November 2002 to July 2003, were done with the Chief Executive,

[46] Those excluded from the interviews were the Personal Assistant to the Chief Executive, External Relations Assistant, Finance and Business Assistant, and Receptionist. In addition to these, the Director of Technology resigned early in 2003, before I could interview him. Also, I interviewed the two new members added to the Learning Team in the Spring of 2003, but have not included them here, as their presence in the meetings I observed was negligible.

Deputy Chief Executive, Director of External Relations, Director of Learning, Director of Learning Research, and Researcher. One final, retrospective interview was conducted with the Director of Learning, Director of Development and Researcher in March 2004.

The third set of interviews consisted of a 'first-year review', elicited from the same six people as above. In some cases these interviews overlapped with the ones described above, that is, questions to probe the science-technology relationship were combined with those to do with the 'first-year review', simply as a result of temporal lag and in order not to make excessive demands on some individual's time. The latter questions were designed to probe Futurelab's relationship with specific 'stakeholder communities' that had been consistently mentioned in primary documents, meetings and previous interviews, as well as the specific outcomes (prototypes, events, etc.) to which they were linked.

The second and third kinds of interviews varied in length following interviewee responses and depending on whether they were conducted independently or merged together. In the first case each separate interview lasted roughly 45 minutes. When interviews were merged together they lasted on average a total of 45 minutes.

In addition to the three kinds of interviews, *ad hoc* discussions were scattered throughout my intervention, based on specific developments I had observed, as well as primary documents I had obtained.

Below is a detailed summary of the interviews conducted with each individual member of Futurelab, and approximate total time of recorded discussions:

- Chief Executive: background (45 min.), updates (90 min.), review (45 min.). Total: approximately 3 hours.
- Deputy Chief Executive: background (40 min.), update + review (40 min.). Total: approximately 80 minutes.
- Director of Development: background (65 min.), update + review (90 min.). Total: approximately 2 ½ hours.

- Futurelab Manager: background (45 min.), update (45 min.). Total: 90 minutes.
- Director of Learning: background (70 min.), update (2 hours 45 min.), review (45 min.). Total: approximately 4 ½ hours.
- Head of Learning Research: background (45 min.), update (70 min.), review (45 min.). Total: approximately 2 ½ hours.
- Researcher: background (45 min.), update + review (90 min.). Total: approximately 2 hours 15 minutes.
- Head of Production: background (45 min.), other talk (30 min.). Total: approximately 75 minutes.
- Head of Design: background (45 min.). Total: 45 minutes.
- Projects Manager: background (40 min.), other talk (30 min.). Total: approximately 70 minutes.
- Director of Finance and Business: background (40 min.). Total: 40 minutes.
- Head of Technology: background (40 min.). Total: 40 minutes.

All interviews were taped using an audiocassette recorder, and notes were taken. The total duration of recorded interviews was approximately 20 hours. All interviews were subsequently transcribed by myself and edited only so as to increase legibility. The resulting corpus comprised roughly 180 pages of single-spaced text.

On the whole, every individual who had played an active role in the production process in Futurelab's first year of existence was interviewed for this study and those in key managerial and executive positions accounted for the vast majority of the total gathered data. Thus, upon completion of the fieldwork, I was satisfied that I had not overlooked any one individual who may have had a markedly dissonant story to tell about Futurelab.[47]

[47] In retrospect, I realise that Futurelab's newest learning researcher may have had insightful views to contribute on (amongst others) the balance between social and technical specialisms as she holds a PhD in educational technology design. I stand by the methodological reasons for which she was excluded from my analysis, i.e. she was hired merely weeks before the end of my fieldwork and was absent from the meetings I attended.

4.4.3. Analysis of primary documents

The analysis of primary documents was employed to a lesser extent than the two previous techniques. In keeping with STS methodology, those documents that were used were treated as inscriptions, that is, as the codification of provisional agreements reached by the actors on a given set of issues – my task was then to probe interactions 'around' these issues.

Bearing in mind the inherent limitations of inscription devices outlined above (cf. section 4.3.3), the most useful documents with regard to my research questions were: the original Futurelab business plan prepared by the Chief Executive whilst still at NESTA in November 2000; a strategic overview of Futurelab's perceived 'market' before its launch, prepared by an external consultant in March 2000; Futurelab's business plan for 2003, submitted to NESTA in May of the same year. These confidential documents were obtained by request to the Chief Executive or Deputy Chief Executive, and emailed to me in electronic format.

Additional documents comprised the agendas and minutes of the meetings I attended (and some I missed); working research papers drafted by members of the Learning Team; literature reviews; research tools such as questionnaires for usability trials; project descriptions; promotional literature handed out to participants of the Digital Childhoods conference; email messages; etc. These were envisaged as supplemental materials, to be drawn from on an *ad hoc* basis in order to fortify or illustrate data gathered through other means.

4.5. Coding and analysis procedures

This section briefly presents the main analysis procedures used to code and sort the collected data.[48] The main dataset consisted of transcriptions made from the recorded meetings and individual interviews. The primary source documents were treated as a distinct dataset of more limited usefulness.

[48] See Appendix C for sample coding documents.

The datasets were not assigned to specific operational questions on a one-to-one basis. Rather, decisions were made on the basis of the datasets' suitability to the main hypotheses. For consistency it was determined that the dataset comprising primary source documents (official Futurelab documents) would be useful exclusively for addressing the topics pertaining to Hypothesis 1. This hypothesis concerns problematization and it allowed for the use of a register perhaps more descriptive (as in describing FL's stated purpose) than for the second main hypothesis – although the individual perceptions elicited through observation and interviews were required as well.

Hence, the analysis pertaining to Hypothesis 1 (Chapter 5) is based on data generated from both datasets. Text conveying the 'official Futurelab view' on issues such as the relationship between the technical and the social, relevant social groups, etc., was identified and but only used as a backdrop against which to contrast individual responses and perceptions where relevant. Hypothesis 2, which addresses user involvement and user-related knowledge and expertise, required the use of data to do with individual perceptions, whether generated through group interaction (observation) or in individual interviews. Here the source documents dataset was not used.

In sum, the analysis relevant to problematization (Hypothesis 1) (see table 4.1) draws on both datasets, whilst the remaining one is based on the main dataset exclusively.

This study employed thematic coding and analysis. A pilot analysis was conducted using the QSR Nudist v.6 software package but it was deemed more of a hindrance than a useful tool in the context of this study and the limited technical skills of its author. Instead, this study relied on the manual coding and analysis of data. The coding and analysis tools were evolved together through an iterative process comprising four steps which, on the whole, aimed to enable an empirical account akin to the 'sociology of controversy' favoured by STS. The reader may refer to Appendix C, section 1 for a detailed account of coding and analysis procedures, and to Appendix C, sections 2, 3 and 4 for sample coding materials.

4.6. Limitations of methodology and related issues

The balance between interesting narrative and the reporting of data (cf. section 4.5) has implications with regard to the matter of replicability. Although the use of a rigorous coding tools ensures some measure of objectivity of results and, hence, replicability of the study, the narrative which is built from the data rests heavily on the analyst's firsthand experience in the site of study over a prolonged period of time. This firsthand experience may for instance lead the analyst to afford more space to the accounts of certain actors over others on the basis of their observed influence or perceived clout within the host organization – which may or may not be obvious from the gathered data.

One further source of concern over the course of my fieldwork was the risk of 'going native', i.e. the risk of getting involved emotionally with the subjects to the point of losing sight of my research objectives. Though I recognized this as a potential risk inherent in all qualitative research techniques and participant observation, in particular, on the whole, I do not share the specific motivations or passion of the individuals who were the subjects of my research. This is not a value judgement – my interest was initially that of social scientific inquiry.

Lastly, I am aware that a common criticism levelled against research conducted on the basis of a single case study is that the findings they produce can be difficult to generalize. However, inferences can be drawn from my findings to account for substantively similar practices in analogous, or very different, settings, for instance, early R&D work in private firms. Further, my purpose is not to account for innovative practices at large, but rather to investigate how user-related knowledge and experience are integral and complex parts of practices of this nature. Arguably, this can best be achieved through the detail and coherent data yielded by a systematic, in-depth case study.

4.7. Summary

This chapter argued that a single, in-depth case study is suitable to this investigation's specific objectives as well as inscribing it in the tradition of social studies of technology. In terms of data collection techniques, it discussed the relevance of using non-participant observation of team meetings, semi-structured interviews of key participants and the thematic analysis of primary source documents in order to address this study's research questions. It also detailed how the author went about designing and conducting the field research, as well coding and analyzing the resulting corpus of data. Lastly, it discussed the limitations and problems which arose in the course of the fieldwork.

The following two chapters (5 and 6) draw on this data and provide an empirical account of Futurelab and its producers in line with this study's main research questions. Then, in Chapter 7, the empirical data is discussed in the light of the relevant theory in order to assess the relevance of the main hypotheses.

CHAPTER 5

PROBLEMATIZATION IN ACTION: THE ROLE OF AUDIENCES IN EARLY PRODUCTION

5.1 Introduction

This chapter examines the involvement of producers and users in the activities of NESTA Futurelab over the course of the organization's first year of existence. In its first year of operations Futurelab is the scene of fundamental discussions on strategy and methodology which reveal what activities are relevant to the undertaking and how they should be drawn together and ordered, so as to increase the likelihood of the enterprise attaining success. How are the issues of purpose, stakeholders, technology, audiences and outcomes effectively combined by the actors in the course of their work? While it is to some extent enlightening to consider the organization's discourse on such matters,[49] in the following section the individual actors are given a voice and their interpretations are considered. This seems all the more relevant in the case of a nascent organization whose members have little to build on by way of established knowledge of products, practices, procedures – or indeed audiences. At this stage Futurelab is an idea in the process of being materialized.

At the heart of the discussions held in Futurelab's first year lie the endeavour's perceived stakeholders. The prioritizing of learning research comes to be seen as the best way of ensuring that Futurelab's social remit – the improvement of education and learning – is served, thus gaining the lab acceptance in the education community. At the same time, learning research is used to attract commercial partners through the promise of generating knowledge about a potential market they have yet fully to engage.

In line with the social constructionist framework set out in section 3.4.1, this period is treated as one of problematization. That is, it is a timeframe in which the

[49] An brief discussion on this topic is presented in Appendix D. Though not essential to the understanding of the following account, it sets a backdrop against which subsequent developments may be measured, by foregrounding the agency of individuals in shaping a technological endeavour previously existing in discourse only.

producers are chiefly concerned with mapping a hypothetical 'system of alliances, or associations, between entities, thereby defining their identity and what they "want"' (Callon, 1986: 70), in order to give sense and direction to their endeavour.

5.2. Futurelab in practice, or problematization in action

During its first year Futurelab is involved in the development of specific projects and the insight gained from these contribute to the overall undertaking. However, this section attends to the reflexive discourse on the endeavour at large, for it is these considerations which many deemed problematic in the early days and which came to the surface in the early meetings I attended. In any case, the spatio-temporal context addressed here is a pre-market one: none of Futurelab's projects had been brought to market at the time of the study. In this timeframe, basic issues of purpose, stakeholders/relevant social groups/audiences, outputs and process are bound together in a complex web which for the producers is not exactly seamless – for them, social and technical issues must be untangled, sorted, and reordered for the lab to function effectively. What follows is an account of this process based on the perceptions of those involved.

In what follows I argue that what appears to hold the hypothetical system of alliances together are conceptions of the represented users – they, rather than technology *per se*, are the reason why Futurelab staff set out to enrol partners; the users then become the object of mediation between Futurelab and its stakeholders. At this stage both the endeavour's stakeholders and its users are subsumed under a general conception of 'the Futurelab audience', which the producers attempt to unpack.

5.2.1. 'What is the purpose of this place?': an overview of the key issues

In Futurelab's official documents (cf. Appendix D), learning research and communications/events are effectively subordinated to the production of prototypes. In theory, Futurelab would develop prototypes in a first instance and then assess their merits or otherwise with regard to learning and disseminate these findings to the broader community. It was assumed that all stakeholder groups – notably industry and

education – would find their profit in this arrangement. In practice, this prescribed ordering of activities is contested from the outset.

Upstream from questions of process, the matter of agreeing Futurelab's very purpose was a recurring, nagging issue in its first year of existence. In an early interview following an animated Strategic Directorate meeting, the Head of Learning Research (HLR) outlines the situation in the following terms:

> Head of Learning Research: (...) that's something we're going to have to work out between us, whether you can have the sort of organization like this and if you do, what are the **basic principles and values** you need to have underlying it in order to enable it to work well. And it's just something we're still working on, slightly tempestuously.
> Philippe Ross: Do you have any ideas on that? Will it ever be resolved, that you'll ever find some sort of compromise?
> HLR: No, because actually it goes right down to the root of the definition of Futurelab. (...) It's actually about **what is the purpose of this place as an organization. Is it about the dissemination of things? Is it about making things in practice? Or is it about developing knowledge and understanding, which then, as a side effect, hopefully, improves what goes on in terms of practice, policy and software development?** My view very strongly is that we have an opportunity here to be developing our knowledge and understanding in a whole variety of different areas and that that is actually a key and important part of it. What tends to happen is we have conversations around this, where I say something like that, and then [the Chief Executive] will say '**yes but we still have to publicise what we're doing**', and I'll say 'yes of course we have to publicise what we're doing, those two are not mutually exclusive, it's just a question of which we prioritise first'. And we could be in danger, here, of publicising what we're doing very well and very effectively, and making lots of things that look great, and tell nice stories because **we need to be seen to be doing things**, and not actually doing some of the substantive, rigorous thinking that needs to go on underneath. That's the concern I have at the moment, which is what makes me particularly arsey in meetings. We'll just have to work that through. (Interview, 18 December 2002)[50]

This quote is a fitting introduction to my account of Futurelab's first year as it evokes and draws together, albeit using broad strokes, the problematic elements of purpose, outputs and the producers' acute awareness of the expectations weighing on what is still a fledgling organization. Judging from this initial outline, these issues are very much open to debate, and the HLR contends that this stems from a lack of agreement on the 'principles and values' which should underlie the enterprise and thus facilitate its decision-making.

---

[50] The reader may refer to the list of Frequently Used Acronyms for a complete list of the respondent's initials as used throughout chapters 5, 6 and 7. Unless otherwise stated, the emphasis within quotations is my own.

In the second emphasized passage, she lists the organization's three key activities in reflecting on 'the root of the definition of Futurelab': communications/events ('the dissemination of things'), prototype development ('making things in practice') and learning research ('developing knowledge and understanding'), respectively. She argues that the prioritizing of these activities must follow from a shared conception of the lab's purpose ('It's actually about what is the purpose of this place as an organization'). In her view, 'basic principles and values' must be agreed upon for Futurelab to work, for these would then dictate the nature of its outputs and the processes whereby they are produced. Thus, for her, 'what Futurelab is about' in terms of concrete activities should be determined by 'what it is about' in a more abstract, philosophical sense. For the HLR, the tempestuous exchanges in Futurelab's early days owe to a lack of clarity and consensus in this respect.

Complicating matters further is the perceived urgency of the situation, which stems at least partly from the producers' awareness of the scrutiny of external parties ('we need to be seen to be doing things'). Later in the same interview, the HLR again singles out Futurelab's purpose as a key source of tension within the lab and, revealingly, she draws a direct link between this and a consideration of the endeavour's stakeholders:

> PR: Can I ask you to generally describe what you think are key sources of problems or disagreements or tensions?
> HLR: Well, if you talk about sources of them, we've talked before about the difficulties in terms of **who we think we're doing this for, and who we are funded by**. (...) So the tensions arise, I suppose, around questions of communication, finding time to communicate. Because we're new we don't have systems set in place, we don't have values that we all automatically start up with and share. Because **if you've got a shared values-system or a shared set of understandings then you can make decisions faster,** and you don't necessarily need to have the big long conversations around them. Whereas because we're just starting up, we still need to have those big long conversations about things so we can figure out tentatively, you know, **make explicit the things we all actually think we're doing here (...)** (Interview, 18 December 2002)

In this producer's discourse, the question of 'what is Futurelab about' blends in with the question of 'who we think we're doing this for' – which may or may not overlap with 'who we are funded by'. The HLR reiterates the need for a 'shared values-system or a shared set of understandings' which, in her view, would increase the effectiveness of the decision-making process designed to determine what projects

Futurelab takes forward and the partnerships it initiates with external partners. In the current situation, the lab's development is hindered by the need for the staff to have 'big long conversations' around 'the things we all actually think we're doing here'.

Judging from these comments, Futurelab's progress at this early stage appears to be held back not by indecision as to specific artefacts or technical options per se, or strict business objectives, but by a more deeply-rooted problem: the absence of a common set of values that would guide the whole of Futurelab's activities. In invoking stakeholders, the HLR is hinting at the notion that *Futurelab cannot be all things to all people* – this obviously includes the individual producers' outlook on the endeavour, but also the expectations of 'who we are funded by' and, somewhat more vaguely at this point, 'who we think we are doing this for'.

The principles and values which the HLR claims would facilitate decision-making are not spelled out here, nor is the notion of 'who we think we are doing this for, and who we are funded by'. But her opinion on Futurelab's activities is clear: the development of knowledge and understanding of education and learning must be made a priority, so that changes in education practice, policy and technology development may come about as a result. In short, she wants learning research to be the driver of Futurelab's activities.

This view was reiterated a few months into my investigation. Here, as Futurelab was still struggling to make its mark on the field of learning technologies, the Head of Learning Research describes what she sees as the key tension underlying the enterprise. In response to a question about Futurelab's claimed status as a laboratory ('in what respect is Futurelab a laboratory?'), she once again calls the organization's purpose and structure into question:

> HLR: What we are doing is having theories, hunches, that we are trying to explore. What we are not doing particularly well at the moment is driving the projects from that perspective. And we've got a tension here around that, and it's a tension that pervades the organization and it's one that underlies a lot of the discussions, debates and disagreements. And it's about **what should drive the projects that we select?** And a lot of this is tied in with how FL is set-up in the first place. **What the organization thought it was for, and thinks it is for. And this is a really sensitive area. It comes down to: should learning questions drive everything that we do? Now, if they do, then that raises questions about the organization of the entire place,** because there's me and [the Director of Learning] and then there's seven people in production, and five in other

> areas and stuff. My view would be that we should – and this was my view when I joined – we should be saying, we should be asking questions that we would then develop resources to explore, so that we build understanding. That at the moment is not really how we are working so by my criteria it is not working particularly well as a lab, if that is what it wants to be at the moment. But we are in negotiations to change that. (Interview, 26 March 2003)

In the HLR's view, decisions as to 'what should drive' the projects Futurelab chooses to develop are inseparable from its purpose, i.e. what the organization 'thinks it is for'. Rather than hitching learning research onto projects as, at best, a complement to the development of prototypes or, at worse, as something of an afterthought, the HLR believes that research questions should be at the very origin of the production process, much as they are in a scientific undertaking. By effectively instating a form of social scientific investigation rooted in educational concerns, such a change would make Futurelab more of a research laboratory with the capacity to get things done technically, and less a production laboratory with a (somewhat peripheral) research component, as the original Futurelab business plan made it out to be. For the HLR, this has major implications for the organization's structure which she suggests is too heavily tilted towards the production side of things – if learning research is indeed made Futurelab's core activity, then its structure and resources should be modified accordingly. So on the whole, the HLR suggests that Futurelab's structure and activities should be dictated by a common understanding of its purpose. She indicates that such a change is in the process of being implemented ('But we are in negotiations to change [the current structure]').

Such an outlook is hardly surprising coming from the lab's Head of Learning Research, a career academic with strong convictions about education and its failings. However, Futurelab's development in the months following this interview attests that learning research indeed became the organization's driving force, gaining ascendancy over prototype development. This may at first glance seem like a subtle shift, but its occurrence attests to the ostensible impact of audience perceptions on the process of production,[51] even in the absence of a specific product. The following attends to the relationship between Futurelab and its various audiences.

---

[51] What is more, it sets the scene for Chapter 6 which attends to the representation of the users and expertise in new media production. Broadly speaking, this argument is that producers act as 'experience-based experts' with regard to the end users of their artefacts: they draw from their experience with relevant social groups in social settings dislocated from that of production, in order to socially construct

5.2.1.1. The shift to learning research

The rise of learning research at the expense of prototype development is illustrated by the structural changes that occurred at Futurelab over the span of my investigation. Between December 2002 and May 2003, Futurelab lost its Director of Technology, then its Director of Production and finally, its Chief Executive.[52] The gaps left by the departure of the former two individuals were not filled, and Futurelab's Deputy Chief Executive assumed the direction of the lab upon the Chief Executive's departure, thus abolishing the position of Deputy Chief Executive. By the end of my fieldwork in June 2003, the Learning Team had gained three new members: two were new to the organization, while the third – the Researcher – joined the team from his position within the Production Team.

As stated in Chapter 4: Methodology, I was not granted access to Futurelab's Executive Management meetings, therefore I did not witness firsthand the negotiations in which matters of human resources and organizational structure were explicitly debated. However, the responses gathered from individual interviews and the discussions held in Futurelab's various other meetings suggest that the changes undergone by the organization are at least partly attributable to an emerging consensus along the lines of that which HLR had called for, that is, the agreement of 'basic principles and values' around 'what Futurelab is about' and 'who it is for'.

Before I move on to discuss the individual responses, it is worth noting that Futurelab's second business plan, drafted in late Spring 2003 and hence coinciding with the end of my fieldwork, clearly identifies learning research as the organization's main priority ('Priority 1: Originating, undertaking and publishing new learning research, independently and with partners'),[53] whilst relegating prototype development

---

the users. The point made in this underpins this general argument in emphasizing the crucial importance of social, rather than technical, knowledge in the first year of Futurelab's activities.

[52] The Director of Technology resigned shortly after the start of my intervention and before I could interview him. From what I could gather these were amicable terminations, with the possible exception of the Chief Executive. Regarding the abolition of the posts of Director of Technology and Director of Production, it is perhaps best explained by what the Head of Design and others in the lab describe in interview as the need for Futurelab to have a 'general awareness' in respect to technology (Interview with Head of Design, 6 May 2003), as opposed to technical expertise as such. This issue is more fully addressed in section 6.3.1 of Chapter 6.

[53] The heading is followed by this description: 'Both our organisational credibility and our values rest on our ability to stimulate new thinking and practice in the field of educational ICT. Not only must we

production to second place. This is significant in that, unlike the lab's original business plan (2002-2003), which was produced by a single individual in anticipation of its inception, this document was a collective effort to which all the current staff were asked to contribute. As such, it can be seen as offering a distillation of their views on the endeavour. Of particular relevance here is the list of 'five key lessons [that] can be drawn from our first year of operation' (NESTA Futurelab 2003: 4). This list of 'lessons learned' echoes some of the key tensions outlined under the previous heading (5.3.1), which will be unravelled and discussed at length in this chapter, using the producers' responses. It reads as follows:

> Internal
> 1) The need for tighter focus: there is a danger of trying to deliver on too many fronts, of trying to be all things to all people and of 'chasing the money'. We recognise that we can achieve stronger results and strengthen our credibility if we clearly define and communicate our focus, and channel our resources into core activities
> 2) The need for clearly defined roles and responsibilities, SMART objectives and measures of success that will help a creative team work together more effectively
> 3) The need to build relationships with individuals, organisations and businesses who can increase our capacity in certain areas (e.g. multimedia design and production, programming, learning research, etc) to support our R&D activities
>
> External
> 4) In the current economic climate, commercial companies in our market are particularly driven by short-term returns and are reluctant to invest in long-term R&D. Futurelab clearly has a key role in filling this gap, though securing funding from the private sector to engage in long-term R&D remains a challenge
> 5) There can often be a tension in private-public partnerships when balancing the 'public good' with the commercial sensitivities of the private sector. Futurelab is facing the inevitable challenges of operating in this space.

Points 1, 4 and 5 are notable reiterations of the issues raised by the Head of Learning Research in the foregoing.[54] In anticipation of the account presented in the following pages, I wish to underline the intricate link between Point 1 which concerns Futurelab's internal functioning, and Points 4 and 5 which spell out some of the external forces exerting pressure on the organization. Both are linked in that the latter points spell out the expectations of commercial partners and the tension that arises in trying to balance these with 'the public good', whilst the former indicates how this tension is felt within the organization: namely, as 'a danger of trying to deliver on too many fronts, of trying to be all things to all people and of chasing the money'. In sum,

---

identify the right questions to stimulate broader debate, we must also originate our own research in order to establish NESTA Futurelab's reputation for innovative thinking and to ascertain new areas for prototype development.' (NESTA Futurelab 2003: 10)

[54] Points 2 and 3 are of lesser importance here as they reflect, respectively, the issue of human resources and the matter of expertise, which is discussed in depth in the following chapter.

if 'Futurelab is facing the inevitable challenges of operating in this space' (Point 5), one solution is 'tighter focus' within the lab. The following pages attend to some of the ramifications of this internal/external link and the emergence of the lab's 'tighter focus.'

5.2.1.2. Linking the normative and the strategic

When asked to comment on the structural and operational shift from Production to Learning in the Summer of 2003, members of staff acknowledge that this is a significant change in operations but the change is depicted more as the natural result of the lab's evolution since its inception than a top-down executive decision. Explanations depict the shift as one or both of the following: as the result of the producers' will to assert more emphatically Futurelab's vision of the future of education and learning; as a strategic repositioning brought about by a better understanding of Futurelab's market. The first stresses the normative dimension of the endeavour; the second highlights its strategic dimension.

Futurelab's Development Director (DD) explains the changes in the following terms:

> Development Director: I think there's a couple of reasons. One of them links to the need to get away from thinking about it as 'Production' and 'Learning'. (...) But I think also there is a change somewhat to focus more on having our knowledge and our intelligence – and I don't mean clever, I mean **what we know of the outside world** – to have the knowledge and intelligence of the organization, which does tend to come more from the research side, lead where we're going. **It's about building the confidence to say we know what the future of learning with technology should be, and this is where we want to go. So it's having that lead the business**, rather than saying, this is a really whizzy idea, let's try it and oh, can we do some research on it as well? (Interview, 30 June 2003)

In the Development Director's words, it is important that social knowledge ('what we know of the outside world') lead Futurelab's activities, the expectation being that technical decisions should follow from it, and not the other way around. However, social knowledge does not simply mean the disinterested discovery of user needs and preferences. Indeed, these comments highlight the clear normative impetus, in this producer's perception, of the lab's evolution over the preceding months. According to him, the emergence of learning research is linked to the need to assert more emphatically Futurelab's vision of 'what the future of learning with technology

should be'. The Director of Learning (DL) speaks of the core team's 'sense of mission':

> PR: (...) I noticed a strong commitment of the individuals on the production side and elsewhere to this notion of 'let's enhance learning and let's do something for the kids and the learners'.
> Director of Learning: Absolutely. That's clearly what drives FL. That we're not 'Futurelab technology' or 'multimedia', we're Futurelab Learning. We're funded by the Education Ministry. And we've signed up to work here, certainly the original team, because learning was what Futurelab was about. And there's that sense of mission. (Interview, 15 March 2004)

The shift to learning research was not implemented with a disregard for Futurelab's strategic objectives, however. In response to the same question about the organization's structural evolution, the Deputy Chief Executive[55] expresses the following view:

> Deputy Chief Executive: The very make-up of Futurelab's team initially was one of emphasis on production and on technology, and having people who could actually make prototypes and have the design capability and the technology expertise. While we were originally only supposed to have one person who new anything about learning research. And it became very quickly apparent, partly from an external perspective, that our uniqueness and our real edge lay in the fact that we have the learning research capability. (...) So from that slightly pragmatic view, we need to put more emphasis on learning research. But also it was apparent from some of the early prototypes that we were looking at, that we possibly stumbled in looking at whether they were creatively interesting rather than if there was a learning outcome. And we realized very soon that we'd be replicating what really is a broad failing in the marketplace, that there can be some quite neat and whizzy things on the surface, but in fact they're having little impact on learning. So we have to put learning first. And in fact we can do things quite simply when it comes to the visuals, if there is enough of a compelling reason for motivating the learner. (Interview, 30 June 2003)

The Deputy Chief Executive's account emphasizes the strategic reasons for the shift in addition to the normative reasons. She asserts that the value of learning research was revealed 'partly from an external perspective', thereby signalling that perhaps this was a feature unique to Futurelab in the marketplace which it should enhance in order to gain a business advantage. But she also states the change came about through the need to have an impact on learning, by 'motivating the learner'. Lastly, the DCE states that if sources of learner motivation can be established, then technical choices would follow somewhat unproblematically ('we can do things simply when it comes to the visuals'). On this point she and the Development Director are in

[55] As I draw from responses provided by both the (now former) Chief Executive and Deputy Chief Executive throughout my account, to avoid confusion I maintain the distinction between the Chief Executive and Deputy Chief Executive, despite the aforementioned structural changes.

agreement: it is of no use to consider a 'whizzy' technology if it is not beneficial to learning.

The Director of Learning illustrates the DCE's account in describing a situation 'not untypical' of the manner in which Futurelab's resources were called upon by partners in the first year:

> Well if you look at the kind of people who came to us with ideas and what skills they themselves lacked, it wasn't the production side of things. We had people who were multimedia producers. I mean [company name] is a classic example: they're a couple of guys who've got their MA in digital design and art, have an idea that they think is nice, their creative juices had flown and they'd come up with this idea of [project name], and they wanted to know 'does it have educational validity?'. And that's the question they asked us and that's the question we worked on together to shape their creative idea into something which was useful and utilizable by kids. Now that is not untypical of most of the products we've worked on thus far. (Interview, 15 March 2004)

Taken together, the above comments suggest that the operational and structural shift that occurred in Futurelab's first year owes both to strategic factors (i.e. a good opportunity for the business) and to the will to carry out a normative endeavour aimed at changing the social activity of learning and education ('what learning with technology *should* be'). The Chief Executive would synthesize both dimensions of the shift by stating that it reflected Futurelab's need to 'play to [its] strengths' (Interview, 3 July 2003).

How are these two dimensions – the normative and the strategic – linked in practice? Both the strategic and normative dimensions overlap in the question, 'What do people want and/or need?', which is at the heart of problematization. It appears that a consensus among the core staff on the lab's purpose progressively informs the way it goes about its activities.

5.2.1.3. What are the relevant social groups and what do they want?

According to Futurelab's Chief Executive, the major hurdle facing the organization in its early days is the hypothetical status of the future market it hopes to engage and the uncertainty that it will yield financial results for potential partners in sufficiently short order. In the opening minutes of my first interview, in November 2002, he describes

the situation in which Futurelab finds itself (what in the second business plan is termed 'the inevitable challenges of operating in this space'):

> Chief Executive: (...) [E]ven though we may be given a greater security in our future [thanks to core funding from the DfES], it's not total. And because it's not total, there's always the tension between those who want to think about the future and those who don't want to think about the future. And we want to think about the future. **Therefore we're not able to give people instant returns on their investments, and there is a tension there but at the same time, it's very good to be anchored into what the people really want, this is what the market is.** And [to be anchored in] what schools and the DfES ought to be doing. I mean, it may well be that you sell some products that are the equivalent of coffee-table books – I suppose they look good and people think they should have them – but mostly, you only sell things that actually work. Rather than going buying a language CD-ROM that doesn't help them learn a language. **So there is a question of 'what is this hypothetical future market?' and that's really full of contradictions.** (Interview, 6 December 2002)

What people really want – in the early days of Futurelab, this issue is at the forefront of the designers' concerns. In the first highlighted passage, the Chief Executive uses the generic term 'people' to refer to those groups whose wants the producers are aware of and which must be taken into account in the production process. Upon closer inspection he is talking about two distinct sets of relevant social groups. First, those people Futurelab must enrol as partners in the enterprise, a necessity due to the lab's limited funding stream. Second, the endeavour's 'future market', i.e. the projected users of its eventual products. Such are the two main stakeholder groups of which the producers are keenly aware.

The producers' awareness of Futurelab's various stakeholder groups, along with their wants and needs, underpins the question of how Futurelab should conduct its activities. The Director of Learning illustrates this in recounting an important change in 'methodology' that occurred in the months following Futurelab's creation:

> Director of Learning: (...) we have a **vague methodology** about which way to achieve those things. I think that is shifting and changing in a way, because I think that probably had you asked the question to the team on 14 December 2001...
> PR: When you opened for business...
> DL: You would have got the message, well, production will take in ideas from the call for ideas, we will turn them into prototypes, the learning team will take them out into schools, and either accept them or reject them.
> PR: A fairly linear, straightforward process.
> DL: And I think we've changed that. I think people begin to realize that participative approaches in design, really taking into account the opinions of learners, teachers, other stakeholders, of actually having educational questions asked at the outset, emerged fairly quickly in going through the process. But to then say, have we cast a methodology in stone, the answer would be no. We are necessarily **eclectic, opportunistic**. (...) (Interview, 26 February 2003)

From an initial situation in which process and outputs would have been perceived as fairly well laid out in line with the organization's original business plan – which called for learning research to be subordinated to the production of prototypes – there has emerged not only a reversal in this process ('actually having educational questions asked at the outset'), but also a sense that there can be no set methodology, or at least that the way Futurelab goes about its business remains 'vague' and 'eclectic'. In other words, there has been a realization that production and research do not fit together as neatly as the original business plan suggested, yet there are no set rules as to how the lab's activities should actually be conducted. According to the Director of Learning this is due to the consensual acknowledgement that the opinions of 'learners, teachers and other stakeholders' must be taken into account from the outset of the design process.

The Head of Learning Research expands on this view in the follow-up to a response quoted earlier, in the introduction of this section:

> Head of Learning Research: My view very strongly is that we have an opportunity here to be developing our knowledge and understanding in a whole variety of different areas and that that is actually a key and important part of it. **What tends to happen is we have conversations around this, where I say something like that, and then [the Chief Executive] will say 'yes but we still have to publicise what we're doing', and I'll say 'yes of course we have to publicise what we're doing, those two are not mutually exclusive, it's just a question of which we prioritise first'**. And we could be in danger here of publicising what we're doing very well and very effectively, and making lots of things that look great, and tell nice stories because **we need to be seen to be doing things**, and not actually doing some of the substantive, **rigorous thinking that needs to go on underneath**. That's the concern I have at the moment, which is what makes me particularly arsy in meetings. We'll just have to work that through.
> PR: You obviously have the educational community in mind. I mean, [they] would come up to you and say 'yeah, you're doing very nice things but they're useless'?
> HLR: Yeah, the education community would definitely see a dominance of presentation over content, if we're not careful. We could be liable to accusations like that in the future. That's why we're working very hard that that isn't the case. And the other thing is we've got to produce things that are useful for whichever constituency that we're working with. I mean, if you're working with the education software community or the telecommunications companies, these are intelligent people, they have perspectives on things, they have viewpoints on things, they don't just want stuff that's pretty either – they want things that are well thought through and that are going to help them achieve what they want to achieve. So they're not mutually exclusive and it's not just the academics that would moan, **there's a whole range of different constituencies out there and all of them need us desperately to do something useful.** (Interview, 18 December 2002)

Again, the HLR lists Futurelab's three key activities of communications, prototypes and learning research and she evokes the 'danger' of favouring the first two (communications and prototype development) at the expense of learning research. In order to be successful in carrying out its remit, the organization must mediate between the interests of both the education community and industry in terms that will make the lab an obligatory point of passage (cf. section 3.4.1) in the field of educational technologies.

5.2.1.4. Futurelab as mediator between education and industry

On this point the producers' talk about Futurelab's role bears some trace of the strategic aims outlined in its founding documents. Conceptions converge on its role of mediator between, broadly, the field of education and the technology/media industries,[56] and this role is expressed in a variety of ways. For instance, the Head of Production speaks of Futurelab successively as a bridge, a translator and a marriage facilitator: 'What it does do, its most valuable bit, which is not fully realized yet, is the bridge between the production world and the education world. And actually providing the translation between the two'; 'Futurelab's role in that is to begin to marry the bits together and to get them to respect and to talk to one another, the fields of production and education.' (Interview, 29 November 2002). Others describe Futurelab as an important 'meeting place' for people from either 'world' (Interview with Head of Design, 6 May 2003); as an opportunity to 'synthesize things that aren't usually mentioned in the same breath' (Interview with Researcher, 5 February 2003); and as a response to the 'gap' left by industry's and the educational system's unwillingness or inability to engage in fruitful collaboration (Interview with Chief Executive, 14 February 2003).

For the producers, the lack of collaboration between industry and education (and hence the opportunity before Futurelab) is largely due to their diverging interests or, more specifically, to the perception either community has of each other. The problem can be summarized in the following terms:

---

[56]The former is typically seen to include both education practice (schools, teachers, students, etc.) and research (academics, learning specialists, etc.); the latter comprises public and private sector producers of technology hardware and/or content, whether media-based (television and film production, software) or otherwise (artists).

> Head of Production: Education thinks that everything that production has produced is rubbish; production thinks that education just goes round and round in circles, issuing papers, justifying grants, talking to themselves but never actually achieving or doing anything. There's no respect at all in there. So therefore you haven't got that healthy thing. But both have done something worthwhile, but if we can actually acknowledge that and respect it, then we can build from it... (Interview, 29 November 2002)

> Head of Learning Research: The thing is, with education everybody wants a quick fix. Everybody wants the magic pill that's going to get children to know everything fast and quietly and without problems. And the academics will say, there isn't one. And therefore industrialists say, well you are no use to me then. And they don't listen. But actually, if you are able to develop sustained partnerships with people, you have a transformation on both sides, where you all start asking interesting questions that actually help. But the access of organizations to that is pretty limited. And there is a degree of fairly profound scepticism on the part of education researchers as to how much... [industry is willing to listen] (Interview, 26 March 2003)

The Head of Production (HP) and Head of Learning Research tell the same story but from opposing perspectives. The key obstacle to instating a form of collaboration between industry and education is the former's endorsement of the view that the latter are isolated in the proverbial ivory tower of academic research, as the HP states. From the HLR's standpoint, such a view betrays the industrialists' bitterness at the fact that academics deny them the 'magic pill' they so eagerly require, i.e. hard and fast facts on the way children learn that can then be turned into successful products.[57]

The HLR goes one step further, asserting that the divide between both communities is in fact the reflection of 'a structural tension within society':

> Head of Learning Research: **The problem is that education is seen as a market by the industry. By teachers and education researchers it is seen as a public good. And you have a major tension there, it's a structural tension within society**. So if you're talking to a big producer of hardware and software, their impetus is to get their stuff into schools and to figure out the best way of doing it. If you're talking to an education researcher working for that company, their impetus is to figure out the best thing to support learning, which may mean not using that technology. So there is a fundamental issue there, and we need to figure out ways of working together. (Interview, 26 March 2003)

[57] It is worth noting that the Head of Production and the Head of Learning Research in this instance speak on behalf of industry and the education community, respectively, based on their extended experience in either field. The former states elsewhere in the same interview: 'Maybe because I come from a production side, I think that Academia will continue to go round and round in circles (...)' As for the HLR, her sympathy for, and in-depth knowledge of, education researchers and their grievances is quite obvious. The role of experience is discussed at length in section 6.3.

The dichotomy underlined here illustrates the tension described in Futurelab's second business plan as opposing the 'public good' and the 'commercial sensitivities' of partners. It also begins to flesh out the normative dimension which was staked as the crucial topic of debate in Futurelab's first year.

The mediation between industry and the education community is hindered by their adherence to competing conceptions of education: for the former, education is a market; for the latter it is a public good. Crucially, this implies competing conceptions of the role of children. Although both industry and the education community may want 'children to know everything fast and without problems', exactly what this all-encompassing definition of education entails in the context of educational technology production, depends on either perspective. What does industry want? 'To get their stuff into schools'; therefore they want users for their products, first and foremost. What does the education community want? Better, more effective learners, which may in fact mean not using technology at all, i.e. not becoming users. Needless to say, the latter prospect is not attractive to commercial partners.

Yet, Futurelab needs to bring the two stakeholder groups together. Both the HP and HLR suggest that the solution to this divide lies in the establishment of a sustained relationship which would reveal the benefits of collaboration to both communities. The Development Director puts the challenge before Futurelab in an instructive light, suggesting that it lies in the existence of two separate – though perhaps not incompatible – definitions of success in relation to educational technologies:

> PR: If your purpose is to make society a better place through education, what would your conception be of a successful technology?
> Development Director: There are two ways to come at it. There's successful in the sense of did people use it, enjoy it and get something out of it? And then there's successful in terms of the bigger picture we started from, that is, does this challenge the way we go about things, does it challenge our thinking on what education is and could be? **And the two things are completely separate**. A technology could be successful in the first instance and not challenge anything. Or it could be extremely challenging but fail miserably in terms of engaging anybody in anything. (Interview, 13 March 2003)

Thus, one may distinguish between a commercial conception of success premised upon the production of artefacts and their adoption by users ('did people use it, enjoy it and get something out of it?'), and a more social one that need not involve such tangible outcomes at all ('does it challenge our thinking on what education is and

could be?'). Although both communities would likely welcome success in both guises, the former corresponds to industry's priorities, whilst the latter fits with the education community's priorities. As the Development Director states, the two means of assessment 'are completely separate.' But in order for Futurelab to establish itself in the field of educational technologies, it must reconcile these two conceptions and their attendant stakeholder groups. As the Chief Executive succinctly puts it: 'Even if we don't do the final production, [prototypes are useful to show] that we can originate concepts that can change the world of education and make money for somebody. Because that will attract private and public money in the future.' (Interview, 3 July 2003)

In sum, it is one thing to acknowledge the potential benefits of a partnership between industry and education which would be satisfactory to both parties, as well as Futurelab, and prescribe a process whereby it can be achieved in theory. It is quite another for the producers to sort out this process in practice. As the Futurelab Researcher – a key lynchpin between Production and Learning – explained in interview, the producers perceive this situation as a sort of double-bind:

> '(...) people keep going on about this **self-perpetuating circle**, which is that until we have a really amazing kind of application, none of the big organizations are going to stick money into educational technology. But until the big companies put money into educational technology, we're not going to have a really amazing technology. (Interview, 30 June 2003)

In order fully to appreciate the bind producers find themselves in from the outset, it is useful to reiterate the notion of publicity, which the HLR described as both a necessity and a menace to Futurelab's development in an earlier quote (cf. section 5.2.1). The publicity of Futurelab's activities (through communication/events) is crucial to the endeavour: the organization must be seen to be doing 'something useful' in the eyes of its stakeholders for them to come onboard – *even before it has actually produced an educational artefact.* This publicity, the 'need to be seen to be doing things' at such an early stage, is problematic in that it has a potentially paralyzing flipside: from the very outset the producers feel, and must take account of, the scrutiny of their perceived stakeholders, whose expectations are in some measure divergent, if not incompatible.

In the words of the lab's Head of Production, the producers must meet pre-existing expectations from the moment they are out of the gate:

> Head of Production: And it's also that you're having to be, **you're having to put on this successful front** – well, it's not that you have to put it on, but when you work in the corporate sector like I did, we always used to work this method where they always dangle a carrot in front of you, so even if we did this press release that bends the rules a bit over what you've achieved, then we've got to make sure we live up to it, yeah? And we never go out too far but you know, it's the donkey chasing the carrot trick... But of course for us [at FL], they come in thinking it's all here and it's all 'gee wiz'. (...)
> PR: Moving on to outcomes, and this relates to some of the things you just said... What would FL have to achieve in the short, medium and long terms to be considered successful, in your view?
> HP: **It's got to deliver on what everybody thinks it's already doing.** (Interview, 29 November 2002)

The strategic need 'to put on this successful front' was an important battleground over the course of my investigation. It illustrates that decisions as to how the production process should be organized are not a simple matter of convenience or efficiency. More importantly, they are not born out of technical necessity. Indeed, the 'perceived scrutiny' of their stakeholders informs even the producers' decisions as to which type of activity, between prototype development and learning research, should take the lead and be displayed as Futurelab's main feature.

In practice, the producers effectively give Futurelab two options in terms of which activity it chooses to make its driver, and both entail opportunity costs with regards to its potential partners. Indeed, the seemingly straightforward matter of 'where do we start' involves a possible trade-off in terms of Futurelab's legitimization: any decision may well be received favourably by one group of stakeholders, but it risks putting off another.

On the one hand, Futurelab can focus on the production of prototypes which would then be assessed in a learning perspective and thus project the image of a production laboratory with a (somewhat secondary) learning component. In this case it would likely be embraced by industry, for potential commercial partners, or 'funders', are keen to actually see the materialization of Futurelab's work before they are ready to commit to the endeavour, as the lab's Project Manager and Deputy Chief Executive make clear:

> Project Manager: In the short term, I think **we need to get a couple of prototypes done.** Which will benefit [the Development Director] and [Deputy Chief Executive], because it's **something to show**, it's good for funders, because it just shows 'after a year, yeah this is what we've done'. So it puts people's doubts at bay. **Because it's easy to say we've done this, bla bla bla, but we need to show.** So in the short term we need to be doing that. (Interview, 5 February 2003)

> Deputy Chief Executive: Where I don't think we've made our mark yet and I hope we will, is in drawing in the creativity of the games development community and of the media community, and inspiring them to get involved in the educational market. And I think that's natural that there's an element of their having a lot to do and them saying **'well, show us what you've done and then we might believe you'**. (Interview, 26 February 2003)

The pressure to 'show' Futurelab's outputs is keenly felt by the producers. In addition to commercial partners, the DfES, which granted Futurelab its core-funding, is equally keen to measure the organization's progress through its tangible outputs, as this excerpt from a Strategy Directorate Meeting illustrates: 'We have just received an email from [a DfES officer] saying that by Friday the DfES would like to show [Education Secretary] Charles Clarke some examples of Futurelab's work.' (Deputy Chief Executive, Strategy Directorate Meeting, 1 July 2003.) Incidentally, the announcement was greeted with general expressions of panic and affected indignation.

The option of making prototype production the driver of lab's activities risks alienating the education community, which would see in this orientation 'a predominance of style over substance', as the Head of Learning Research stated in an earlier quote. The Development Director conveys a similar idea in asserting the importance of learning research: '(...) part of that is about maintaining our reputation – being seen as worthwhile researchers, doing things properly.' (Interview, 30 June 2003)

On the other hand, Futurelab can favour the learning research side of its operation and be seen as a research laboratory with the capacity to produce working prototypes. In this case, it is more likely to make inroads into the education community, but industry would need persuading as to how it could benefit from associating with Futurelab, especially if prototypes are not forthcoming. It is less clear how this option would sustain the organization in the short term, as its initial structure makes it highly dependent upon external resources. Indeed, its funding stream and modest financial resources mean it must establish partnerships with external parties –

most notably commercial partners with deep pockets – in order to do so. Furthermore, after its 3-year period of DfES funding comes to an end, the organization is expected to sustain itself, most likely through royalties perceived from marketing the products it develops in partnership with others.

So why did Futurelab implement a shift to learning research in such circumstances? As the following account seeks to demonstrate (section 5.2.2), for the producers it boils down to a choice of which stakeholder group they will prioritize – commercial partners or users.[58]

5.2.2. (Re)defining Futurelab

Individual responses on the topic of Futurelab's reasons for being suggest that social considerations outweigh technical and economic objectives in the minds of producers. Questions such as 'what is Futurelab all about?', 'where does it fit in the grand scheme of things?' and 'what would it have to achieve in order to be successful in your eyes?', elicited a range of responses covering the general context of the Futurelab enterprise and the need to bring about social change, to the organization's role of catalyst for the development of the UK's technology, media and creative industries (cf. section 5.2.2.1: 'The Hollywood of education allegory'). Despite some superficially dissonant responses,[59] most individuals were keen to stress Futurelab's projected social impacts rather than the prospect of technological innovation or economic growth as such.

The producers assert that Futurelab exists 'to make models of how the world could be different' (Interview with Chief Executive, 18 December 2002); 'to make the world a better place' (Interview with Head of Learning Research, 6 December 2002); to help 'bring about equal opportunities for children' by not constraining them to rigid career paths (Interview with Head of Production, 29 November 2002); and to 'increase

[58] Although the following focuses on Futurelab's interactions with commercial partners rather than with the education community, it does not mean to gloss over the importance of 'being seen to be doing things' properly in the eyes of the latter group of stakeholders. However, by all accounts this was less problematic. As the Deputy Chief Executive states: '(...) I think it was inevitable that the education community would see much sooner what we were trying to do and the creative and technology communities need something much more tangible to buy into us, as it were.' (Interview, 30 June 2003)

[59] E.g. to the question of Futurelab's success, the DL answered in quantitative terms: 'OK. 50 potentially good ideas, followed by 10 potentially good prototypical exemplars, followed by 3 things that went into real production.' (Interview, 29 November 2002) But he would go on to qualify this by saying it meant that FL would be involved in developing ideas, not technologies as such.

human happiness' (Interview with Director of Learning, 26 February 2003). The Deputy Chief Executive responds to the question 'where does Futurelab fit in the grand scheme of things?' in the following terms:

> I hope that it will make its mark partly on the future of learning and teaching. I think that in our small way we're already making that impact – we are giving a flavour of the future. We are demonstrating, particularly through our learning research, the potential of technology to liberate what have been fairly constrictive learning and teaching practices. (Interview, 26 February 2003)

Technology in this context is depicted as a potential means of bringing about social change, not as an end in and of itself to which Futurelab must aspire. For the producers, there is a crucial difference between an endorsement of technology 'as such' and a belief in its potential to help effect social change. This distinction has ostensible consequences for the production process. The matter of technology's potential is explicitly addressed in section 5.2.3.2; for now, I wish to discuss in greater depth the purpose of Futurelab as perceived by its members which reveals the producers' sense of caution and/or scepticism with regard to technology and the economic forces behind it.

The social implications of the Futurelab endeavour tend to be expressed in one of two guises: as a claim of the centrality of education to the well-being of society as a whole (so in essence, a concern for the public good); and, somewhat more prosaically, as a concern for those people directly engaged by this social activity, i.e. children and to a lesser extent, teachers.

As an illustration of the former, one prevalent view within Futurelab depicts the organization as a catalyst in the debate on the future of education which is seen to have implications for the development and well being of society as a whole. This view is expressed by Futurelab's Development Director, in response to the question 'where does [Futurelab] fit in the grand scheme of things?':

> Development Director: That's a BIG question! (...) I think the important things Futurelab has to address are ones that it is not in the best position to do yet. **They're about the whole philosophy of teaching and learning – what it's for.** I think it's possible, but I'm not sure I'm convinced entirely by this, but it's possible that new technologies and the new methodologies they bring in with them, could be a catalyst towards making us have a look at the education system that's grown up and where it's come from and where it's going. Things that worry me about the political situation and

> the broader socio-economic environment that we live in – Western capitalism, if you want to be really broad about it – is the notion that education's principal reason for being is a vocational one, what we are doing is taking young people and training them to be good workers, to be economically productive. And that really worries me.
> PR: The utilitarian vision.
> DD: Yeah. The whole cultural notion of education has actually been lost. Perhaps not entirely lost, but subdued, or pushed to the back. Because nobody, politically, ever talks about any particular part of the curriculum because it is actually good for society in a general, cultural kind of way. That worries me. And I'm not sure FL is a solution to that, but it's part of that whole debate. (...) That's what attracts me to working at FL, is being able to have a voice in that debate. (Interview, 13 March 2003)

The Development Director's mere reaction to the question ('That's a BIG question!') indicates that the matter goes beyond the strategic objectives of a start-up business. For him, Futurelab must address 'the whole philosophy of teaching and learning – what it's for'. His comments convey his worry and clear scepticism of the 'socio-economic environment that we live in – Western capitalism (...)' and the vocational, utilitarian model of learning it entails which rests on the production of 'good', 'economically productive' workers. To this conception, he opposes a 'cultural notion of education' that involves the development of curricula that are 'actually good for society in a general, cultural kind of way'. Lastly, his comments convey an attitude of caution towards the potential of technology in the context of education and he points to 'the methodologies' that accompany new technologies as a possible 'catalyst' for a re-examination of the shape and function of education in society.

The long-term goal of a major transformation of the institution of education is shared by the Futurelab Manager and Head of Learning Research:

> Futurelab Manager: I think that the long-term aim is... I would love for us to have some impact on learning so that when we look back in ten years' time, we notice that we did contribute to a big shift in how education is considered by academics, by government, by policy-makers. (Interview, 5 February 2003)

> PR: What would Futurelab have to achieve, in the short, medium and long terms, to be considered successful, in your eyes?
> Head of Learning Research: (long pause) I think probably it's about presenting different models of how learning can happen, and not just in an academic paper, but presenting models that certain other ways of thinking are possible and certain other ways of teaching and learning are possible and that they can be enabling and empowering. (...) And ideally, if we came to succeed, **I want a complete change in the national curriculum, a radical overhaul of the assessment system and a complete shift in the relations between teachers and learners, generally**. That would be my long-term definition of success. (Interview, 6 December 2002)

For these producers, the long-term social transformations they hope to bring about through Futurelab outweigh the organization's economic role. Crucially, the language they use is a telling indicator of their sense of having a personal stake, and of their active engagement, in the Futurelab endeavour: '[the current system] worries me'; 'I would love for us to have some impact on learning...'; 'I want a complete change in the national curriculum...'. The following bears this out further.[60]

In some instances they go one step further than merely endorsing the idea of social transformation, by establishing – unprompted in most cases – an opposition between this and the lab's projected economic impacts. The opposition is most eloquently expressed by the Head of Learning research in the following:

> (...) Basically, education is a good market for the technology industry and they need to find ways of getting into education. If you look into early policy statements around the NGFL [National Grid for Learning][61] there were statements like 'we have great software developers and we need to build a market for software developers'. So there's the kind of economic imperative that we are here to support the technology industry... I personally don't think that's our main job. I think the technology has the responsibility to develop itself if it has to. Our main job is to try to develop humane, empowering, creative learning resources for children, because from the age of 5 to 16 or 18, it's a hell of a long time to spend doing something that is soul-destroying, uninteresting and unsupportive of your development as a person. **So I'm on with trying to make children have a better time.** (...) (Interview, 6 December 2002)

In addition to expressing the dilemma nagging the producers, and the perspective she feels Futurelab should adopt, the HLR's definition of success and of the organization's 'main job' is rooted in a more focussed concern for the people involved in the activity of education, that is, children. Indeed, she argues that Futurelab's must develop 'humane, empowering and creative learning resources for children' in order to save childhood and early adulthood from the situation she implicitly accuses the current system of favouring, namely, activities that are 'soul-destroying, uninteresting and unsupportive of [children's] development as a person'.

The way in which the HLR expresses her personal reasons for involvement at Futurelab – 'So I'm on with trying to make children have a better time' – eloquently

---

[60] The producers' sense of personal stake and active engagement is echoed in section 6.3.2, in which I argue that the producers' expertise stems partly from their sense of entitlement to contribute to production based on their social experience, rather than on formal qualifications and job description.

[61] The National Grid for Learning (NGfL) is a DfES-funded initiative launched in 1998 to facilitate the integration of ICTs in education. More information can be found at the NGfL website: http://www.ngfl.gov.uk/about_ngfl/

conveys her own enthusiasm, as well as her sense of a personal stake in the Futurelab endeavour. As importantly, it distils to its simplest and most pragmatic expression, what came to be acknowledged by the producers as Futurelab's purpose.

The Projects Manager expresses a resonant view in response to the question 'what is [Futurelab], where does it fit and why is it interesting in your eyes?': 'Well I think it's interesting because it is trying to discover new ways of learning, and making it more exciting by using new technologies. Or just a different approach, to make it more exciting for kids.' (5 February 2003). Similarly, the Head of Production states the importance of the Futurelab endeavour in terms of its potential benefits to his own grandchildren:

> [I]f we can bring the producers and those who receive it, together, then maybe we can make something that will make a real difference. You know, my kids have grown up, but maybe their kids, it could make a difference for them. (Interview, 29 November 2002)

In a similar vein, others display a concern for children in making a distinction between Futurelab and the manner in which educational technologies are developed by other organizations, notably in the commercial sector. Regardless of their management stream (Management/Communications, Production or Learning), the producers are critical of what they perceive to be the prevailing model of technological development which endorses a dynamics of technological push from designers to their markets.

As the Head of Design puts it: 'I've worked for a manufacturer of technology hardware and software, and frequently, R&D specialists would be in their ivory tower, just 'doing it', and they'd deliver it and say 'this is what you want' (Interview, 6 May 2003). The Head of Learning research echoes this view: '(...) there's a rule as to what happens in technology, which is people design things for the office and the businessman, and then it gets repurposed for a 5 year-old girl – it doesn't make much sense.' (Interview, 6 December 2002). The Chief Executive expresses his disdain for the dominant trend whereby technology is developed 'because we can', rather than as an answer to existing needs (Interview, 14 February 2003). For his part, the Development Director expresses a similar perception of the commercial sector in describing them as the intended recipients of Futurelab's learning research output:

> So the games developers and educational software developers actually. People who are perhaps from a background that is either practitioners – you know, suck it and see, or 'I tried this once and it did work, so I kind of stuck with it' and then have expanded it into doing a whole realm of other things that are still based on that principle of 'well I did this once and it worked, so carry on with that', you know. (Interview, 30 June 2003)

In sum, the producers see the process of innovation as it is carried out in the commercial sector as detached from the social context of use. Indeed, it is depicted as being prone to (cynically) repurposing technologies with little regard for their intended users and their needs; having a purely technical impetus ('because we can'); and driven by a formulaic approach which makes an organization's previous successes the basis for subsequent initiatives. This denotes the producers' rejection of technical essentialism and its commercial motivations and their will to place social needs first.

Furthermore, it is interesting to note two key rhetorical devices used consistently by the respondents in so doing. First, the producers are keen to convey their enthusiasm, passion and sense of personal commitment to Futurelab as a social endeavour, either by using expressions such as 'I personally think that...', 'I would love for us to...', 'that worries me...', and so on, or by invoking their personal experience to justify their involvement in Futurelab (e.g. 'maybe it will make a difference to my grandchildren'). Second, in many instances the producers spontaneously suggest that Futurelab's social objectives and its commercial objectives are in opposition to each other.

5.2.2.1. 'The Hollywood of education' allegory

The producers' ostensible concern for the social aspects and anticipated outcomes of their work, as well as their stated distrust of technological innovation and its commercial impetus, are somewhat at odds with the idealized view of Futurelab which holds that the organization could help turn the UK into the 'Hollywood of education'.

Coined by Sir David Puttnam, NESTA Chairman and successful movie producer,[62] and pronounced at Futurelab's official launch, the notion of 'Hollywood of education' encapsulates the opportunity for the UK to gain global influence in the field

[62] See Yapp (2003) for an overview of the development of ICTs for education in the UK over the last decade and the role of NESTA, and Sir Puttnam, therein.

of education technology by drawing from the country's strong base in the media, technology and creative sectors. It is an eloquent allegory, spontaneously rehearsed by the Head of Production ('I very much buy into David Puttnam's thing: 'there is the possibility for the UK to become the Hollywood of education.' Yeah, I'd always thought that', Interview, 29 November 2002) and the Chief Executive in my very first interviews in order to outline, in an admittedly crude way, the scale of Futurelab's ambitions. The latter explains what the expression means to him:

> But what I'd say we bring that [a similar UK-based lab in education technology] doesn't is, to put it crudely, David Puttnam's 'Hollywood of education' bit. You know, coming from the media, yes, these tools empower people to create things but you still need creative people to author and create the media, the games, the experiences that can work together with people's own creativity. (Interview, 6 December 2002)

The Chief Executive highlights the opportunity to draw on the UK's media industries, of which he has extensive experience, in order to design artefacts that will enable people to develop their creativity in an educational context. The Deputy Chief Executive (DCE) echoes this view but she also stresses the commercial component of the 'Hollywood of education' allegory and the opportunity for global expansion:

> It can be viewed so many different ways, but putting it in the context of can we inject the creativity and the sheer, rich talent of the UK media community into education, then yes I do [buy into the view]. And whether we can have that be as commercially successful and as dominant as Hollywood, I'd like to think so. (Interview, 26 February 2003)

Elsewhere the DCE expands on this projected outcome, stating: 'And so my hope in joining FL was that we would move fairly quickly to become a global player, or at least having an impact on the global stage. I still hope that will be the case.' (Interview, 26 February 2003).

However, the 'Hollywood of education' allegory elicited mixed reactions from the producers, not least from the DCE herself. Indeed, she cringes at the mention of this phrase and suggests that such a desirable status should not be achieved at any cost:

> Deputy Chief Executive: (laughs) I hate the term and from what I understand it's David Puttnam being misquoted anyway, so... (...) I think if you ask the UK media community if they aspire to be Hollywood, they would strongly urge not. They don't want to head down that naturally mainstream.
> PR: When I asked the question, I saw you cringe...
> DCE: (laughs) It's that – it's the sense that perhaps it doesn't allow the independence, the irreverence of the European cinematic community, that **it tends to be commercially**

> **driven rather than the content of things, that there seems to be a formula that works in financial terms.** That's why I cringe. (Interview, 26 February 2003)

The DCE plays down the relevance of the metaphor in the context of Futurelab, invoking the media community's aversion to becoming 'mainstream' and displaying a distrust of formulaic activities dictated by financial success, thereby echoing the Development Director's earlier comments to this effect. The 'Hollywood of education' thus evokes an undesirable image for the producers: that Futurelab might become subservient to a commercially-driven, formulaic approach at the expense of more valued principles such as independence and irreverence.

The HLR has a similar reaction as the DCE, sighing ostentatiously when prompted on the significance of the 'Hollywood of education' allegory. Her response crystallizes a more basic, sceptical attitude towards the importance of Futurelab's role as a catalyst to industry. She reiterates the opposition between Futurelab's social purpose and its economic role, in terms that put into sharp relief the dilemma facing the producers:

> PR: What are your thoughts on [the 'Hollywood of education' analogy]? What does it mean?
> Head of Learning Research: Yeah, I've heard that a lot. In terms of what it means to me... If it means that we are able to produce really wonderful, exciting, magical, fascinating things that stimulate young people to be interested in learning or to discover new things about themselves or about other areas, then I think that's great. But I think there's enough other people looking after the interests of industry in this place, I think my job is occasionally to go 'I'm not sure I care that much about whether I increase BT's net profits this year'. (Interview, 6 December 2002)

The HLR's assessment of the situation is a fitting summary for the arguments discussed in this section. In her view the analogy can be taken to mean one of two things: either Futurelab serves the interests of children through the creation of artefacts with the kind of production values typically associated with Hollywood films ('wonderful, exciting, magical, fascinating'), and which stimulate learning and discovery; or it serves the interests of industry. If the two are perhaps not incompatible, clearly they are an uneasy fit in the producers' view, as these comments, and those of her colleagues, indicate.

The utterance of such an opposition is telling in that it takes the dynamics of problematization – i.e. the establishment of a hypothetical system of alliances among entities, based on the perception of their wants and needs – beyond a simple matter of mediation between potential partners, in this case the education community and industry. Indeed, the producers effectively instate an opposition between the interests of one such group – industry – and those of the projected users of Futurelab's eventual products – children. Resolving this perceived conflict then becomes crucial.

5.2.2.2. Mediation among stakeholders: taking sides

Further evidence of the producers' unease at the need to take into account the interests of commercial partners as well as children is revealed when they are asked outright 'who stands to benefit from the Futurelab endeavour?' or 'who do you see as Futurelab's stakeholders?' The producers almost invariably point to children (or kids) in the first instance and it is with some reluctance that they mention potential commercial partners (or 'funders'):

> Futurelab Manager: I would have thought eventually kids. And teachers. And I didn't really understand that when I started, but it doesn't really matter what we do and what we come up with, if kids are not interested then it's not going to work, is it? And also teachers, whatever their role is in the future, and I really think it will change, to be honest. And the people who are responsible for teaching kids as well. And **whether you like it or not**, people who have got money to give us. (Interview, 5 February 2003)

> Deputy Chief Executive: It might sound trite, but I'd like to say the children of the future stand to gain the most. And I hope if we can crack this, or at least be part of cracking this and making technology a useful part of the future learning landscape, then that is most fundamental and the most important for us being here. I think teachers come a close second. They really have to be part of what we do and on the whole process. And I think **anything apart from that is so secondary. I mean yes, we can talk, in terms of stakeholders, of the DfES who are funding us, commercial partners are very important** not only to us but that we can hopefully open some doors for them as to what is possible. But really those two [children and teachers] have to be at the heart of what we do. (Interview, 26 February 2003)

> Researcher: Well, I really hope, and this is a massive priority, I hope it would be the kids we work with in schools and if the projects we're working on take off, then kids more widely. **I'm not personally very concerned about all the big organizations**. I mean I know they're essential to us, for providing us with funds and support us by coming to our conferences and helping to spread the word and stuff. But if we don't actually do something for the kids, then we're failing. And that's the most important thing. Once we've really got projects going, later this year, I'd hope that we'd be seeing kids as often as we see commercial partners. (Interview, 5 February 2003)

For the Futurelab Manager, Deputy Chief Executive and Researcher, educational technologies developed by Futurelab would hopefully benefit children in

the first instance, and perhaps also teachers. All three mention the strategic and/or economic aspects of the endeavour, but they do so somewhat dismissively – acknowledging their importance to Futurelab's existence (as one would perhaps acknowledge 'official company policy'), but quickly playing down their significance in favour of the broad social implications of their work. This is in line with the Head of Learning Research's previously discussed responses ('I personally don't think [it]'s our main job [to support the technology industry]; 'I'm not sure I care that much about whether I increase BT's net profits this year').

Importantly, these responses indicate that the notion of 'stakeholders' comprises two key groups in the minds of the producers: 'potential-partners-as-stakeholders' and 'users-as-stakeholders'. Both are kept in play simultaneously and from the very outset of the enterprise.

On the whole, the issue of determining the long-term outcomes of, and who should benefit from, Futurelab's activities has the hallmarks of a moral dilemma for the producers – whose interests are they 'looking after'? Their concern with the social group of children is more a form of allegiance than a simple awareness. This complicates matters further, but also points to a way forward, for their comments suggest the impossibility of remaining neutral in such circumstances. In fact, the producers seem to be taking sides.

5.2.2.3. The 'children of the future': from object of concern to object of mediation

It is worth rehearsing the Chief Executive's initial account of the tension which hindered Futurelab's progress in its first year (cf. section 5.2.1.3). According to him, the tension stems precisely from this opposition between the present and the future – or more specifically, between potential-partners-as-stakeholders and their wants and needs on the one hand, and users-as-stakeholders and their wants and needs, on the other. Indeed, the sticking point in Futurelab's attempts to enrol partners is the 'hypothetical' status of the 'future market' the organization hopes to engage, and hence the uncertainty that it will yield financial results in sufficiently short order.

The Chief Executive in this instance uses the generic term 'people' to refer to those groups whose wants designers are aware of, and which must be taken into account in the production process. He is in fact talking about two distinct sets of relevant social groups/stakeholders. First, those people Futurelab must enrol as partners in the enterprise, a necessity due to the lab's limited funding stream. These potential-partners-as-stakeholders want 'instant returns on their investments' and Futurelab's inability to guarantee this is a source of tension. More accurately, in the Chief Executive's words it is these potential partners' short-sightedness that instates a tension between themselves ('those who don't want to think about the future') and Futurelab – '[a]nd, he states emphatically, we want to think about the future.'

A central element of this future is the second social group whose wants the designers are aware of: '*the* people', i.e. the public at large, which comprises the potential users of Futurelab's products. In the words of the Chief Executive, what they 'really want' provides the grounding for the enterprise. His claim that such an approach is 'very good' hints at a moral stance that is consistent with Futurelab's socially-motivated aims and it suggests that these should rightly take precedence over the interests of commercial partners. What is more, his use of the present tense ('what people really want', 'this is what the market is') suggests that the wants of these users-as-stakeholders are objective and tangible, that they can somehow be demonstrated.

The hypothetical status of the market does not seem to be an issue for the producers – indeed they are driven by a belief and conviction that it exists and has tangible needs. Rather, the issue is demonstrating them so that others may recognize them as such and decide to contribute to the enterprise. The potential benefit to commercial partners is a deferred one that can only materialize if they are willing to 'think about the future' – a leap of faith they appear reluctant to make.

Therein lies the rub for the producers – their role rests on the hopeful mediation between the wants of partners and those of the market, between the present and the future. The Chief Executive suggests that the enrolment of the former depends upon the enrolment of the latter, and vice-versa. That is, for commercial partners to come onboard and contribute to the production of artefacts, children must become users and thus provide a viable market; for the children to become users, commercial partners

need to have been enrolled in order for artefacts to be produced. To the designers this is a 'chicken or egg' conundrum - or, as described by the Researcher in an earlier quote, a 'self-perpetuating circle' (cf. section 5.2.1.4). The producers employ two related tactics in order to move forward: in line with their normative outlook, they make projections as to user needs; in line with their strategic imperatives, they set out to persuade partners. Both aspects are entwined in the Chief Executive's response. The normative bleeds into the strategic in that, rather than being pitched in opposition to the interests of industry, the humanist concern for the wants of 'the people' is presented by the Chief Executive as consistent with a market-driven approach that can commercially benefit partners. The key for Futurelab in this context is to convince commercial partners that this is the case. This view is broadly shared across Futurelab.

As the Head of Learning Research puts it:

> My sense is that actually, if we can create, if we can **persuade** the technology industries to really think seriously about their 'market' – in their terms – or about children, in mine, then they will be more financially successful. But it's the taking the learner, the child, seriously first, that will bring them market benefit afterwards, as opposed to starting off from the position 'we must improve market share of the UK, whatever'. I have the somewhat naïve belief that if we produce things that are really good quality, and that really do the job, then the other stuff comes afterwards. And that's the position that I try to adopt most of the time. (Interview, 6 December 2002)

Even though the producers are keen to distinguish between the social and commercial aspects of their work, to potential partners these are presented as two sides of a same coin – an intimate knowledge of the wants and needs of children can engender commercial, as well as social, benefits. The object of Futurelab's activities in this context is one and the same social group; how it is described is simply a matter of perspective ('market' vs. 'children' and 'learners'). However, in line with the convictions of its members, Futurelab must persuade partners that it is necessary to start by 'taking the learner, the child, seriously first'.

Such an argument enables Futurelab to pitch itself more effectively to commercial partners, as it makes learning research – according to them, a scarce commodity in the commercial sector – the key to success. This view is born out in the following comments:

> Chief Executive: But for the most part, the games industry taken collectively has never been reflexive or thoughtful about why what they do works, how it works, let alone how it might be used for learning. There is now a growing minority of the games companies [who think] there is big market in learning, but we offer really a quite unique perspective that says: 'you think you've got all these ideas, you think you've got a big market; you could have a bigger one and a more interesting one if only you'd thought about this sort of stuff – **we know about this sort of stuff.**' (Interview, 6 December 2002)

> Chief Executive: So, I think private industry, large companies, needs to think about this and that's what we are trying to persuade them to do, that by working with us they can start to think strategically about, yes, driving the market for their markets (sic), but **driving it by finding something that people actually want to do and need and is valuable**. (Interview, 14 February 2003)

> PR: So if it's not money, what is it that you offer?
> Project Manager: Well like I said, someone might have a great idea and they have developers, but they have no idea about learning, **they have no idea what a child would learn from their projects, if it's worthwhile pursuing – that's something we can offer**. (Interview, 5 February 2003)

> Researcher: We're here to inform the educational community and the multimedia community and the games community. And obviously the games industry is an example where they don't see any benefit in terms of moving in to education, because they're making packet loads of money as it is. But if we can **demonstrate that games in school are going to be a massive success**, that they do something very valuable, they might be more interested. (Interview, 5 February 2003)

In order to appreciate the ramifications of such a process of mediation between the wants and needs of stakeholders and users, it is useful to reiterate the seemingly unproblematic juxtaposition uttered by the Chief Executive in the long quote of section 5.2.1.3: in one instance he speaks of Futurelab's market as being real, as an opportunity to be seized ('what the people really want (...) is what the market is'), whilst seconds later it is candidly recognized as presumed and uncertain ('what is this hypothetical future market?'). Far from denoting confusion on the producers' part, such a juxtaposition merely reflects the intricate relationship between both social groups from the early stages of production. Again, sorting it out is not a matter of objective mediation among stakeholders, but something which, as the Chief Executive states, is 'full of contradictions'.

5.2.2.4. A tale of two markets/audiences: the role of mediation

The perception that learning research confers Futurelab added value was crystallized in the organization's second business plan (2003-2004), drafted in late Spring 2003. In addition to providing a further marker of Futurelab's new direction (unlike the previous business plan, this one was the result of a collaboration among current staff),

the business plan by its very nature frames the shift to learning research as a matter of strategic planning. The document was given high priority status by the producers as it would serve not only to articulate fully Futurelab's acquired 'sharper focus', but also to allay the concerns expressed by the DfES in the (relative) absence of finished prototypes.

In addition to spelling out the 'lessons learned' from Futurelab's first year of operations (cf. section 5.2.1.1) and confirming learning research as the organization's main priority, perhaps the most striking feature of this second business plan is the prominence it gives to the ultimate users of Futurelab's output – 'the learner'. The opening lines of the document's introduction make this abundantly clear:

> Since our launch in December 2001, NESTA Futurelab has focused on positioning itself in the educational ICT arena, assessing market needs, establishing contacts and identifying the availability and accessibility of funding. The priority for 2003-4 is to deliver high quality output, turn contacts into partners, and adjust our business processes and culture in light of our experience from our first year of operation. **In the coming year, we will place the learner at the heart of all our activities.** (NESTA Futurelab 2003: 3. Emphasis added)

I probed the producers about the underlying reasons for making such a statement, given the fact that 'the learner' had been, to me at least, a widely shared, ostensible concern throughout the first year. In other words, I wanted to address the utility of making explicit, in the context of strategic planning, what had become by most accounts an accepted fact within the lab – the need to drive Futurelab's activities from an understanding of the user's wants and needs. To this observer, the use of the future tense ('we will place the learner at the heart of all our activities') in the business plan did not so much announce the adoption of a new perspective within the lab, as it marked the acknowledgement that 'the learner' was more than just the ultimate benefactor of the Futurelab endeavour (object of the producers' awareness) – it was crucial to the lab's attempts to enrol potential partners (the object of mediation).

As key lynchpins between Futurelab's 'creative end' and the outside world – most notably potential commercial partners – the Deputy Chief Executive's and the Development Director's responses to my probing are most insightful in the way they illustrate the producers' perception that the innovation process, if it is to bring about social change, is a staggered (or two-step) process which need not grant an active role

to the end user in a first instance. Indeed, both the DCE and DD perceive Futurelab's potential partners and end users as constituting distinct groups of recipients for Futurelab's outputs – the DCE refers to them as 'markets', the DD labels them 'audiences'. They both assert that Futurelab engages these markets or audiences in sequence rather than concomitantly.

The Deputy Chief Executive offers the following explanation:

> PR: In the latest business plan [...] it says that the learner will be at the heart of all of FL's activities. What does this mean exactly? What I mean by that is, how is this different from the way things were done in the first year? I think it's in the second paragraph of the business plan that it is stated that the learner is at the centre – why?
> Deputy Chief Executive: Why? Because it is absolutely critical, in the way that any organization that is producing a **product** should do some **market research** and figure out what the **end user** would like, the **consumer** would like. There should be that interaction with the end user. But more fundamentally, as I mentioned before, we are not about technology – we are about the learner, we are about improving the learning experience. So it is fundamental that the learner is at the heart. I think that hasn't always been the case. The very make-up of FL's team initially was one of emphasis on production and on technology, and having people who could actually make prototypes, and have the design capability and the technology expertise. While we were originally only supposed to have one person who new anything about learning research. And it became very quickly apparent, partly from an external perspective, that **our uniqueness and our real edge lay in the fact that we have the learning research capability.** (...)
> PR: (...) There has been a shift in recent months, the Production side shrinking, let's put it that way, whilst Learning has grown. So there is a strategic reason to that?
> DCE: Absolutely, yes. We are in constant demand to speak at conferences, input on early prototypes, to produce research. **The call on our resources is through the Learning Team.** We are finding that the creative community inevitably have access to creative suites, they have access to creative skills. But **where they fall down is on learning research.** We have had in this recent call for ideas, some teachers come to us with what seemed to be fairly reasonable ideas, who will need some of our design and production resources, so it's certainly not a case of just completely detaching ourselves from that. But our sense was that the balance wasn't right and didn't really meet the **market needs.** Hence the change. (Interview, 30 June 2003)

In the span of just over one minute, one is presented with two distinct definitions of Futurelab's market. In a first instance, the DCE justifies the importance of placing the learner at the heart of Futurelab's activities by likening the process to market research: as with any organization that seeks to market products, Futurelab 'should do some market research and figure out what the end user would like, the consumer would like'. Hence Futurelab's market in this instance consists of the learners that will eventually become end users; the product with which Futurelab will engage this market is, quite obviously, new artefacts designed to enhance learning. As such, it corresponds to the 'hypothetical future market' described by the Chief Executive in an earlier quote.

Shortly thereafter, in a second instance, the Deputy Chief Executive credits Futurelab's better understanding of 'market needs' with bringing about the organization's transformation in the previous months: 'it became very quickly apparent, partly from an external perspective, that our uniqueness and our real edge lay in the fact that we have the learning research capability'; 'The call on our resources is through the Learning Team'; 'We are finding that (...) where [the creative community] fall down is on learning research'; lastly, 'our sense was that the balance wasn't right and didn't really meet the market needs. Hence the change.' Here the DCE is speaking of an altogether different market. Indeed, the market whose needs have purportedly been revealed in the span of Futurelab's first year, thus leading to the organization's transformation during this time, is not the market of users described in the first portion of her response. Rather, it is a market of potential partners.

Such comments help to put in perspective and, in turn, are supported by the DCE's observations in an earlier interview:

> Deputy Chief Executive: In terms of the Learning Research, in external meetings [the Director of Development] and I have found that Learning Research is certainly the thing that seems to press the most buttons with potential partners. So having [the Head of Learning Research] or [the Director of Learning] in a meeting to talk very clearly about what they see as the future of education and the role of technology in that really has helped our standing and credibility with partners.
> PR: Can you be a bit more specific about why you think that is? Why do people see in [them] a key resource?
> DCE: I think it's because very few of the commercial companies have the luxury of academic research, where they might talk to a university, which rarely happens, and they tend to get academic speak back. (...) **But that was news to me – when I first started I shared [the CEO]'s view that it was going to be our production and our prototypes that would really send people into spasms of joy, but it just hasn't been the case. Partly it's that we haven't had any prototypes to show**, but I am increasingly sceptical – I think it's the learning research angle that really sets us in good stead. I don't know – at the moment we are not leading the field in multimedia, we're good at design, we're very good, but we're not exceptional, we're not breaking new ground. While in our learning research field, I think we are.
> PR: Do you think there's also perhaps a sense that by dealing with people such as [the HLR and DL] these potential partners are moving one step closer to their potential markets, the users in a sense?
> DCE: Yes, absolutely. Yes. They like the idea that [the HLR and DL] are the people that are going into the field and talking to the children. They're one step away from that. And they somehow take from that a trust and a respect for the two of them, so that when they say it's unlikely that a child will consider it something useful, or it's unlikely to be of any realistic value to a teacher, then it's sort of taken as a given. I think access to children and to a user environment is a big, big plus. (Interview, 26 February 2003)

So what is the product Futurelab seeks to offer this market? It may be said that the perceived needs of this market – learning research – become Futurelab's key product. Crucially, however, learning research is only a 'need' to partners in the context of Futurelab's normative endeavour – it is not a need in absolute terms. To this effect, one recalls the Chief Executive's and Researcher's comments (cf. section 5.2.2.3) on the enrolment of the games industry, which is seen as a prize partner: '(...) the games industry taken collectively has never been reflexive or thoughtful about why what they do works, how it works, let alone how it might be used for learning.'; 'And obviously the games industry is an example where they don't see any benefit in terms of moving in to education, because they're making packet loads of money as it is.'

Judging from these comments, commercial partners are doing nicely without *needing* to get involved in the education market at all – what they do 'works' even without putting much thought into it, and they have the commercial success to show for it. Learning research is perceived as a need only to the extent that Futurelab manages to persuade its potential partners that this is the case, i.e. that a larger market, and hence more money, is forthcoming if they are willing to 'take the learner seriously'. For Futurelab, the ultimate aim of such actions is to bring about social change.

The Chief Executive sheds further light on the way in which both markets described by the Deputy Chief Executive are brought together, in response to a question about the utility for Futurelab to conduct learning research, as opposed to simply using its partners' R&D:

> Chief Executive: We exist because there is a gap. If there were no gap and people really were looking 5 to 10 years ahead, **in the public interest but also in their market interest**, and they were as willing to put money into content and applications as they are into technology – which I think is good for their markets and I think they are beginning to be convinced of this – if they were, then you might say 'what is the point of Futurelab?' (...) So that's the reason. We'll work with them, but only if they see that we are adding value to what they do and if they are adding value to what we do, especially cash (laughs). (Interview, 14 February 2003)

For the CEO, the promotion of learning research is a means of catering to both the 'public interest' and the partners' 'market interest.' Such considerations, as well as the DCE's explanations above, afford a useful perspective on the notion that 'the

learner is at the heart of Futurelab's activities' – here it appears in the guise of the promotion of user-related knowledge, not direct user involvement. Indeed, the organization's knowledge of the 'hypothetical future market' of learners becomes the key to its dealings with the market of potential partners which are a central part of its activities in a first instance.

The Development Director offers a complementary view in response to the same question (on the emphasis on learners in the second business plan). He reiterates the normative basis of the Futurelab endeavour and identifies 'influence' – rather than monetary gain – as the key return the organization seeks to derive from its dealings in the 'current' market of potential partners:

> Development Director: I think [the mention of learners in the business plan is] kind of trying to highlight and acknowledge that the audience for the ultimate product we might come up with – and by that I don't mean things we necessarily produce, but the **influence** we have in policy and practice, in what other people are producing – is about making it better for the people that are learning. That is what it is saying, I think. It's about keeping in mind the big picture. No matter which bit of the plan you are working on, no matter what you are focussed on, and delivering, and even this particular plan for this particular year, in five years time or whatever years time, if somebody says 'what influence have we had, what difference has FL made?', it should have made a difference to the way people learn, and their enjoyment of learning. That's the ultimate test.
> PR: Through a sort of trickle down effect?
> DD: **I hope it's a bit more than trickle down. It's like pump down**, kind of thing (laughs). Because **it's about us getting influence**, but making sure that all the time we have that – 'the final learner is what it's about at the end of the day', you know. (Interview, 30 June 2003)

The Development Director would reiterate his view in a later interview, in response to a question about the skills required for a career in educational new media production:[63]

> I would say that some of it has to do with understanding the system that you are trying to change really. It's about knowing who you need to influence and in what way to actually bring about a piece of improved educational resource. (Interview, 15 June 2004)

Such a conception underscores the fact that the end-users (learners) are an absent third party at this stage, but one towards which producer-stakeholder interactions are resolutely oriented. The DD's conception of a 'pump-down' as opposed to 'trickle down' effect (in the first of the two quotes above) is telling in this respect: the impact on learners and learning practices is not merely a desirable outcome

[63] The producers' perceptions on such issues speak to the topic of experience and expertise and as such, they are explored in greater depth in the following chapter.

– it is the ultimate objective. On the whole, the process of mediation described by the DD is akin to a 'two-step flow of influence' (Katz and Lazarsfeld, 1955; Katz, 1957); but here, it is enacted knowingly and strategically by the producers.

What is more, the DD is keen to stress that the exercise of influence is not to be treated as a means of gaining notoriety for its own sake ('it's about us getting influence, but making sure...'). The Head of Learning Research expresses a similar view: 'And ideally [we] do things in partnership with people and do it in a way that can empower them so they can go off without you. It's not about us maintaining our self-importance. (Interview, 26 March 2003)

For all the indications that Futurelab's activities are oriented towards the end user, however, the need to engage this audience directly is not deemed a priority, at least in so far as 'direct engagement' is taken to mean sustained market research or active collaboration. Such is the view put forward by the Development Director in response to my suggestion that, given Futurelab's broad social aims, then its ultimate audience must be 'the general public':

> 'Well, from my perspective, I am not that interested in the general public, you know? It's too big and it's not interested in what we do. We're not aiming to be prime-time TV, ever. Again, do the survey – nobody there will have heard of NESTA Futurelab. Maybe one or two. But that's not an issue. I don't think we need to engage with that audience.' (Interview, 30 June 2003)

This is one of the contradictions evoked by the Chief Executive, the ramifications of which are explored in greater depth in Chapter 6. The DD would clarify his position in a later interview, when prompted on Futurelab's knowledge of its end users:

> PR: Still with regard to the **users**, do you feel you have a clearer sense now of who they are than you did when you first came here?
> Development Director: Mmm nah. I wouldn't say any more or less clear, to be honest, no. No. We're still... We're driven by the fact that we are primarily funded by the ICT in Schools division of the DfES. We have that kind of focus on school-age learners, home or at school. They have teachers and will have teachers for the foreseeable future, you know, teachers aren't going to vanish. **That defines the audience well enough for us**, I think. We don't seek to know them any more than we do – we don't need to. **There's another audience, in the sense that software developers and the policymakers are actually probably a bigger audience for us in terms of what we're doing than the actual users**, in that sense. (Interview, 15 March 2004)

The DD is not arguing against the need to engage with the users wholesale; rather, he is saying there is only so much useful information one can gain from this in the early stages – and Futurelab already have a sufficient understanding of the end user in his opinion. The grounding for such statements can be found in the very dynamics of mediation.

Futurelab's role of mediator is not limited to the provision of a forum in which various stakeholders can physically meet and discuss joint initiatives or design and evaluate prototypes in the presence of users. Of course, this is one aspect of Futurelab's activities which it is keen to develop, but it is not conceivable that it would become the paradigm of how mediation is carried out at Futurelab. As a general rule – especially in the early stages of the organization's existence – interactions tend to be bi-lateral meetings between Futurelab and prospective partners, rather than tri-lateral meetings between Futurelab, its partners and users.[64] The Head of Learning Research offers some insight on the three-way relationship between Futurelab, its potential partners and the end users in such a context:

> Head of Learning Research: Basically, we are not trying to develop a uniform process of assessing and evaluating learning, that will work across all the different projects. And this is where I get tortured, because it comes down to the question of what do you think assessment is for. If you're talking about education – forget Futurelab for a second – assessment should be something that is ongoing and that supports the development of understanding. So the assessment should be giving feedback, it should be encouraging somebody to self-assess. And actually, if you then come back to Futurelab, part of what we are doing is actually formative assessment – I don't know if you know that phrase... it means ongoing.
> PR: Yes, formative as opposed to...
> HLR: Summative, yeah. So to some extent what we are trying to do when we work with the designers, [the Director of Learning] and I, is a process of formative assessment so that they start asking the right questions when they are not with us. So the question of what we are assessing and whom we are assessing is a really interesting one. **We are not assessing the children themselves** – we are working with the children to get some feedback on it, but actually what we are trying to do is work with the software developers or the industry so that they start thinking that it is normal to ask some of these questions themselves, on their own, to reflect on their own practice themselves, further and faster, or differently. **So the evaluating learning question is a really interesting one in this setting, because actually it's evaluating learning for the designers and the makers. So it's formative assessment for them, rather than summative assessment of the users. Does that all make sense?** (Interview, 26 March 2003)

[64] Even if such tri-lateral meetings take place (which they occasionally do), the breadth of Futurelab's ultimate audience is such that some form of representation is inevitable. The issue of user sampling and 'representativeness' is discussed in section 6.2.3.

There is, in the Development Director's, the Deputy Chief Executive's and the Head of Learning Research's comments, a clear sense that the two-step flow of influence embodied by mediation is endemic to the innovation process. In order to ensure Futurelab is in a position to exert influence on the future of learning and the learners with whom they are so keenly concerned, it must first exert influence on the partners, which it does by invoking its knowledge of the learners. Hence both markets/audiences – potential partners and end users – are part of a complex and on-going three-party relationship with Futurelab.

The Development Director sums up the shift from prototype production to learning research in the following terms:

> There's a huge cloud of optimism. We have a team now that is much more fit-for-purpose. We've got a structure that is much more fit-for-purpose, that can now deliver **the goods** much more efficiently. (Interview, 30 June 2003)

To put it crudely, 'the goods' in this instance designate learning research. At the risk of over-simplifying the Development Director's thoughts, it can also be seen to mean 'the end users'. One recalls the 'donkey chasing the carrot trick' described by the Head of Production as a strategy used in order to 'put on a successful front' in the initial stages of such an enterprise (which then compels one to 'deliver on what everybody thinks it is already doing'; cf. section 5.2.1.4). So who is the donkey and what – or indeed who – is the carrot Futurelab will choose to dangle? In what ways does Futurelab 'bend the rules' in putting forward its achievements?[65]

In such a context removed from the inflationist discourse of marketing, it is enlightening to consider exactly how the producers sort out the production process and what they make of such notions as technology, objectivity, the 'discovery' of user needs and user-driven design. If the ontological status of the users is a strategic

---

[65] I wish very strongly to stress that the use of such metaphors by the Futurelab producers – and the use I myself make of them in this narrative – is not intended to reduce the learners to a commodity, in the way television networks are reputed to 'sell' their audiences to advertisers, for instance. As far as I can see, this is not the case. Here the three-way relationship is seen by the producers as a necessary means of ensuring social change for the public good. Further, the audience in this case is not a measurable, quantitative entity exchanged for financial compensation; it is a normative project which remains in the hands of Futurelab, and which enables the organization to gain credibility and influence for the purpose of leading the project to fruition. In short, it is perceived earnestly as a sort of 'win-win situation'.

problem for the producers (as the chief Executive acknowledges in describing them as a 'hypothetical' entity), how does this sit with Futurelab's acknowledged role as purveyor of user-related knowledge and hence, as guarantors of future success? This perhaps forms the most interesting 'contradiction' the Chief Executive alluded to earlier. More than anything, this speaks to the producers' will and ability to address the former social group – potential partners – on behalf of the latter, i.e. children.

5.2.3. So what is the product? Unpacking learning research

The statement that Futurelab 'will put the learner at the centre of all its activities' does not absolve the producers from having 'to show' potential partners the fruit of their labours, in an effort to gain credibility and enrol them in the enterprise.

In the first Strategy Directorate Meeting I attended, several of the key issues that were to inform Futurelab's development over the following year were discussed by the participants. The following excerpt raises such issues as the need to publicise Futurelab's activities and the stress this places on process; the underlying issues of expertise and the presence and usefulness of users in the cycle of production, pre-materialization.

> **Deputy Chief Executive**: After one year of operations it seems important – and our advisory board has brought this up – to raise our profile, to have things to show for our work, that show what it is we are about. We need to make it very clear what we are doing, here in Bristol. I feel it is important for us to focus more on outputs. What is being done in this respect? There was talk of doing project diaries. I'd like to hear about those, but they sound like they are specific to individual projects. We need to discuss how to capture what we do in general, and what would be the best format for that. (...)
> **Chief Executive**: These project diaries, if they are going to be useful, they mustn't feel 'oh I can't say that, or raise this concern because it might get published'. So I take your point, [DCE], we need to raise our profile and report the lessons we've learned, but I don't actually feel that these should be published, even in a limited capacity, because they would stop being useful. (...)
> **Head of Production**: I don't think anything has got to a stage where we can sit back and reflect on its worth.
> **Director of Development**: One thing that strikes me is that we can't do generic, enormous reports on a 'type' of thing...
> **Head of Production**: No.
> **CEO**: (...) If you look at NESTA, they give people's diaries, they tell stories, they report on individual cases for the web... That to me is the kind of thing that would bring Futurelab to life. We would obviously have to have the sort of internal soul-searching removed, but I don't think we should say the only thing we put out is general lessons learned. I think we do need real stories. The trouble is somebody has to do the work.
> **Director of Learning**: I have a nice concrete example. [The HLR] was at a school in Cotham for the Savannah project, getting kids involved in talking about and shaping a concept. That in itself is an important story. (...) That little story in itself represents our values. A, about the fact it has to do with innovative technologies and B, we actually see

> that we consult kids at a very very early stage in the process. It says something about the way we are. (...)
> **Head of Learning Research**: I think what we need is to combine that with other case studies into one story, so that what we have is something substantial that shows we get kids involved as co-designers. (...) There's two things here: there's communicating to the outside world, and there's learning from what we do. They are different.
> **CEO**: Quite. (...) But we mustn't get ahead of ourselves, and claim that we have an immense amount of lessons learned six months after getting in the building. So I'm saying it might not be for quite a time that we feel entitled to put all our stuff together and come up and say 'we've found stuff'.
> **HLR**: No, but qualitative case studies are valuable, and if you've only got one case study there are things to say. There are already questions being asked about gaming, about the integration of multimedia content into the learning process, about other things. As a result of that, we really ought to be able to write something really rich about that experience and what has been learned from it. And no, we are not saying we have the definitive answer to how one should use mobile technologies and multimedia resources, but we ought to be able to write about stuff that is obvious to other people. Your point is absolutely right about everybody not necessarily having the habit and experience of that sort of approach, so that we might require other people to collaborate. But if we think this is an important part of what we do, then we need to think ahead to the resources we need and the implications of it.
> **HP**: The audience we are trying to talk to, who are they and what do they want? I mean the audience we need to prepare these 'lessons learned' for.
> **CEO**: The education community, policy makers, industry and (inaudible).
> **HLR**: And us. This is about us becoming an expert. (...) This is the stuff on which our expertise is based. This is the stuff that means people go 'they know what they are doing'. (Strategy Directorate Meeting, 18 December 2002)

This is an early indication of a tension between the need to report in an honest fashion about both the positive and negative aspects of projects and the need to show a confident public face devoid of what the CEO calls 'internal soul-searching'. It is clearly encapsulated in the statement that Futurelab must at once and confidently display its expertise ('people go, they know what they are doing') and become an expert ('this is about us becoming an expert') by learning from the production process. So what exactly does Futurelab produce and how? In other words, what is Futurelab's expertise and how is it put forward? To answer these questions it is necessary to unpack the notion of learning research and demonstrate how Futurelab instantiates its knowledge of education and learning in a manner consistent with its normative endeavour and the interests of its stakeholders.

5.2.3.1. Adopting the user's perspective

The lab's Deputy Chief Executive provides an initial indication of the complexity facing the producers, in response to the question 'what is FL about and what is being produced here?':

> Deputy Chief Executive: We're trying to empower learners through participation and inclusion, and technology is just one tool in doing that. And a very useful tool, but it would be wrong to approach everything through the technology – we must think of new ways of going about the interaction with the learner. And so FL is about doing just that – trying to motivate learners and to address people in ways that will engage them. And **our emphasis is certainly on new and emerging technologies**, and we're not about to look at new curricula or look at new teaching practice in terms of training. So **our focus is on technology**, but it's important to address it **through the learner's perspective** rather than through the technology. (...) **We are not trying to find a market for particular pieces of hardware or software.** And the second part of your question was what do we produce? It's very much prototypes **giving a flavour of the future, giving a sense of how either new technologies or new ways of going about things can engage the learner.** So we're not about ready-made products that are about to go to market, it's simply, like I say, a prototype.
> PR: But clearly, in the light of the first part of your answer, the prototype isn't a necessary outcome, or is it? There's the whole research process that might eventually lead to a prototype?
> DCE: Absolutely. Our sense is that we will undertake approximately 15 to 20 projects each year, and of those, probably **80% will fail in real terms, in that there won't be a tangible prototype.** But we will have **learned** an awful lot. So what we produce is absolutely that – the research, the learning outcomes that will then hopefully help others to not make the same mistakes or to benefit from the research that we've done, the **testing** with learners. (Interview, 30 June 2003)

The DCE is keen that Futurelab's main objective is to 'empower learners through participation and inclusion' rather than the production of artefacts per se ('technology is just one tool in doing that'). However, one notes an apparent inconsistency with regard to Futurelab's outputs in response to the question 'what does Futurelab produce?': 'It's very much prototypes giving a flavour of the future' vs. 'what we produce is absolutely that – research and learning outcomes'.

Far from denoting confusion on the DCE's part, such comments foreground the complexity of the situation in which the producers find themselves in these early stages. The status conferred to 'new and emerging technologies' contributes in no small measure to this complexity. For the appeal of working artefacts (albeit only in prototype form) lies not only in their capacity to entice commercial partners – it also resonates with the producers' belief in the potential of technology. Indeed the DCE reiterates Futurelab's broad commitment to new technologies as a means of engaging children in learning, supporting Futurelab's research activities and eliciting the involvement of external parties by giving them 'a flavour of the future'. Despite an ordering of learning and the technology that supports it as ends and means respectively, learning research and prototype development remain intricately bound together. In a different interview, the DCE sums up Futurelab's relation to technology

and the problems this poses to the producers: '[A]lthough we are not about technology, it is central to what we do' (Interview, 26 February 2003).

The DCE's long response above points to process, or methodology, as the key to Futurelab's success in such a context. More specifically, she describes a number of mechanisms whereby the producers combine their concern for the learners with a belief in the potential of – rather than a commitment to – technology, in line with their normative undertaking: the adoption of the user's perspective and learning by doing. These are discussed in what follows.

Here as in section 5.2.2.2, for the producers, the 'right way' of going about production is a matter of the perspective one chooses to adopt. Although the DCE asserts, in the above quote, that 'our focus is on technology', she dismisses technology as an autonomous element or perspective in its own right: 'it would be wrong to approach everything *through the technology*'. She illustrates what such an approach would entail, asserting that Futurelab is 'not trying to find a market for particular pieces of hardware or software'. Elsewhere she adds:

> Deputy Chief Executive: So, an example is we've had a number of technology companies come to us with very much business applications, whether it's PDAs or wireless devices, and ask what could be an application in the learning/education market. And that's really not what we're about. We are not trying to find a market for particular pieces of hardware or software. (Interview, 30 June 2003)

In other words, the will to implement a particular artefact would signal the adoption of a 'technological perspective' – something to which she claims Futurelab is opposed. The alternative is to address production 'through the learner's perspective rather than through the technology.' Thus, the producers' concerns for (and allegiance to) the end users take the form of a perspective through which production activities must be approached.

If in some instances Futurelab staff acknowledge the success of private sector companies (e.g. Electronic Arts and other producers of video games), they are inclined to denounce their methods on the grounds that 'children and teachers are brought in very late in the process', if at all (DCE, 26 February, 2003). For them such methods entail a form of *ex post facto* justification of technology's value for education, which they are keen to avoid.

The methods employed in the private sector elicit divergent thoughts which further stress the sense of moral conflict felt by the producers. Discussions around the educational value of games and play bring this conflict into focus. For instance, the DL agrees that learning must be made more stimulating for children, but he warns against the lure of dazzling technologies which may not be of real benefit to them:

> Director of Learning: One thing I am certain of is that kids are motivated by quizzes – but that doesn't make quizzes a good form of learning. Kids are motivated by eating fried potatoes, you know, but tell that to a nutritionist. If we can capture that kind of motivation and put it into something deeper – but you actually have to know what you mean by the word 'deeper' first! (Interview, 18 December 2002)

On the other hand, the Researcher argues:

> Researcher: It's like a lot of people are talking about having massively multiplayer online game environments for learning. What makes people assume that the current online games don't accomplish all of that already, without even, in design, being about learning? I mean, without even thinking about it most of these designers are creating learning spaces because people just wouldn't carry on playing such and such if they weren't learning about their environment and learning [about] new people in their environment, or overcoming new challenges. People conceive of that as doing something better, but not thinking of it as learning.
> PR: So they achieve learning outcomes accidentally?
> Researcher: Yeah! It think that is something [the Head of Learning Research] and I would like to look at more – do we need explicit learning environments when these games already do it for the people who use them. (Interview, 30 June 2003)

Futurelab's objective of making learning research the driver of production, as opposed to 'repurposing' existing technologies, poses a problem to the producers. Clearly, the commercial sector – games producers especially – possess useful knowledge about how to elicit and maintain user interest through what may otherwise be seen as 'whizzy' or dazzling artefacts. Futurelab is keen to tap into this knowledge.

The Chief Executive suggests that to approach things through the industry's perspective would mean to blindly serve its interests by procuring them a market for their products, thus undermining Futurelab's social agenda. He is keen to distance the organization from such an approach:

> Chief Executive: The [name of education-based lab], that [name of manager] runs, is really in an extreme way really, whatever he may say, focussed on technology. What we are focussed on is content – not just content, 'content' is the wrong word... Broadcasters would love new media to be about content, intellectual property that they own and they can distribute in new ways, but it's not – it's about the experience, it's about interactivity, it's about giving power to the user. But in so far as there is a distinction

> between the experience and the content [on the one hand] and the technology [on the other], we are about the experience and the content. (...) When I distinguish between content and technology, I also should really have said, 'broader process and technology', 'social context and technology'. And I think unless you think through those things... you know, you have to put yourself in the position of a teacher who's got 30 kids to teach – and alright, not all learning occurs in schools, it's important that we realize this and not just focus on schools, but suppose we are – how does she spend her time [the teacher]? You can give her all the technology in the world but if you haven't thought about the length of the school day, the length of each period and whether that can be changed, this horrible thing called the curriculum... We would love to be able to say 'we have proved that a certain kind of learning that crosses a couple of subject areas, let's say, can be greatly enhanced or made more creative by this piece of software and technology, if and only if it is taught in a certain way, and if the school timetable is changed in a certain way and the curriculum is changed in a certain way – that's part of the knowledge'. Now if then people say 'it doesn't work', you say 'well, you haven't changed the curriculum – of course it doesn't work'. So all those surrounding factors... (Interview, 6 December 2002)

In his words, Futurelab is not about technology. What is more, contrary to the designs of industry, who 'would love new media to be about content' which they own and which can be repurposed to generate new profits, the Chief Executive stresses that this is not the case at Futurelab. Or at least, it is not *just* about content. Rather, 'it's about the experience, it's about interactivity, it's about giving power to the user.' That is, content has no worth independently from the user experience that accompanies it and gives it value. So much is made clear when, in rejecting technology as Futurelab's purpose, the Chief Executive replaces content – which is 'the wrong word' – by 'broader process' and then 'social context': 'When I distinguish between content and technology, I also should really have said, 'broader process and technology', 'social context and technology'.

Again, such remarks serve to mark a distinction between a 'technological perspective' which the producers conceive as either existing in a social vacuum or implemented cynically for commercial gain and a user-centred perspective. The latter is embedded in, and inextricable from, a social fabric that must be taken into account in order for Futurelab's products to be seen as 'working': educational technology is of no use whatsoever 'if you haven't thought about the length of the school day, the length of each period and whether that can be changed, this horrible thing called the curriculum...' As he states, such considerations of 'broader process', 'social context' or 'surrounding factors' are 'part of the knowledge' that is tied in with any educational artefact Futurelab produces, and which will determine its success or otherwise.

Following the Chief Executive's response, social context and new media content merge in 'the experience' of the user. Others echo this conception in stating that Futurelab's key output is 'learning outcomes' (DCE, above) or, as the Researcher puts it, 'experiences': 'I think the most important stuff we are doing, and hopefully we will do more of, is producing learning experiences' (Interview, 30 June 2003). Such ideas capture the intricate mix of research and prototype development and speak to the need to somehow combine 'the social' and 'the technical' in a product.

Another similar term used to describe Futurelab's output is 'proof of concept':

> PR: So what does it mean when... when people use the term 'proof of concept'? That one of the key things you do here is **proof of concept** in education technology...
> Head of Learning Research: At a basic level, it's 'we think this thing might stimulate question asking'. Does it? No. OK, we've proved it doesn't work to do that. So it's a really basic level. Or if you take another example, one of the games I was working with for [project name], which was a lovely, lovely project. Its aim was to encourage children to think about collaboration and to develop their thinking skills. Now, in the first iteration of it, when we took it out to schools, it basically, patently wasn't doing that. And we could have predicted quite a lot of that beforehand. The concept didn't really work in the way it was designed at present. However, because we've got an ongoing relationship with these people, what then happens is we give them feedback, we give them reports, we reflect back to them what we are seeing. And we say, have you thought about doing this, that and the other? Also, I'm sort of a teacher – I'm like, you gotta read this, you gotta look at this, you gotta understand this stuff! So it's sending them things that might be interesting as well. It's encouraging them to take their thinking off in different directions. And then they will revise it. So **proof of concept** is really: this is the thing that we think this is going to do – does it? And it's as simple as that. And if it does or doesn't, it's actually the beginning, ideally, of the process. (...) Proof of concept means that... the concept for a project might be... it's proof of the concept of the project. The concept of [this project] was 'we think games software might be useful to encourage collaborative learning', alright? That's the concept. So we then would go out and say, does this concept actually work given the software that we have been able to develop? (Interview, 26 March 2003)

Thus, 'proof of concept' makes a product out of Futurelab's involvement with children. Following the HLR, proof of concept is an iterative process, an 'ongoing relationship' with partners of which Futurelab remains in charge, setting relevant research questions at the outset, offering guidance to its partners and 'encouraging them to take their thinking off in different directions'.

5.2.3.2. The ability to 'get things made': both privilege and problem

Notwithstanding the decision to place the learner at the heart of Futurelab's activities by favouring learning research and adopting the user's perspective, the producers'

views on their activities of production amount to a candid acknowledgement of uncertainty and tentativeness, rather than a clear sense of direction. In this context, 'learning by doing' appears to be the only conceivable – not necessarily a deliberate, or the best – way forward.

It is worth noting in the first instance that the producers' uncertainty with regard to production stems to some extent from the fact that Futurelab has both the Learning research and production capabilities. The Director of Learning suggests as much in his description of Futurelab's specificity:

> I think one of the things that makes us different to many places is the fact that we can make prototypes. My colleague [...] who's Professor of Education Technology in the School of Engineering at [a British University] says his privileged position is that, because he's an educational technologist in an engineering department, he can get things made. And we can do that here, too. You actually need... We are not talking about pie in the sky here; we're talking about stuff. We are talking about artefacts that will at least exist in a form that we can learn from, in that sense. Which is problematic. (Interview, 29 November 2002)

According to the producers, Futurelab is different from academic research departments in having the capability to get things made, a feature which according to the DL is very useful in making real, or instantiating, the theoretical ideas on which its activities are founded: 'We are not talking about pie in the sky here; we're talking about stuff.' So much is consistent with Futurelab's strategic imperative to enrol commercial partners, as the Chief Executive illustrates:

> (...) I suspect, especially in thinking about some of the work that somebody like [the Director of Learning] has done over the years, that a lot of the deepest insights in the field have been around for 20-30 years. The question is demonstrating them, and making them real and making them vivid and proving their worth to the point that the world decides they're valuable and takes off with them. (Interview, 14 February 2003)

However, the Director of Learning goes on to suggest that the purpose of prototype production is not to put Futurelab in a position to market artefacts, but rather to enable the producers to learn about process. Thus, 'learning by doing' is useful in the pursuit of Futurelab's normative endeavour above all else. This, he concludes, makes Futurelab's prototype-making capabilities 'problematic'.

The Director of Development sheds light on the underlying reasons for this. In response to the question, 'what is Futurelab about and what is being produced here?', he explains:

> (...) OK, what is it about? Partly it's about – and this sounds mundane – but process. New ways of doing things rather than, particularly, new things in and of themselves. Although it's about new things too because you need the new things to prove the new ways, more often than not. Which is where I see the prototypes and the research tying together. In as much as with the prototypes, we take ideas and try to turn them into reality, we want to learn something about process. The reality thing, whatever it is you make, isn't particularly the end that you're after – it's a means to get to a different end. It might be a useful end in itself, but that process of learning, that process of trying something new, is the important bit. And learning from that process. Then disseminating it and applying it to other things. (Interview, 30 June 2003)

This reiterates two ideas that are widely shared across Futurelab. First, the production of artefacts is but a means in the pursuit of a broader objective, namely, the improvement of learning and education. Second, the general process of production is also one of learning for the producers themselves. Hence, regardless of the specific forms it may take, it remains subsumed under 'learning research'. More specifically, the process is reliant upon 'learning by doing': whether or not the production process has a material outcome.

Accordingly, the production of artefacts, central though it is to Futurelab's activities, does not have the status of finality – it remains a means to a greater end in the eyes of the producers. Others echo this view in saying 'this is an investigation into whether or not Futurelab even has the right foundations' (DCE); and 'it might be that we end up disproving a point – proving that educational technology is just more clutter and that it gets in the way of children's learning.' (Researcher). In a different interview the Researcher elaborates:

> I think it's about demonstrating or disproving the worth of some of these things, and being completely candid about it. Without a red face, being able to say, it looks cool, it sings and it dances but no, it doesn't work with kids. Or kids love it, but they love it because it's play, but really they are learning nothing from it – in 2-3 hours they are just fiddling and getting nothing from it, and that's why they love it. I think we should be open and admit those sorts of things. (Interview, 26 February 2003)

Beyond the strategic dimension of the endeavour, Futurelab's progress is hampered by the producers' struggle with their own conceptions of how 'the social' and 'the technical' may be made to fit together. The producers' acceptance of technology as a tool for learning is a further stumbling block – a fact resonant with the

Director of Learning's remark that Futurelab's ability 'to get things made' affords it at once a 'privileged position' and a problem. For the producers entertain a guarded belief in the potential of technology to engage and empower learners, rather than an *a priori* will to implement it. Accordingly, their views of their activities of production entail both philosophical reflections on the tension between social and technological determinism, and tricky practical questions to do with the linking of theory and practice.

The producers' considerations of how a concern for the social might fit with technical affordances in the process of innovation, reveal an initial state of paralyzing complexity. When asked to define the nature of the Futurelab endeavour in relation to technical determinism and pure social determinism, the Director of Learning offers no ready-made answer. Instead, he asserts that this is a question he wishes to explore through the production of educational technologies at Futurelab:

> Director of Learning: (...) But I want to ask the question, really, because as my thinking is largely determined by activity theory – that the relationship between a subject and an object always goes through a mediation system, and that mediation system consists of the cultural tools and artefacts. (...) So the technologies, the cultural artefacts around do materially affect what counts as attainment, what counts as learning, as well as it affects the what and the how, and the when and the who as well, for that matter. So I want to ask the question. It's not a dichotomy between social determinism and technical determinism – there is **a seamless web**. (Interview, 26 February 2003)

From the DL's response one gets a sense of the pleasure he takes in being afforded the opportunity to explore such questions in a hands-on manner. Exactly where an endeavour of this nature sits in relation to technological determinism and social determinism is an as-yet open question he himself is concerned with. His rejection of a 'dichotomy between social determinism and technical determinism' and acknowledgement that there is a 'seamless web' of technology and society is telling: it is a problematic starting point for actors, not just an artefact of their own making.

The Head of Learning Research expresses a similarly candid view. She underlines the uncertainty of process rather than hazarding a clear-cut response about Futurelab's methodology at this point. She too endorses theoretically informed approaches to production, but she stresses the crucial problem of translating theory into practice:

> HLR: (...) My background is... **I do not think that technology leads to particular outcomes – I think that's an incredibly silly point of view.** It think it changes the conditions within which we might operate but I think there are much more personal and structural things that contribute to what happens with learning with technologies. But the problem is, there are lots of academics who can tell you that over and over and over again, and we know it. **The question is what do you then do?** And at that point **I'm quite glad that we have slightly more people here who are supposed to be making things** than who are supposed to be raising questions around 'well actually if we work from activity theory or actor-network theory or if we take a social shaping of technology perspective...' We can see all of that, but what is really interesting is while I value all those perspectives and I use them a lot in my writing and in empirical research, **the question of how they link in with design, the question of how they link in with practice is a really interesting one and I'm not sure... Don't know that yet.** (Interview, 18 December 2002)

The HLR highlights the difficulties of linking theory and practice or, more specifically, of subordinating the latter to the former. One may very well deny technological determinism and start from a social perspective informed by theories in which one strongly believes, but still the problem remains: how can one effectively link the two?

Downstream from these reflections there are echoes of the self-perpetuating circle discussed in section 5.2.1.4. In considering the balance between research and prototype production, the Researcher reiterates this point:

> (...) Both sides of the work [prototyping and learning research] have to complement each other – you can't do the research without something that works, I mean technically works, and you can't make something that pedagogically or learning [-wise] really works unless you've got the research. Sometimes it can be a bit of a **nasty circle.** (Interview, 15 March 2004)

In this instance the Researcher is referring to trials in schools, i.e. research that requires the children's active participation and which is typically carried out once a project idea is reasonably advanced. But the underlying problem is the same as that raised by the HLR in the previous quote: how does theory link in with practice if what one is after is more than just a mechanically functional artefact? That is, if one wants to produce something in line with one's theoretical conceptions of enhanced learning?

Tellingly, the HLR throws her hands up at this impasse, stating: 'And at that point I'm quite glad that we have slightly more people here who are supposed to be

making things than who are supposed to be raising [theoretical] questions...'[66] Such a reaction suggests that 'learning by doing' – i.e. learning about the usefulness of technology for educational purposes by producing artefacts – may be the only way forward, let alone the best option. In a similar vein, the Researcher discusses the possibility of such issues never being resolved, this time in relation specifically to games:

> Researcher: But if we can demonstrate that games in school are going to be a massive success, that they do something very valuable, [the games industry] might be more interested.
> PR: Can I ask your personal view on that? You said earlier you were a keen gamer...
> Researcher: I think it's highly contestable, and I don't mean by that that they're not going to work. I mean that at the present stage no one really has a strong argument about whether they are or not. (...) **And I doubt if anyone will ever definitely prove or disprove their usefulness. I think it's just one of those things that will go on forever.** I'd like to hope that some really compelling games with applicability for education will emerge in the next few years, I'm reasonably confident they will, there's lots of people doing good things. (Interview, 5 February 2003)

The producers make no excuses for what might arguably be perceived as a surrender to technical determination – this is because they simply see no other way of carrying out their remit:

> Head of Production: But we actually need to get things out there. And we have to get the response from kids. And it's a difficult one because we've got to take risks – none of us know what's actually going to turn them on, none of us know what's going to make them take interest in topics that they reject at the moment, because we're too far removed from it. (Interview, 29 November 2003)

> Researcher: We're exploring the kind of technologies which organizations like HP Labs, and Macromedia are developing, a lot of which is fairly embryonic, and trying to look at that and saying, in five years time will people be using this? How will they be using this? And a lot of that involves just taking a stab at it. When we tell people what we're doing, wearable computing and things like that, they ask, is that really going to be used in schools in 5 years? Well, we don't know. We really don't know but it's worth a look in. If it works and if it really does something valuable for kids' education, then we'll feed out that information to others. We're not going to be precious about it, because we're not here to make a fat profit for ourselves. (Interview, 5 February 2003)

The Chief Executive summarizes the process and its usefulness:

> It's no good playing with something and claiming it's contributing to learning if you don't really know that it is. So the research part is fundamentally important to us. (...) I think we learn by doing. With great respect to the academics of this world, I think in this field, you learn the deepest lessons by making and testing and thinking and then going back and reiterating the process. (Interview, 6 December 2002)

---

[66] This statement was made early on in my fieldwork, before the shift from production to learning research.

The rejection of technical determinism, on the one hand, combined with a belief in the potential of technology, on the other, entails a belief in learning by doing, i.e. to learn from the production of prototypes. More importantly here, it underscores a difference between a guarded belief in the potential of technology and the endorsement of technology wholesale, as typically expressed by the will to implement a specific technological system or artefact. When one adopts the former – what next?

Although the Director of Development suggests that the interplay between material outputs and process is 'where I see the prototypes and learning research tying together', his choice of words highlights the difficulty of conceiving of a worthwhile activity in isolation from a material outcome, i.e. a prototype. By equating 'reality' with material outputs and suggesting that most projects 'won't get anywhere', process, valuable though it might be in the eyes of Futurelab, remains an abstract concept. The DCE's earlier statement (cf. section 5.2.3.1) that a majority of projects 'will fail in real terms' conveys a similar idea.

5.2.3.3. Projects as PR, branding and honest research

The above comments highlight the challenge of making process, or methodology, a marketable commodity, which is exactly what Futurelab will endeavour to do. The Development Director spells out the reasons for this:

> I think [prototypes] are a means rather than an end, being modest. I mean certainly, for the people whose projects they are that wouldn't apply – they really want to see a definite output. And I think it's fair to say that most of them – perhaps with the exception of Savannah, which all the people that are involved in that have got a kind of research interest rather than a strict **'I want a product' interest** – the other ones have got a 'I want a product' kind of interest in it. So for that very small audience, the people who are actually the partners, there is a very specific output that they want. But for everybody else, I think it's a means of learning rather than particularly the thing itself that's most important. (Interview, 30 June 2003)

Although Futurelab hopes to produce useful knowledge from the projects it develops rather than prototypes as such, the commercial partners are quite keen to get a product out of the deal. Hence, for Futurelab prototypes are a means to an end; for their partners the product is an end, whether they share the commitment to education or not.

One means whereby the producers 'square' the awkward status of prototypes in their mind is to view the projects as both an opportunity for learning and as 'a PR thing', as the Researcher explains:

> PR (going through list of Futurelab outputs; the question is 'what audience are they for?): Next I had prototypes.
> Researcher: Should be for the kids. I think that through the learning research, that is the main focus. Like I was just saying about [one of Futurelab's largest projects] – what does this give kids that they wouldn't otherwise have? But at the same time, it's partly for us and our partners, to demonstrate to the people who have pots of money, what kind of stuff is worthwhile, that it can be done, possibly without huge expense. **In some respects the projects are a bit of a PR thing, as much as anything else.**
> (Interview, 30 June 2003)

According to the Researcher, Futurelab's projects have a primary purpose: the betterment of children's learning. They also have, through the prototypes they engender, a key 'secondary purpose – well, not purpose, but certainly secondary usage – [...] as a kind of PR thing' intended to show potential commercial partners the education is a market worth investing in. Thus, somewhat independently from (or in addition to) their worth in terms of research, prototypes are useful in and of themselves, in the first instance as a form of currency – their mere existence is reassuring proof that Futurelab gets things done. And that is enticing and important to eventual funders and partners.

The Deputy Chief Executive also recognizes the utility of prototypes in this regard, but she warns against the danger that this could backfire and damage Futurelab's image:

> PR: I have been told that as the link between FL and the outside world, you would be particularly keen to have something to show potential partners or whatever, something concrete to show, 'you see this is what we can achieve at FL, come along with us and help us build more of these'... Can you say something about that?
> DCE: I would. I think the danger... I wouldn't want us to have just one prototype and to become too boxed and too blinkered. Partners could see us as the ones that build that particular kind of mobile prototype, whatever it might be...
> PR: You could be typecast?
> DCE: If we can create some sort of presentation that includes some footage of our work in schools, showing our interactions with children, showing that whole process. A flavour of some of the prototypes that are in development to show how we link academic research with creativity... somehow showing the process. Because once we get the buy in of commercial partners, that Futurelab is a good thing, in terms of how it approaches problems and how it finds solutions, that is more important that actually making something tangible. Like you say, it could typecast us.
> PR: So would you say that one of the things being produced here is know-how, when you referred to process?

> DCE: Yes. A number of companies have said 'if we can crack that whole thing of linking academia and industry, and prove it works, then that would be very valuable in its own right. For instance BP have been trying to do it, to get academics to talk to industry and not... there's a sense of 'never the [inaudible] shall mix.' And I think that's it, and **that's one of the hardest things – to market know-how and to prove it's there.** (Interview, 26 February 2003)

Whereas most commercial enterprises would conceivably be happy to be 'typecast' – to become synonymous with one successful product – this is seen as a danger here, further illustrating that for the producers Futurelab is not about the technology or about maintaining its self-importance. As an alternative to devoting its resources to the development of a flagship prototype, the DCE sees process – in the form of 'how it approaches problems and how it finds solutions' – as the means of obtaining 'the buy-in of commercial partners'. More specifically, she stresses the importance of displaying Futurelab's engagement with the users through 'some sort of presentation that includes some footage of our work in schools, showing our interactions with children, showing that whole process.' Elsewhere she asserts that the development of process is the key to Futurelab's branding:

> Deputy Chief Executive: We are demonstrating, particularly through our learning research, the potential of technology to liberate what have been fairly constrictive learning and teaching practices. I would hope that that would develop considerably so that we can really, in a sense develop our brand, so that we can become something of an 'Intel inside'. That our badge of credibility, 'Futurelab inside', every product that we have been involved in and that we will have endorsed, that that really becomes... that it stands for something important. (Interview, 26 February 2003)

The Director of Learning gives a similar explanation, from a distinctly academic perspective, of why Futurelab should be open about process at this stage of its development rather than put forward finished products. In this specific case he is talking about Futurelab's literature reviews which were originally meant to serve, internally, as a knowledge basis for projects. Given their quality, the documents were subsequently considered as a possible output for general consumption. For the Director of Learning, this would be unproductive at the stage in which Futurelab currently finds itself in the ideas development cycle:

> There are times when we're going to have to put forward strong, well-thought, well-argued cases forward to policy-makers, because that's what they're asking of us. Or to people in industry because they want specific guidance. And perhaps there are going to be times when we need to come down our fences and actually say 'well, we think this is better than that'. If I'm starting up in a position which is authoritative – if you're a **keynote** speaker you're speaking from your personal authority – therefore you are more

> selective about the things you want to say. If you're in a **seminar** situation, you may well want to bounce ideas out specifically to get feedback to see whether the idea has any validity (...). Whereas if you are actually at a later stage in the cycle of development, saying 'we have definitely found this', you're making more emphatic statements, then I think at that particular point you are exposing yourself to stronger criticism if your idea doesn't hold water. **It has something to with the ideas development cycle in that sense.** Yes, obviously you want criticism in the first stage, but that's implicit in the way you are talking about it in a sense. You know: strong ideas but weakly held. Whereas you might have strong ideas which you are more willing to be defensible about, later on down the line. I think that's just part of an ideas development cycle. There are things that you don't necessarily feel strongly about but you just want to make them available to people. And you don't feel at that stage that there are issues of brand 'integrity' – you know, have you done damage to the integrity of the brand by suggesting them? (Interview, 18 December 2002)

Both the DCE's and the DL's comments speak to the tension between the need to produce tangible outputs and learning from the process regardless of materialization in prototype form. The DL's seminar/keynote analogy conveys the same concern with regard to research output: he is concerned about the weight given to certain ideas over others and the lack of variety in opinions expressed, when one of Futurelab's objectives is precisely to be eclectic and open. In this sense, branding and honest research are seen as in some measure incompatible.

More specifically, branding – in so far as it is defined as the establishment of a link in the minds of audiences between a brand name and a set of specific products and/or values – is perceived as a hindrance to the ideas development cycle, at least one that is genuinely open and socially-grounded. The DL is concerned that by turning what was originally a research document written in 'seminar mode' and meant for a limited audience (internally for Futurelab, then stakeholders) into something for general consumption, the idea expressed therein might be taken as authoritative and thus give the false impression that Futurelab has come to conclusions with regard to learning technologies. As the DD claimed earlier, this claimed openness is seen to set Futurelab apart from commercial initiatives – the organization does not employ specific methods simply because they have worked in the past; but because they are open-minded and they believe in what the DL later calls 'a principled approach'.

There is one crucial by-product (or 'collateral' output) of Futurelab's research activities which has a similar and immediate use in terms of providing potential partners 'something much more tangible [than research] to buy into us' (Interview, 30

June 2003) and which also poses a problem in terms of the perceived incompatibility of branding and research: the involvement of users as such.

5.2.3.4. User involvement (or access to kids) as product in its own right

In the quote above (5.2.3.3) the DCE mentions video footage that will be used to entice partners ('If we can create some sort of presentation that includes some footage of our work in schools, showing our interactions with children, showing that whole process'). The HLR refers to these, somewhat cynically, as 'Hallmark moments': storybook, clichéd depictions of children enjoying themselves whilst interacting with Futurelab staff and/or using prototypes.

> **Deputy Chief Executive**: We have just received an email from [DfES officer] saying that by Friday the DfES would like to show Charles Clarke some examples of Futurelab's work.
> (general panic/indignation)
> **Development Director**: Oh God!
> **Head of Learning Research**: Shhhhhhhh...
> (laughs)
> **DCE**: So, over to you, [DL], for your rant...
> **Director of Learning**: I am going to sound like [the CEO], I'm afraid. In the sense that [he] was always asking for collateral things that we would be able to show people when we're out there, and I would like to raise that. I did two presentations last week and talking about things is nowhere near as good as actually having bits to show. (...) I think we want to think on some projects how something early, even though it might not be representative of the whole thing. [The DCE] came to me and said what can we show of Size Matters and I said nothing. But first we need to actually think through, what is it that we can take out that would really demonstrate what we're doing that really impresses. And I really needed something last week. And we obviously need it this week, too. (laughs)
> **DD**: And that's got to be a whole company thing. When you are generating material, there's stuff there that can be transformed into a presentational piece. (...)
> **Head of Design**: That's the idea. We've had meetings around it (...) and we determined what we wanted. And because of the amount of time that we have in general in our days, we are fitting things in. At least that was the intent. I've done the paper edit and you would have had three pieces of really quite strong, hopefully, video collateral by now. (...)
> **DL**: It's just that I want it to be raised in our profile. In terms of our priorities, we need it desperately. Otherwise we are not going to succeed.
> **DCE**: Apart from what do we do by Friday, is there something to say... Like Savannah for instance – what should we have and at what stage?
> **HD**: We should at least have something.
> **HLR**: I think at the planning stages, I don't want to get into a position where we're researching and the filming doesn't work, we don't get the right sort of stuff. Like when we were working with kids the other week, you don't get the right sort of questions out of them. But actually building it in, and liaising with [the HD] and [the DD] to say, OK we'll be in schools these days, let's sort out permission slips and stuff – because that issue isn't going to go away. And arrange for somebody else to come in and get those sort of (sarcastically) 'Hallmark moments' that will help us sell the project out. But it's also about the beginning of projects. (...) I actually think we should separate that out from the learning, because it is communication really. (...) [T]he simple fact is if you're

> there and you're working with a group of kids and filming for research purposes, you're asking questions, you're trying to stop children screaming around walls, you're trying to make sure the teachers are happy, you're trying to make sure all that is working... You really don't have time, unless we start putting two people on every project, to also be thinking 'how do we film this to get nice shots of the right thing'. When we were doing the [partner name] workshop, because of the way we set it up for example, it didn't produce the sort of collateral that [the HD] wanted.
> **HD**: Well one shot, I think the overview, worked well – it showed people and how we went about everything. The two minutes of that were fine. The interview with kids didn't work, but that's alright... (Strategy Directorate Meeting, 1 July 2003)

Interestingly, the use of 'Hallmark moments' can be seen as contradicting the staff's general disdain of the concept of 'stealth learning' which holds that kids can learn unbeknownst to themselves, i.e. they can have fun and learn at the same time. The disdain rests on two notions: 1) kids actually enjoy learning things, therefore learning does not need to be hidden from them (DL); and 2) having fun by no means guarantees that kids are doing something useful in terms of learning.

The key to 'Hallmark moments' is to capture images of kids having fun in the process without necessarily knowing that they are also doing something useful learning-wise. The HLR makes this quite clear by saying this might interfere in the research process and, hence, that the capture of Hallmark moments must be done independently from the design of usability trials and other forms of interaction with kids. This is a further illustration of the tension between branding – of Futurelab as directly involving children in their activities – and 'honest' research, which may be hindered by the presence of cameras and so on.

The point of Hallmark moments is to show partners that they indeed are moving closer to their markets, as the DCE explains:

> [Potential partners] like the idea that [the HLR and DL] are the people that are going into the field and talking to the children. They're one step away from that. And they somehow take from that a trust and a respect for the two of them, so that when they say it's unlikely that a child will consider it something useful, or it's unlikely to be of any realistic value to a teacher, then it's sort of taken as a given. I think access to children and to a user environment is a big, big plus. (Interview, 26 February 2003)

The Head of Production asserts that communication with kids is crucial and that it is inevitably compromised when one comes from the commercial sector:

> Head of Production: And we need to be able to find a link in the communication – which I think Futurelab can do. I feel far more confident going into a school and talking 'as Futurelab' than I ever did when I was managing my own company.

> PR: Why is that?
> HP: Because I'm neutral. I'm neutral. I'm accepted. I'm not the man with the big car in the car park who's done this or done that. You know, I'm coming in there in this neutral role and nobody's going to sell anything to me either. I used to go into schools when we were producing stuff, but you know... there's a joke going round here that the Queen always experiences the world smelling of paint, because everywhere she goes, the paint is so fresh... She doesn't actually know that the world doesn't smell that way. I think you get that same thing within the commercial sector because everywhere you go to, because you're coming from the commercial sector, you're a potential sponsor. So you go in and they lay it on. I mean, I've been to schools where I've had meals in the school canteen that... I can't believe that these meals... I mean there's wine and everything! **I think that we now are in a position to be able to communicate with the kids.** We're trusted by teachers, we're not the DfES, we're not any of the other things that can affect their careers. (Interview, 29 November 2002)

The absence of a strictly commercial relationship ensures Futurelab is trusted by teachers which, in turn, grants them more ready access to schools and enables better communication with the kids. Thus, by associating with Futurelab, private sector partners are promised a more direct link to this potential market. The following chapter investigates further the forms and uses of user involvement.

5.3. Summary

This chapter presented an account of the evolving three-way relationship between Futurelab, its potential partners and the end users, from the day it opened for business in its current building, to when it produced its second, revised business plan almost exactly one year later. It has shown that the need for Futurelab to produce outputs for these two audiences puts a strain on process, as their respective expectations are perceived by the individual producers to be at odds with each other. Thus, the organization shifts from being a new media production facility with an education research component, to more of a research laboratory with the capacity to 'get things done' technically. This significant change does not stem from a revision of Futurelab's objectives, nor does it relegate the actual production of artefacts to a marginal activity. Rather, it is embedded in a momentous evolution of process as the producers contest the organization's prescribed functioning from the outset and they set out to (re)shape its production activities in line with their normative outlook.

The key observations made throughout this chapter are summarized in table 5.1 below.

Table 5.1. Key empirical observations made in Chapter 5

SECTION HEADING	PAGE	KEY OBSERVATION(S)
5.2.1. 'What is the purpose of this place?': an overview of the key issues	108	FL cannot be all things to all people; the producers claim its structure and activities should be dictated by a common understanding of its purpose.
5.2.1.1. The shift to learning research	113	FL's shift seems attributable to an agreement of 'basic principles and values' around 'what FL is about' and 'who it is for'.
5.2.1.2. Linking the normative and the strategic	115	FL's shift owes both to strategic factors (i.e. a good opportunity for the business) and to the will to carry out a normative endeavour aimed at changing the social activity of learning and education ('what learning with technology should be').
5.2.1.3. What are the relevant social groups and what do they want?	117	In order to be successful in carrying out its remit, the organization must mediate between the interests of both the education community and industry.
5.2.1.4. Futurelab as mediator between education and industry	120	The mediation between industry and the education community is hindered by their adherence to competing conceptions of education: as market and public good, respectively. This implies competing conceptions of the role of children. 2 definitions of success: a commercial one premised upon the production of artefacts and their adoption by users ('did people use it, enjoy it and get something out of it?'), and a more social one that need not involve such tangible outcomes at all ('does it challenge our thinking on what education is and could be?'). FL must reconcile these two conceptions and their attendant stakeholder groups. The publicity of FL's activities is crucial: the organization must be seen to be doing 'something useful' in the eyes of its stakeholders for them to come onboard – even before it has actually produced an educational artefact. This 'need to be seen to be doing things' is problematic in that the producers feel, and must take account of, the scrutiny of their perceived stakeholders, whose expectations are divergent. This is termed a 'self-perpetuating' or 'vicious circle'. Decisions as to how the production process should be organized are not born out of technical necessity. The 'perceived scrutiny' of their stakeholders informs the producers' decisions as to which type of activity, between prototype development and learning research, should take the lead and be displayed as FL's main feature; both entail opportunity costs with regards to its potential partners.
5.2.2. (Re)defining Futurelab	126	For the producers, technology is a means to a social end and there is a difference between an endorsement of technology 'as such' and a belief in its potential to help effect social change. The producers are keen to convey their enthusiasm, passion and sense of personal commitment to FL as a social endeavour and they spontaneously suggest that FL's social objectives and its commercial objectives are in opposition to each other.
5.2.2.1. 'The Hollywood of education' allegory	131	The producers instate an opposition between the interests of one stakeholder group – industry – and those of the projected users of FL's eventual products – children. Resolving this perceived conflict then becomes crucial.
5.2.2.2. Mediation among stakeholders: taking sides	134	The notion of 'stakeholders' comprises two key groups in the minds of the producers: 'potential-partners-as-stakeholders' and 'users-as-stakeholders'. Both are kept in play simultaneously and from the very outset of the enterprise.

CHAPTER 6

ON THE INVOLVEMENT OF STAKEHOLDERS IN PRODUCTION AND THE EXPERTISE OF PRODUCERS

6.1. Introduction

This chapter provides further illustrations of the Futurelab Chief Executive's assertion that there are inherent contradictions in attempting to grasp a 'hypothetical future market'. Chief among these are the contradiction between the user-related expertise the organization seeks to display to the outside world and the all but impenetrable uncertainty acknowledged within; and that between the producers' claims of direct user involvement and the ongoing forms of indirect involvement that pervade production in the users' absence, and which the producers' acknowledge more or less explicitly.

In the following I argue on the basis of the evidence in this study that direct interaction (or co-design), though a principle in which the producers believe, is but one, ideal(ized) variant of user involvement which is more in line with a feedback mechanism (albeit a cyclical one) than a sustained process of co-creation in which users and producers have equal footing. Here, I account for the more pervasive practices which instantiate and validate user involvement within Futurelab.

6.2. The involvement of stakeholders in Futurelab's everyday activities

Having explored from a broad 'systemic' perspective the ongoing relationship between Futurelab and its stakeholders in the absence of actual users, this section attends to the involvement of users and partners in Futurelab's everyday production activities.

6.2.1. Who should be involved? The tension between openness and constraint

The Director of Learning and Director of Development both stress a crucial contradiction between openness and constraint in granting various parties access to,

and input in, the production of learning technologies. For the Director of Learning, such a contradiction is unavoidable:

> PR: If that is the case then [that Futurelab may initiate a paradigm shift], can you give me a sense of who does, and who should, have a say in the process of validation of this new paradigm?
> Director of Learning: Well, here **there are inevitable contradictions**. In the first instance I think we have to involve the learner, firmly based on empirical interaction with the learner. **But we can't expect the learner to have all the answers. We therefore seek out other validation and involvement from other stakeholders – teachers, curriculum developers, researchers, academics.** But to be realistic, **we are being selective of our sources, to people who we think are probably sympathetic to our perspective**. And we are not going totally out of our way to find people who hold contrary opinions.
> PR: Right. How would you describe this perspective in a nutshell?
> DL: Education needs to be learner-centric. That playfulness is a good attribute to have in a learning environment. That the world is changing because of digital technology, and that change is socially determined and that we would like to see the implementation [of] changes which increase human happiness, rather than being used as tools of social control. We don't believe in delivery models of learning, which a lot of e-learning actors are promoting. I suppose that would be a fair thing to say as well. And all the implications therein. (Interview, 26 February 2003)

Following the DL, direct user involvement is an important principle: design must be firmly grounded in 'empirical interaction with the learner'. However its utility is tempered by the fact that 'we can't expect the learner to have all the answers'. Futurelab thus seeks validation of its production activities from other stakeholders, and the organization is inclined to solicit like-minded partners. For the DL, this is an inevitable contradiction of user-centred design: useful knowledge may indeed be derived from the learners, but as it is validated independently from them, it has no worth on its own and/or it can be interpreted in many ways. The involvement of users *per se* is discussed below; for the moment I wish to dwell on Futurelab's role in granting access to partners.

In this instance, the paradigm through which any knowledge is assessed – and which governs Futurelab's association with external parties – consists of principles of pedagogy (learner-centrism, playfulness, etc. as opposed to 'delivery models of learning') and social values (human happiness, not social control). In a later interview the DL would expand this view slightly and reiterate its utility as a selection criterion:

> PR: The sense I get about how you here see the users, the learners, is that it's not just... When you talk about THE users or THE learners, it's not just a plainly descriptive thing, you are not just describing people who exist. What you are describing is a sort of value-laden ideal situation – you are not just talking about how children are, you are also to a

> large extent talking about how children could be, a potential, or what they should be even in order for society...
> DL: Sure. I mean if you are talking about **empowerment** for instance, then you are walking around with some idealized notion of what power is and how people may exercise it. But you know, hey...
> PR: Yes, but what I want to get at here is that... Doesn't that increase the likelihood that... Or isn't there a greater chance there for disagreement between you and potential partners, if you need to see eye to eye on this sort of conception of how the world could or should be, in a sense?
> DL: (emphatically) **Yes! And it gives us one parameter for why we might select or reject projects.** (Interview, 15 March 2004)

In response to the latter question, the Director of Development echoes the DL's learner-centric conception of education, but he is sceptical as to whether all partnerships are founded in a shared understanding of the core values driving Futurelab:

> PR: (...) You are not just describing who the user is, you are describing who hopefully the user will be, in a sense.
> DD: Yeah, yeah. I suppose the only sense that can come out of that really is the notion that we want people to be self-directed and self-motivated learners. And that would apply across everybody as an ideal that we would hope they would achieve by using the resources that we've got. That the effect of what we are making is that more people would be self-motivated and self-directed, enthusiastic, engaged, lifelong learners, you know. That they'd go through their formal education and come out of it as enthusiastic for learning as they were when they were 7, and every kid of 7 loves learning, kind of thing. That would be the ideal, yeah. (...) Yeah, I think we do have a fairly high degree of agreement on that. **And now whether that's because we only attract or seek out the kind of partners with the same mindset or whether actually there is a wide agreement on what that ideal is, I don't know.**
> PR: But there is an ethos there. [The FM] mentioned earlier that is part of the Futurelab ethos...
> DD: Yeah. The thing that is dangerous in that for me is that you want to make sure you avoid the '[inaudible] and apple pie' syndrome. It's like, nobody is going to disagree that you'd love everybody to be active and involved members of society. I mean 'Well yeah, duh". (...) (Interview, 30 June 2003)

In other words, one cannot make presumptions about the reasons why partners would want to join in with Futurelab: is it strictly for commercial reasons or social ones? Or both? It is impossible to tell – this gives the producers all the more reason to steer the process firmly. Whatever the case, these producers appear to believe they can derive some benefit for the whole of society by enlisting the partners that they are and by developing the projects that they are, whether or not they have the partners full commitment in social terms. One could say Futurelab uses its commercial partners for social gain – a reverse take of sorts on the age-old practice of marketing whereby commercial enterprises invoke social benefits (empowerment, leisure time, etc.) to justify technical developments of an ostensible commercial nature.

The HLR and DD echo the DL's view on the need for constraint, asserting that whilst the whole of society should be involved in validating the social change Futurelab seeks to bring about, this does not make the lab's production activities a completely open process. The HLR explains:

> PR: To the extent FL has the responsibility to empower, to involve people in this process, who do you feel should have a say, a direct input into the process you have described?
> Head of Learning Research: Well, there's loads of people that should have a say. The question is, who constitutes the whole system? I would say the homeless guy on the street has a say, because he has obviously had educational experiences, he is obviously a witness of the society that is around him, and the education system that we have is probably deeply implicated in his current existence. **So I don't think there's anybody that shouldn't – that is my concern.** (...) So yeah, we need the people who make the tools, we need the politicians, we need the teachers, we need the children, we need the shop assistants... You know, I really don't see it as a closed system. **However, in practical terms, how you actually enable that range of people to be involved is a really difficult thing to generate. It's just really hard.** (Interview, 26 March 2003)

The Development Director argues long the same lines and points to a way forward:

> PR: Supposing you were working on a new paradigm, who in your eyes should have a say in the validation of that paradigm? Ideally, who should have say in the process?
> Development Director: It's probably a bit of a political answer, but it is the whole of society. You know, it's the education of our young, it's a huge, huge societal question. It's got to range from businesses and the commercial world, which are an important part of our existence. Although I don't agree with the vocational approach you have to acknowledge that it's there and that's part of what the system is about. Then there's the whole political structure that represents the people, if you like – organizations, movements, people that will be involved.
> PR: Earlier you said something about the new methodologies that come with new technologies. (...)[D]o new methodologies mean more people can get involved? You spoke of the broader public – is Futurelab an opportunity to get people involved in these debates who otherwise might not be?
> DD: **I don't think so. Not yet. We'll have to do something that really works, that's really big and that's really different. Then we'll be able to say this has worked and things happened.** (Interview, 13 March 2003)

In a first instance, the DD is speaking of validation in the long term: Futurelab's impact on education will determine whether or not it is successful. In a second instance, upon the suggestion that Futurelab may be open to the wide scale involvement of its stakeholders, he describes Futurelab as more of a self-contained experiment, the outcome of which will subsequently be judged by the whole of society. As the DD says, Futurelab must first produce something that 'really works' in order for more people to then be involved.

This illustrates further that the assessment of 'useful functioning' is not unique to the diffusion process (cf. section 3.4.1), as proponents of SCOT suggest; it is endemic to the production process as well. It is part of what the DD would later call 'steering the future', which operates mainly through the 'call for ideas' (CFI) the organization puts out on a quarterly basis in order to solicit innovative ideas and attract partners. The Development Director explains:

> (...) I mean there is a couple of purposes for [the call for ideas]. The obvious one is getting ideas into the organization. The call for ideas has to be solid because we need to get good ideas in. One point. Second is actually a very important one that is a bit more implicit, a bit more hidden – it is one of the means that we can **steer the future**. We set a focus for the call for ideas by limiting our interest, to give a direction to people who look at it and say, ok games and elements of games used in science and modern languages, that's what you should be looking at because that's where it's at, that's where you should be focussing your ideas on. So there's that kind of quite subtle use of the call for ideas as a means of **steering future directions**. And the third use comes **from the top of my head**, and it's very much about making sure that FL is a fair organization, that anybody's idea can get heard. It's like **'anybody can be president'** kind of idea. You know, if you've got a brilliant idea and you put it into us, we will actually look at it and take it on board if it's that brilliant. **So it's about fairness and accessibility and making sure people are heard if they've got an idea**. That's important. (...) But also, for the people who do know us and who know what we do, it's quite a powerful symbol of what we stand for, in terms of bringing as many different ideas from as many different sources as we can in, and being objective about them. And we're not going to take every idea that comes our way, but saying, look we are open about thinking different thoughts in this field and whoever you are and wherever you come from. And some of the stuff we get is pretty wacky, you know (laughs). And we are open to look at that kind of stuff. I don't know if that answers the question?
> PR: Well, yes... so the CFI symbolizes your openness and it's a kind of democratic process?
> DD: Yeah. In some ways, it's important – and this might sound **contradictory** – that the criteria of selection are very strict on that. We don't just take anything; we are very focussed on what we take. **Because it is essential that FL is bold and is confident to say 'this is where we think the future for learning and technologies is'**. It's not 'oh, we've got a big pot of money and if anybody's got a few ideas we'll try 'em out'. No. **We know what is good, what is not good and where it's going. We've got to be confident to say that.** (Interview, 30 June 2003)

The idea that 'anybody can be president', embodied by the call for ideas, is qualified by the proviso that 'the criteria of selection are very strict on that'. Although Futurelab solicits innovative ideas externally, it must remain confident that it is at the forefront of knowledge with regard to educational technologies and thus determine the area of focus (in this case, games and modern foreign languages). Here the DD is talking about potential partners rather than users, but his remarks are in line with the DL's view that any knowledge solicited from the users must ultimately be interpreted and/or assessed by the producers, who thus remain the arbiters of its worth and significance.

All the above remarks embody the contradiction between, on the one hand, transparency and openness in granting stakeholders access to the production process – which Futurelab do believe in and display to the outside world – and on the other hand, the constraint that is necessary in order for the endeavour to engender the desired results. This is yet another dimension of Futurelab's struggle with the need to carry out its social remit and the requirements of publicity, i.e. to display its activities in order to enrol partners.

6.2.2. The forms and uses of interaction with the users

Through what he terms 'an unkind analogy', the Chief Executive qualifies the value of ideas solicited from children:

> [After listing Futurelab's various sources of ideas] So you've got 9 routes in for ideas. The problem is which do you put most resources into? (...) The competition for kids might be great PR, because everybody will have heard of Futurelab and you give a prize and so on, but actually, what is the quality of the idea you are going to get? **An unkind analogy I use about this is: if you were running a mission to Mars and people said 'oh you'll get good ideas on this from kids', do you run a school competition for kids? No you don't, do you?** Because the question is, if we think we are right at the front of knowledge... (...) It's not that the teacher down the road in a school is not creative. It's not that some of them aren't aware of some of this. But it's not fair to expect them to come up with ideas. (Interview, 14 February 2003)

Far from dismissing the input of children wholesale – the CEO goes on to state: 'We want to know what students want, you know, what kids want, because it will inform the development of any idea that we have here'; '(...) the germ of an idea might well come from a teacher, or it may come from a kid of 5. It can come from anywhere (...)' (Interview, 14 February 2003) – this quote crudely illustrates the limited utility of involving children in design (at least as originators of ideas) and the need to assert Futurelab's expertise: 'If we think we are at the front of knowledge (...) it's not fair to expect them to come up with ideas.'

The Director of Learning makes a distinction between experience and expertise in describing the producers' and the users' input in the early stages of a project:

> PR: If you could set out the steps needed to successfully carry out a project, do you have a clearer sense now of how that would be done than you did at the start? About the process?

> Director of Learning: We need a germ of an idea. That germ of an idea may be educational, it might be technical. (...) And that idea then needs to have experience brought to bear on it. I say **experience rather than expertise** because expertise may imply that there is already some given knowledge in the area. But for people to come up with lots of **'what ifs' and 'maybes'** around a situation which in turn needs to then crystallize into something much closer to a specification of where we might go. And some of that expertise may well come from taking the idea to children even at that stage, early on. Certainly **having refined the idea, I would then take the idea to children in some form or other**, either as a pen and pencil exercise or a mock-up of some kind. Which will refine the specification. (...) There are interesting issues there about project management – classically project management is the area where we have run foul more than anything else. (...) Because user-involved development of that nature... of necessity, the reason you want to involve users in the first place is that you actually want to change and co-shape what it is that you are doing. And basically, what you learn in project management school doesn't sit too easy with that kind of process, I don't think. (Interview, 15 March 2004)

The distinction between experience and expertise is discussed fully in section 6.3. For the moment, the DL's comments stress a first instance where an idea – generated in-house or by external partners – is refined by the producers, drawing on their experience ('what ifs' and 'maybes'), and a second instance in which the expertise of children is solicited through trials, or workshop-type activities, in order to further 'refine the specification'. Thus, the users' contribution is staggered, punctual and more importantly, it is controlled by the producers.

A case in point is *Savannah,*[67] arguably Futurelab's most ambitious project initiated in the first year and co-developed with the BBC and other prestigious partners. In this instance the DL is very clear in pinpointing the key 'ingredients' which go into the development process and the sequence of events that lead to an artefact:

> PR: Alright, then, upstream from all this [interactions with stakeholders and users], when the idea first came to you or when you first started toying around with the idea, was a hunch all you had? Is that how you would describe it? Just a hunch, or was there more to it than that?
> Director of Learning: Three ingredients. One – wearable computers and identification tagging are getting messages back to you about who you are and where you are in relation to everything else. Came from a discussion on the technologies developed at Hewlett-Packard. 'Hmm... this sounds interesting. What would it have been like, playing cowboys and Indians if I had that technology available to me as well?'
> PR: So you are thinking like a kid there.
> DL: Right. Exactly. Yeah, here is a toy. It's a slightly indefinable toy, what games can I play with the toy? Alright? That's the first input in my brain. We then go to the BBC to meet with their Imagineering team and some others, in the BBC in Bristol. And they show a documentary, or part of a documentary which was part of the series Wildlife on One. They use computer graphics interlaced with real footage to explain what is happening on the Savannah, and they try to talk about life on the Savannah as a game. In

[67] See Appendix A for description.

> this half-hour show. Hmm... amongst 15 or 20 other things that we saw during that day. That Sunday, I was sitting in Bristol Zoo, which just where we were, where they have an interactive exhibit which has two light gates, which invites kids to run between the light gates to compare their speed against the speed of a leopard. They have another exhibit where you press a button to compare the speed at which you can press something in comparison with a hummingbird. And compare how long you can hold your breath underwater compared with a hippopotamus. I was watching the kids play with these light gates... At the end of that cycle of three inputs, I went 'yeah, what these kids are doing begins to look like the cowboys and Indians game'. And what I saw... they emerged out of those three specific kinds of inputs which I can actually specifically [gestures: 'pinpoint']... but it still started from that notion of 'what can I do with this toy?' (Interview, 26 February 2003)

On the face of it, the DL's account paints a romantic picture of the 'inventor' as an Isaac Newton struck on the head with an apple. However, it depicts production as an iterative process involving different parties who have different inputs. His account is a good indication of how producers mediate between their everyday experiences in various capacities (professional, personal, etc.) and an intended audience – indeed it reveals instances where the two groups overlap. First his professional experience comes into play: visiting HP Labs to get a sense of available technologies. Then he is thinking back to his own childhood to explore the potential of a technology. Then his professional experience comes into play again, as he visits the BBC and views a documentary on wildlife. Then it all comes together as he is leisurely sitting in Bristol Zoo, on a Sunday, watching actual kids play a game in which they imitate the behaviour of various animals – this enables him to put two and two together.

As for the input of children specifically, it is manifold. In this context the role of actual users is played down, in favour of the producer's role of 'reflexive user' (cf. Bardini) or producer-user (cf. Goffman) as discussed in section 3.4, thinking and speaking vicariously on their behalf. The DL states that the origins of the idea lie in the question 'what can I do with this toy' – in this case, 'I' is the DL as a child. Further, actual children provide some sort of spark which helps the DL's idea gel, but it is accidental and independent from the Savannah project as such. As he goes on to explain, lastly, actual children subsequently provide a form of 'reality check' – this is not untypical of the way projects are originated in-house:

> Director of Learning: More proposals come from walking through this park that you can shake a stick at (laughs). But having done that, the idea's validity requires all that other **validation** from the learner, from the designer, from the technologist, from the storyteller.
> PR: Are all these people, all these stakeholders or all these decision-makers, as it were, involved in the process? Do they all have equal footing in validating these ideas?

> DL: No one answer. Let's take Savannah again as a case study. I'm out of the loop on that, and it doesn't worry me, alright? The guys who know about big cat ethology, the guys who know something about gameplay, and the guys who know about the resolution of the GPR systems and what might be possible with that kind of thing, and the kids at Cotham school, now own more of that idea than I ever did. **Now in the first instance, the kids in Cotham school, had they said 'nah, crap idea', it never would have gone as far as it has done. But whether you can now identify their input at this stage is dubious. But they will have another turn at some point in the future.** (Interview, 26 February 2003)

The notions of 'validation' and 'turn-taking' are consistent with the view that children provide a punctual reality check to the producers. They indicate that the users are solicited at different key points in the ideas development process rather than being part of a sustained process of co-design. Without stressing the point too strongly (this may seem obvious to advocates of user-led design) the notion of 'turn-taking' highlights the authoritative status of the producers as initiators and developers of the original idea, and the subordination of any additional parties. Lastly, the DL's thought on the salience of the users' input (or lack thereof) suggests that claims of children as co-designers might be overstated.

To this effect, one recalls the HLR's assertion that children essentially provide feedback and that potential partners are the stakeholder group Futurelab really seeks to assess ('formative assessment of the designers') (cf. section 5.2.2.4).

6.2.3. This is not science: objectivity, reflexivity, correspondence

In order to further explore their views on epistemology, the producers were asked to compare their work as producers with that of scientists. In playing down claims to objectivity within the production process, their answers further stress the need for 'steering future directions'.

> PR: So what fundamental differences are there between science and what you do here, as far as you see it? Because the last time we met, you said you weren't in the business of producing technology. Would you then say that you are in the business of knowledge production? (...)
> Chief Executive: Well, we want to make models of how the world could be different. I think in fact the limit is not what we know. I mean, in terms of science or technology, if you want to understand or know something, there may well be one crucial experiment that will give you one piece of the puzzle you didn't know. I think the pieces of the puzzle we don't know here are to do with imagination, creativity and courage – they are not to do with 'what we do not know'. **I don't think there is some piece of research you could do in a school with something or other and you can come back and say**

> **'Eureka!', you know (laughs), 'look! this is new, we didn't know this before'. In fact, I suspect, especially in thinking about some of the work that somebody like [the DL] has done over the years, that a lot of the deepest insights in the field have been around for 20-30 years. The question is demonstrating them, and making them real and making them vivid and proving their worth to the point that the world decides they're valuable and takes off with them.** (...) **So, you can know something a long way before it suddenly takes off in society, and it's not to do with what you don't know.** Whereas in science, I suspect it often is to do with what you don't know, and you suddenly discover black holes and that changes your view of the universe. This is not... It's all available to us if we only have the imagination and the courage and the cash to make it happen. (Interview, 14 February 2003)

These observations afford a rough characterization of the production process and the fieldwork it requires: it is not about what the producers do not know; it is about what they do know. That is, production is less about the discovery of new facts than it is about bearing out one's beliefs and convictions, if not knowledge proper. This fits with the CEO's earlier assertion about the limited utility of seeking the children's input; the DL's view of the importance of experience over expertise; the DD's comments on the means whereby Futurelab 'steer the future'; the HLR's view on the formative assessment of partners.

The Director of Learning offers a relativist view of science in response to the same question, but his point is the same:

> Well you see, basically, we firmly believe in baconian hype (laughs). No. I mean, in science as I understand it, in terms of how some people, say Latour, would describe it as a social activity of **determining goals which are done within a social cultural framework rather than being determined by the notion that there really is something objectively out there that we go for. That you then devise methodologies which fit that particular socio-cultural exercise**... I don't see that what I am doing is that different, 'he said cynically', than any other scientific enterprise. A scientist might not recognize it as so, but... (Interview, 26 February 2003)

This sheds light on a response given in an earlier interview on the topic of prototypes:

> The [prototypes Futurelab hopes to produce] would actually **also tell us about the ways things really work with kids**: what the problems were, what the successes were, what attention needs to be paid to focussing on the detail and illuminate things at the micro level and generate data which can tell us things like 'what features make games collaborative', say. Or 'what helps people think more deeply about an issue, however defined'; 'what empowers people to be more creative and better'. It could be any of those things... **But that we actually develop some kind of 'proof'... Proof is maybe too strong a word – but at least some form of heuristic, to test concepts. So that we can then tell the world 'hey, this seems to be ok'.** (Interview, 29 November 2002)

The HLR echoes the DL's point of view on the process in response to my probing about the difficulty of assessing incoming project ideas:

> Head of Learning Research: It's one of those problems. Well, it's not a problem – **it's quite good fun**. You know, if we think that we've got to get THE answer, then we're absolutely stuffed. We will not get THE answer – you don't get THE answer in physics. You're not going to get THE answer in the **social sciences** – it ain't going to happen. But we want to work as hard as we can to try to find a way of doing it. And the projects we have here are in a wide range of different things. [Gives general explanation of 'proof of concept'] So how the hell do you assess this? I'm not making a statement that we will necessarily give an answer. What we can do is... say we design something that is designed to stimulate interesting question asking, and that's what we want if for. If it doesn't do that, if the kids come away saying, well I've looked at it and I'm not interested, it hasn't done its job. On a fairly basic level you are able to assess whether it has done that or not. **But in the questions that we ask of it, we are setting parameters, we are setting a framework, a filter for what we are looking at – we are filtering reality as we are doing it. We just have to keep our fingers crossed that we are asking the most fruitful questions when we do something.** (Interview, 26 March 2003)

Although the producers' comments suggest the production of educational technologies is more to do with hunches, convictions and social goals than with the discovery of objective facts, they also rule out an unstructured, 'anything goes' conception of production in effectively likening the process to science – as the DL does outright and the HLR does in contrasting Futurelab's social scientific approach to physics. In doing so they stake a claim for the rigour and the rightness of their approach. Other terms the producers use to describe the process include 'coherent' (Interview, 30 June 2003); 'fairly rigorous' (Interview, 6 December 2002) 'rigorous and open and honest' (Interview, 15 March 2004). The Development Director states: '(...) we are still confident that there is a right way of doing things and all our projects are planned in the same way – forward.' (Interview, 15 March 2003). The DL sums up the lab's approach:

> PR: So you're not claiming it is a perfectly scientific process, an objective process in that sense, but arguably it is becoming increasingly formalized...
> Director of Learning: Sure. We are being honest about what we do do. We are trying to be – I don't want to use the word 'objective' – but **we are being principled**.
> PR: And transparent?
> DL: Yean, and transparent in what we do do. So that actually is part and parcel of the process. I mean, if you actually believe in user-centred design you never do involve every single user that may potentially use the system, in its design. It's just not feasible, is it? **You have to make some kind of assumptions about people in this environment are a proxy for lots of other people who are in a similar environment.**
> PR: (...) And you select them in that sense, you are in charge of that whole process?
> DL: Sure. Yeah. And you know, if we are to be faulted on anything it's that we do default to those schools that are happy to have us and are in close proximity to the lab, more than anywhere else. Just because we are small, we don't have that many numbers, and so on and so forth. (Interview, 15 March 2003)

Futurelab's 'principled approach' appears as a substitute for an unattainable, objective and scientifically sound approach. As the Chief Executive stated earlier in dismissing the possibility of the producers ever shouting 'Eureka!', they do not expect to discover new things, especially where the users are concerned. Instead, there is an awareness that they are a volatile group that cannot be grasped entirely.

Thus, the tension between openness and constraint (or steering) applies to Futurelab's user-related knowledge. So much is clear when the producers are asked outright about the assumptions mentioned by the DL above, i.e. how they know who 'THE users' (i.e. in their generic form) are. Their responses highlight two mechanisms that are key to the principled approach. First, small-scale, case study-based fieldwork, including both purposive interactions in the context of specific projects and the less focussed means whereby the producers 'keep in touch' with their target users, notably school visits. Second, the reliance on their own experience in the face of impenetrable uncertainty with respect to the users. These are the focus of the following two sections.

In the DL's response above, the 'people in this environment' who are a proxy for those 'in a similar environment', comprises the actual children who take part in Futurelab's activities. But just as importantly, the 'people in this environment' also designates the producers themselves.

The HLR provides a telling illustration of the producers' reflexivity in recounting a meeting with partners for one of Futurelab's early projects:

> So from my sense, what was powerful about that was that all the different constituencies that I think should be involved in the development of a project were involved. The kids weren't at the table – that's the only problem and we need to do something about that – but they were there virtually, via me as a proxy, which is not necessarily the most reliable thing in the world, but, you know... (Interview, 18 December 2002)

This is an unambiguous statement that Futurelab's producers act in the users' name in interactions with potential partners. It denotes the 'best thing under the circumstances' nature of this reflexive mechanism. Real kids were not actually involved in the first instance because an initial idea must first be agreed – they will be brought in later, to validate or evolve the original idea. In the meantime the producer is the representative, the proxy.

6.2.4. More or less purposive interaction the importance of seeing kids

Futurelab's principled approach plays out in the use of small-scale interactions with users, which take the form of trials, and more broadly, means of 'keeping in touch' with children. Both are carried out in nearby schools:

> PR: I had asked you how you know this group of users which you constantly talk about. How do you know who they are, really? What certainties do you have?
> Director of Learning: There is a **default set of users to start with, and those are the people that are accessible to us in Bristol schools**. So that's been practical at that level. And we try and pick those schools that are friendly to us, that are not frightened of innovation, who are happy to have stuff going on. So if you say there is a bias in our sampling, the answer is yes because **we are not trying to prove any absolutes, as if we could. So the kids we work with are the kids we can get a hold of.** (Interview, 15 March 2004)

The acknowledgement of a bias in sampling (the use of a 'default set of users') may be problematic to the producers in so far as it prohibits sweeping claims of validity; however, it is not an epistemological issue for them. From an epistemological standpoint this approach appears to be consistent with the purpose of the Futurelab endeavour and the process of mediation described in Chapter 5. Asked whether he has any concerns regarding the representativeness of the sample groups they interact with, the DL establishes what amounts to a distinction between quantitative research involving large user samples and qualitative research conducted on a case study basis. In his view, the latter contrasts with a marketing approach and is better suited to the Futurelab endeavour:

> PR: Do you have concerns about representativeness? In terms of the schools where you do choose to do trials and so on, the people you do have contact with in relation to the people who are the end-users, the whole of the population?
> Director of Learning: Yes and no. You have to start somewhere. We start slow. We realize that we are not being historically scientific in that sense of having mass trial. But there are very real questions about what kind of data a mass trial would give us compared to the kind of data that we actually need and actually want, which is about the nature of the interaction, what learning does go on…
> PR: Questions that can't be answered by mass trials, that's what you are suggesting?
> DL: Yeah, they don't lend themselves particularly to mass trials, but they do lend themselves much better to closer observation. Now the weakness of close observation is that you are only observing those people who you are observing. It's inevitable. Do you generalize from one human being to another? Not necessarily, but what we can say is 'hey, this works for them' or 'let's tweak that and change this and see if it works any better the next time round'.
> PR: So a sort of case study based approach as opposed to a broad survey based approach, in terms of social science?
> DL: Yeah, **we neither have the resource nor the will. We work on a case study basis.** I suppose if it was up to marketing people to some extent there would be focus group based stuff as well. And we're not unhappy with that as an approach. As I say, **we are**

> **not trying to prove mass scientific validity but we try to show that in these circumstances this seems to be something that is worth trying and this doesn't seem to be worth trying or it needs a bit of refining, fine-tuning or rejecting. And find out about things relatively quickly.** (Interview, 15 March 2004)

The Development Director echoes the DL's view of an iterative process involving small-scale interactions and tweaking, in which direct user involvement is a 'kind of safeguard' against irrelevant innovation. For him, the process whereby Futurelab seeks to 'meet this audience' is 'a little bit trial and error':

> PR: (...) Given that you are always working upstream from, you're working in a pre-market setting all the time, how do you know who THE users are? Because there is constant talk of THE users, THE learners and so on of these products which don't exist yet. So how do you know?
> Development Director: There's a kind of easy, non-philosophical answer to that in a sense. The projects that are submitted to us have a target user and the stuff that we... as we develop it we try to act on that target user. We've had a couple of projects that we've tried to have a target user and it's turned out 'actually, it's not usable for them at all', you know, it's much better aimed at somebody younger or somebody with greater knowledge, or that kind of thing. **So it's a little bit trial and error in that sense.** I think that the whole point of the process that we have is that the people that are going to be using the products that we develop – whether it's teaching or learning from it – are involved in the process of making it, so... that's the kind of **safeguard** that we have, that we don't try and design it on a research basis of, you know, 'we've studied the entire UK school population and have decided that this is what they are and this is what they want'. We just get some of them in and try it out. Which, you know, has its flaws in the sense that it's a small group you're trying it with...
> PR: Representative...?
> DD: **Yeah – how representative are they? Yeah.** But then we've countered that to some extent with the lab trials, field trials kind of stage, development and things. So in the first stage there's trials with a half-dozen kids in Futurelab, see what they think of the idea before you've even built any of the software and try that out. And then you try some of it out with the same kids once you've built some of it and move it on. Once you get to the point where **'yeah, it works'** then give it to a teacher and see what they can do with it for three months in the class. You know, that kind of process. And that way the **ideas are constantly refined to meet this audience.** (...) (Interview, 15 March 2004)

The Researcher observes:

> PR: (...) How do you know who these users are? How do you sort of establish that sort of relationship?
> Researcher: Yeah... Well, **from a research perspective we can't ever really generalize outside the children we are working with. Or we shouldn't – it's methodologically unsound to do so** (laughs). I mean I think we do but I mean certainly in our research reports we draw attention to **the context of our study, you know, what sort of school it is, roughly what sort of ability level the a children are at and stuff. And it is dangerous to kind of generalize further than that.**
> PR: But that would be the ideal scenario? Ideally you would be able to make inferences from the people you work with to the larger population that will eventually...
> Researcher: Well I don't know. I don't know if that is particularly desirable. Children have certain skills in certain areas, sometimes regardless of any other factor. And it's a constant debate in education about streaming or banding of kids because they might be great at History but shocking at Geography or something. Does that make them a talented and able student? No actually a better example would be great at maths and rubbish at English, which is probably quite accurate really because they are completely

> different disciplines requiring wholly different skills. **So I don't know, there's just something in me that says actually having a kind of benchmark by which you can say this child falls into this kind of learning category is potentially quite damaging rather than helpful or useful. Although... as easy or... as more easy... sorry, I'm not getting this out – it would make our job easier [to categorize children in this way]**. (Interview, 15 March 2004)

In this instance the involvement of users is a 'kind of safeguard' against irrelevant innovation, not the source from which all decisions are derived. Though inferences and tweaking of the actual artefact may follow, that is the extent of it. Technological production is not premised on universality – the Researcher's rather extensive use of conditionals in describing his role is telling:

> (...) And I think having spent a reasonable amount of time now trying these things out in schools, I've seen some pretty stunning things happening and there's quite a buzz to think I've been involved in that, and **I'm sort of helping to maybe change the way that certain people might think about or can approach certain learning tasks.** (Interview, 15 March 2004)

No claim is made that the laboratory conditions – be they artificial (at Futurelab) or 'in the wild' (trials in schools; cf. Callon 2004) – are designed to be a scientifically sound reproduction of real-world conditions, i.e. there is no posited correspondence. Rather, there is an ideal best-case scenario based on a set of values for the future.

There is a second kind of interaction with 'real users' engineered by Futurelab but which is one step removed from the small-scale field trials carried out in the context of projects: the means whereby Futurelab producers maintain a sense of contact with the relevant social groups of children and teachers. It is embodied in the school visits that took place in the early days of Futurelab, at the HLR's initiative.

The Project Manager describes the visits as a means of 'keep[ing] in touch':

> PR: How is their presence [of teachers and children], or importance, felt here within FL?
> Project Manager: Um... well...
> PR: You know, how are you reminded...
> PM: Well next week I'm going out with [the HLR] to a school, to paper-prototype [name of project]. (...) We also, **everybody did a day in school**, which was really a good idea. Everybody here spent a day as a teaching assistant – it was good, actually.
> PR: To just, sort of, cultivate that contact?
> PM: Well, to make us realize, ok, this is what they do in school. It's years isn't it, since we were... So it's just to remind us what it's actually like and to see how much children use computers now. They had a computer class when we were there, and it was really

> interesting how they used them. We were forked over them. So **that's how we keep in touch**, mainly. (Interview, 5 February 2003)

The above illustrates two different kinds of purposive interactions with children in order to test concepts. One is related to a specific project and fits within a broad conception of 'user-led design' or 'usability trials'. The other is more significant here: interactions with relevant social groups in their natural setting, as it were, quite independent from the development of a specific project. The school visits were used as a means of establishing a common background of knowledge with regard to the intended users, i.e. children, learners, teachers, before they could be physically involved in Futurelab's yet-to-be-developed projects. One notes the marked impression gained from witnessing first-hand and without specific research objectives at this point, the context which Futurelab is designed to impact upon. The DCE elaborates:

> Deputy Chief Executive: When we moved into these premises we were hoping that children would be passing through on a regular basis, testing things, we'd have prototypes out and have school classes coming in and out, teachers just hanging out and giving us their views... And I think **all that will come**, and [the HLR] is working very hard to put up our links with schools. And each of us (...) has spent a day in a local primary school. And that, to me, still stands out as the most special day of all my time here. It was just so inspiring and motivating, just **a wonderful reminder of why we're here**. And personally I'd like to do more of that and to see more involvement and more engagement. And I worry that that is increasingly channelled through [the HLR and DL] while the rest of us are... that process isn't visible to us. (...)
> PR: I like what you said about the school visits. Can you say a few more words about the context for those? Why and how it was set up?
> DCE: [The HLR] set it up with [Bristol-area primary school], which is one of the more enlightened primary schools I've come across. The head teacher there has become quite active in a lot of FL activities, and he arranged a whole programme, over a week, that two people from Futurelab would go in every day and spend the day as a classroom assistant, and it could be year 1 through to year 6. And I personally got year 5, 9-10 year olds. I essentially worked through their day with them, **seeing** the shortness of their attention span and that the teacher had to be so much on the go, keeping things in very short modules to keep the level of interest – that was of real interest to me. **Seeing** the huge variety and range of abilities was staggering – something I hadn't really cottoned onto. And also **seeing** some disabilities – in my class there was a boy with Cerebral Palsy, so how he was looked after at the same time as somebody who clearly had attention deficit disorder and somebody, a girl on the other hand who was supremely bright, how to keep her engaged. **Seeing that challenge from a teacher's perspective really hit home with me.** (...) **There was so much that came clear that we had talked about in theory, just seeing it in practice and seeing how incredibly arrogant we are in many ways – we simply assume certain things**, when just the sheer marshalling and controlling of children takes up 60% of the day. And to say that here we'll hand the children some technology and off they can go with it, doesn't really take into account exactly what teachers do in terms of just making sure everybody is in one place and safe and secure. Just fascinating. (Interview, 26 February 2003)

The direct involvement of children in projects as co-designers is not always possible, especially in the early stages of production. In the meantime their presence is

channelled mainly through the HLR and DL, as the Project Manager claims. But in addition to this, the school visits afforded an opportunity for all Futurelab staff to gain experience, in condensed format, of what it is like to be a child or a teacher in school. The DCE highlights the importance of face-to-face interaction and the possibility of observing children and teachers in their natural setting. The Manager concurs:

> PR: When you say kids are the most important... what form does their voice take within Futurelab, if you see what I mean. Are they a constant concern? Do you feel they are for everyone here?
> Futurelab Manager: I think some people need to be reminded of that. Because some people, like [the HLR and DL], are always talking about yes but what about kids, and will it work in the classroom? Whereas other people... And I think that's a good thing: people who are from completely different backgrounds are used to serving a different market, especially people from a commercial background. I think it's just a repetition thing, people need to be reminded of that. And [the HLR] gets school kids to be around physically, to visit our offices **so that we actually *see* them. Because you know, unless we're actually in the classroom or we see kids, you kind of forget that they're what we're aiming at really**. And also, you know, we have a couple of events we're working on now, if there's any way that we can involve kids then we do. It's an ideal and it's not always possible. I certainly want to be in a school environment – ideally not a school environment, because I wasn't 100% happy about school – but to be around kids more, and to get to understand... Because **I am completely out of touch**! I think a lot of us think oh you know, we're quite young, but we're not! God knows how many years it was since I was at school, so you know, we need reminding. Because we could just be isolated. Carry on what we're doing and forget who we're trying to... [reach] (Interview, 5 February 2003)

Face to face interaction – actually seeing kids – is a way to keep in touch. In this sense it serves as a reality check.

6.2.5. Acknowledging, and living with, uncertainty

Direct user involvement in the form of face-to-face interaction – through trials or school visits – may be perceived as a crucial means of ensuring success in design. But my objective is to go beyond this belief which the producers hold very firmly, in order to question the other forms of involvement which contribute to shaping the endeavour.

I probed the DL about the grounding of Futurelab's knowledge of the users given the acknowledgement that objective so-called proof of their wants and needs can never be attained. His answer details the set of heuristics outlined earlier:

> PR: Can I ask you, how will you ever know you are right in making the decisions you are making at this time?
> Director of Learning: Maybe never. [The Chief Executive] doesn't like me saying this, but I've spent the last 30 years of my life making mistakes.
> PR: And learning from them, assumingly?

> DL: And learning from them. So have I ever made the right decision? I mean, I wouldn't be here if I... (...) No, essentially, there is no right and wrong. But sometimes there is better and worse.
> PR: What signposts can you use to feel your way around? Are there any certainties? Any signposts?
> DL: Yes, and I think that I probably have a long list. All other things being equal, it is better that – and these things include the following. It is better that a child voluntarily engages in an action rather than being forced into it. All other things being equal, it is better that people collaborate together rather than they undertake things in a solitary way. All other things being equal, it is better that... And I can give you a list of all those kinds of heuristics which are of that nature, which indicate positive directions to me... (...) There is no definitive checklist. One of the things I was so keen to point out at all times – it's not very often that a psychologist has come up with a brilliant learning idea. We can be good critics but **the role of imagination** in this process is equally powerful. (Interview, 26 February 2003)

The DL's list of general principles with respect to learners does not translate unproblematically into technical features that will be embraced by the users and lead to successful learning outcomes. In a later interview, he explains:

> PR: Can you draw up a list of what works and what doesn't for these users?
> Director of Learning: Nope.
> PR: No? Are there a few rules of thumb or a few certainties, you know, some general principles you try to adhere to in a general way and others you know straight away if feature X turns up in a proposal...
> DL: **I'll just give you another anecdote I'm afraid, and it's not going to help you generalize out but the anecdote works for me.** In the early days of computers in education we didn't have very fancy graphics machines, we couldn't do something... Computers in those days used to connect to domestic television because you didn't have separate monitors. And a teacher friend had an idea that he would have something that would put big numbers on the screen, big sums: '4 plus 7 equals'... That you could have on a large television, a classroom TV when you do role call in the morning or getting ready for role call (...). [H]e programmed it to occasionally – only occasionally, again at a random level that he could choose – that it would make a mistake. (...) And he was able to put much harder sums up and the kids would actually notice – 'hey!' – and be able to more quickly recognize things that were wrong and develop their own mental strategies for doing that. [This] turned something which if you had a checklist for the evaluation of the quality of computer-assisted learning programmes... Were there any help screens? No. Was there any interactive input from the kids? No. You know, it would fail. (...) So context is all, I suppose is the answer to that question. To cut that long story short, I've thought of my answer: context and situation is all.
> PR: Right. It's not a matter of just putting a technology out there, it's about it fitting into a set of relations and practices and so on...
> DL: And fundamentally those practices are about doing, about **thinking about what is the child's activities**. And what influences a child's activity and what supports a child's activity. And in the end that's where I start my judgement in full, you know. What is this activity system? And what is the role of the subject in this activity system? Much more so than what is the object, I suppose. (Interview, 15 March 2004)

The Head of Learning Research and Researcher respond along similar lines, effectively stating that the only certainty in regard to children is their diversity. As in the DL's response above, their views foreground the role of reflexivity, in the guise of the reflexive user or producer-user:

> PR: Do you have any certainties with regard to children?
> Head of Learning Research: **One certainty I have with regard to children is that they are as diverse as adults.** So that when we talk about children, we often make statements about CHILDREN – and you know, they are all very, very different. That would be a first statement that is usually overlooked, because we tend to talk about children as though they're this one great lump.
> PR: And I assume this applies even when you consider one specific age group?
> HLR: Oh yeah – put five children in one room, all of the same race, ethnicity, gender, socioeconomic background, and they'll all be different, for God's sake! So you know... So one certainty is that there is difference, which I think is important because we try to stick them into boxes. I suppose a second thing would be that children have needs, and they have desires and things that are relevant and important. And to some extent, I suppose if we're looking at the things we are trying to do here, **I am always asking 'how is this relevant to a 10 year old, or to a 5 year old?' You know, how does this meet needs that they've got at the moment?** (Interview, 26 March 2003)

> PR: Do you have any either explicit or implicit list of what works with the users? Some rules of thumb that you use, any absolute certainties in your mind, you know, things of this nature will work whereas things of this nature just don't work with these users?
> Researcher: No, not really. I mean I think the fact that we've discovered that things that look really snazzy and use the latest graphics packages, etcetera, can really just be a disguise for something that is wholly unmotivating. I think we've just learned that **children can see through stuff.** And so **it's still really hard to be able to say 'yeah this is definitely going to be a big turn-on for kids'.** I mean certain things we look at, that looks like a lot of fun to me, you know, and **you try and think what if I were 6 years old, which is impossible to do but you try and think...** (Interview, 15 March 2004)

Thus, children are 'as diverse as adults' (HLR) and they resist any attempt to pigeonhole them. What is more, they have the ability to 'see through stuff', which makes it 'really hard to be able to say "yeah this is definitely going to be a big turn-on for kids"' (Researcher). Further, they are likely to subvert any technology that comes their way, according to the DL. Indeed, in a discussion in which he questions the marketing decisions made by one of Futurelab's partners for a piece of software developed jointly with them (which he feels limit the educational value of the product), the DL states: 'Now I know that the learners will actually subvert that anyway.'

In the same interview, the Researcher adds:

> PR: So how do you yourself deal with that uncertainty of 'do we really know who they are and will they really gain from this?' And so on. On a day-to-day basis, how do you square that in your own mind?
> Researcher: I think all we can ever do really is try the prototypes out with them. I don't think we can do any more. **I mean working with the kids in the development process helps but it's never going to be the whole answer.** Trying things out for longer periods will inform certain projects. I just don't think that we can, really, conceive... (...)
> PR: So there's always a matter of just having a go at it and seeing... based on your instinct?
> Researcher: Yeah. I mean you know, **we're ever so modest sometimes but of course we know more about how children learn than they know. And certain parts of you say 'We know best' and we should know this just from our experience and stuff.** You know, certain people like [the DL] have been working with kids for years and years

> and years, and he sometimes has a gut feeling for how things are going to work or not work. I don't have that myself – I would always err on the side of optimism I suppose. It's like, let's see if it works rather than going, well that's clearly not going to work. But you can be too optimistic and you can be too cynical. (Interview, 15 March 2004)

One can have a sense of how the users should be involved in the design process. But as the Researcher points out, 'it's never going to be the whole answer'. So what bridges that knowledge gap? Experience and a 'we know best' attitude. 'We know best' as adults, as learners, as experts in education. All are valid forms of experience in this context.

6.3. Exploring expertise and experience

This section examines the emergence of expertise and the role of individual experience in the design process. In the first instance, it details the producers' belief that in matters of technical knowledge, a general sense of awareness is sufficient; expertise as such is not necessary.

In the second instance, this section sheds light on the **sense of entitlement** the producers feel in terms of contributing to the production process – most notably in the form of user-related knowledge claims – and traces its origins in the varied social experience of the producers.

6.3.1. Technical awareness, not expertise

The departure of Futurelab's Head of Technology – described by the CEO as a 'technology guru' – was an early indication of the organization's shift from production to learning research. It afforded me the opportunity to address Futurelab's expertise in both social knowledge and technical knowledge.

> PR: (...) You might want to consider the departure of [the HT], and tell me about the void he's left, if any, and how you feel it should be filled.
> Researcher: With [the HT] most of the work he did, aside from the project managing, I didn't really understand, as **I'm not technically-minded at all**. You know, mainframe and programming and stuff. (...) I guess my concern as we move into the next stage of feasibility is we may not have somebody here that has that **technical awareness** that is required in the research process. Somebody who, if I find out about some new piece of kit or something, I can ask [the HT], what does this do? And if I were ten years old I'd understand. (...) I know having someone here is pretty much indispensable for me, I always need a technical expert around pretty much at all times but hopefully with [the Head of Production and others] I should be able to get some steer on where I should be

> looking. (...) But in terms of the hardcore technical stuff that [the HT] did, **I don't know about any of that**, so from my perspective... I don't know, we'll see. (Interview, 5 February 2003)

What is striking about this response is the acknowledgement, by the very person responsible for the feasibility assessment of incoming projects (whereby projects are evaluated for their newness against existing technologies and for their educational potential), of his limited technical competence: 'I'm not technically-minded at all'; 'I don't know about any of that'. He defers to the expertise of the Head of Technology in such matters (revealingly, he also quips that if he was 10 years old, he would be more competent). The Researcher's main collaborator in the feasibility assessment, the Project Manager, makes similarly candid admissions in response to the same question, and she points to the same way forward:

> PR: Can you say something about [the HT] – not him personally, but the position, the void left by his departure. How do you see that void?
> Project Manager: It's very difficult, because **I don't know a great deal about technology**, so it's hard for me to appreciate. I think he's a great thinker and he has great ideas, and in time perhaps they would have come a bit more to the fore. But because we are starting off it wasn't really the opportunity to use his skills, probably. (...) But we do need someone of his calibre for the projects. (...)
> PR: [The CEO] called him a 'technology guru'.
> PM: Yes, that's what he was – such a great thinker. **But whether you need someone like that around constantly, or whether you draw on it for specific projects... I think that might be better.** (Interview, 5 February 2003)

Taken together, these producers' admissions of limited technical competence, as well as their indication that technical expertise can be drawn on in a punctual manner, suggest that technical awareness is sufficient in the context of Futurelab's core activities, and that outright expertise is not.

The rest of the producers' responses to the Head of Technology's departure support this further. Although she would prefer to have a technology expert as part of Futurelab's core staff rather than on an *ad hoc* basis, the DCE plays down the need for technical expertise in this context:

> PR: Can I get you to say a few words on Technology, and perhaps the departure of [the HT] and the gap you see being left by his departure, and how you might take care of that?
> Deputy Chief Executive: I think it has left us with a glaring hole and an urgent one we need to fill. We need the expertise on a project level to show us what the right questions are to ask in terms of technology, related to any prototype that we put forward. It's almost a case of having **a general practitioner who's aware and clear about the various platforms and their potential, but might not know in depth absolutely**

> **everything about every platform, but would know whom to consult and the questions to ask of that consultant.** And in terms of moving forward, my sense has been to get somebody in even on an interim basis to fill that gap, and then to find somebody on a permanent basis. Because without that we are exposed, because **although we are not about technology, it is central to what we do.** At the moment there are a few projects that are ongoing that we've really reached a crunch point where we need to know whether the technology is feasible or whether we are just wasting our time. (Interview, 26 March 2003)

In two different later interviews the Researcher explains why Futurelab effectively favoured calling on external consultants on an *ad hoc* basis:

> I mean, whereas the projects development can vary greatly, so you're always going to need people with different expertise – for some projects you require Flash, other times it's going to be people who can do complex programming – and **I think it is very much the nature of the production role that you have different staff often working on short contracts *ad hoc* as and when necessary.** (Interview, 30 June 2003)

> I mean we are painfully aware sometimes of how much we lack in terms of people with technical skills, and therefore it's a matter of negotiating and **inviting people to come in and teach us that stuff.** (Interview, 15 March 2004)

The DL offers a similar view:

> PR: So here's a thought exercise. If you were asked to design a course, say 'Educational New Media Production', based on your experience, what would its basic components be?
> Director of Learning: Erm... **What would normally be considered technical knowledge and competences would be available as a background rather than the foreground of the course.** (Interview, 15 March 2004)

Ideally, Futurelab producers would have both technical and social expertise, as the Futurelab Manager eloquently states in deploring the departure of the Head of Technology: 'I think it's very sad, because he was a bit of a star, really. He was both an academic-type technologist and an approachable human person, with vast knowledge and experience. And he had kids as well. So he was a perfect Futurelab person.' (Interview, 5 February 2003) But by and large, the social knowledge of the users is deemed an appropriate counter-weight to the producers' lack of technical expertise. As an illustration of this and introduction to the next section, consider the Researcher's account of his first interview for his job at Futurelab:

> So when I came here for my first interview, what I was switched on about was that they were using, or were proposing to use, pretty **new technologies that in the main I didn't know a lot about.** I mean I'd heard about them, but I wasn't technically aware of all their capabilities. So although my knowledge wasn't huge or deep or anything, I certainly had an enthusiasm for it. And also the teaching experience meant that I was able to talk about practical applications in ways that perhaps people who've been in the new media world for a long time, or indeed in educational academia perhaps don't have.

> Very recent, hands-on experience, a pragmatic approach: this is what works with kids, this is what doesn't. (Interview, 5 February 2003)

6.3.2. It's not what you know, but whom you know...

In Chapter 5 it was demonstrated that Futurelab's learning research was made its main activity as it was seen as the best compromise between the need to enrol both commercial partners and the education community. Of course, the role of the Learning Team in this process is key – it is seen by potential partners as key in obtaining useful knowledge of a potential market and by the education community as potential contributors to the field of learning and education. However, the members of the Learning Team are not alone in putting forward user-related claims. In fact, the 'school visits' presented earlier were one outcome of the HLR's and DL's belief in the need to open up the process to their colleagues. The HLR explains:

> (...) I've always been somebody to criticise the idea that the only people who should have a say about education are parents and teachers. I think that's nonsense, to be honest. They know what's going on, they have huge expertise, they know a lot about children, about different models of learning, they know a lot about what works in schools... But actually, this is such a product of long-standing views of who children are, it's such a product of the idea that children are quarantined in this little space and only the teachers and parents can talk to them or about them. If we took a more creative view, of childhood as something that is a stage that we all go through, that we all have responsibility for, then I think the way we treat children and the way we develop educational responses would be much richer, more creative, more resourceful. (Interview, 18 December 2002)

Although in this instance the HLR is speaking about education rather than the production process *per se*, her view is instantiated within Futurelab. For instance, the Futurelab Manager asserts:

> PR: I understand why [the DL and HLR] would be the ones to constantly remind you about the kids, but – and this might sound like a strange question – but are they the only ones here who know anything about kids?
> Futurelab Manager: No. I don't think so. But I think that they are so outspoken that it's just clear that they as a team and as a department must bring us back down to earth. **But no, I think certainly everybody has, in different capacities, an interest in or knowledge of kids. They've all got something to contribute.** I mean, on a personal level some people have got kids, they've been through that, they've got family. I know [the Head of Design] really does want to do stuff, to be out there... It depends on what an individual can offer, though. With [the HLR and DL], it's almost part of their routine that they've either been in the classroom or they've worked with kids... (Interview, 5 February 2003)

The DCE's comments suggest that the core staff's sense of entitlement may have pre-existed their joining Futurelab:

> Deputy Chief Executive: We have this broad remit, from five subject areas, for 5 to 19 year-olds, all sorts of platforms of technologies... Where do you start? How do you select a range of ideas that are going to make your mark? I don't think we've done the best job of that, but we are beginning to develop our focus in a bit of a better way. We are beginning to develop a process in terms of how to select ideas...
> PR: Like with the CFI, which I intend to follow closely...
> DCE: Good – that's an interesting one. And also internally, **the fact that most of us joined FL because we felt we had our own ideas that we'd like to contribute, that we'd like to test out.** (Interview, 26 February 2003)

In the same interview as above the FM she expands on this, comparing her previous experience in an architecture firm – where her substantive input was very limited – to her contributions at Futurelab:

> PR: Concretely, if you're discussing specific technical choices or options for a given project, does that mean everyone's opinion should be considered, even though they're not experts in technology or whatever?
> FM: Yep. And I don't know if you've got this from anybody else, but [the Head of Design] has set up these brainstorming sessions to focus on one funder. For instance, let's look at science projects and see what we can come up with for Gatsby, or whatever. In my experience, the way architects get projects is through competitions. For instance my ex-boss went for the British Museum job and he came second. But when you go for competitions everyone pulls together and you get the project together with presentation, 3D images and all that. Everybody pulls together and everything is produced. And then it is sent off. And you get a sense of ownership because everybody has contributed to that document. And when you win it's absolutely fantastic. There's a lot of money because these are multi-million pound projects, but there's a sense of achievement. And what was my point? Ah yes, so [the HD] organized these sessions and **I was very honest about my previous experience in that, ok, I haven't got a science background, I am not a scientist, but just like everybody else, I feel I have something to contribute to this. I wouldn't want to be part of a contingent to actually go sell a project to Gatsby, but certainly at the point where we can all sit together around the table and talk. [The DD] has got a science background, [the DL] is probably quite knowledgeable, [the CEO] made science programmes and stuff. I mean just the three of them should throw ideas around with people who have no science background whatsoever to help them. And as it happens, I was with a group and I had ideas.** They may not be workable (laughs)... Basically, you shouldn't be pigeonholed. (Interview, 5 February 2003)

In her talk about her lack of experience one can clearly see the distinction that is made between expertise on an external level ('I wouldn't want to go out and sell to Gatsby') and an internal level ('we can sit around a table and brainstorm'). This perhaps is to do with the need to brandish expertise to make an argument from authority (or show of strength) to external parties, while, on the inside, the staff felt comfortable with their interlocutors and, therefore, entitled to make a contribution.

The importance of face-to-face interaction with children/learners is also salient in talk about the producers' expertise, both in providing assurances to partners as to Futurelab's competence and in establishing the producers' confidence.

> Head of Learning Research: Historically, looking at who has been allowed to have a say, if you are somebody who has no children, or if you are not a teacher, and you are not an employer, then what tends to happen in conversations around education is people pull rank and say 'well you've got no kids' or 'you're not a teacher, what do you know?' And I think that sort of statement is debilitating.
> PR: That happens?
> HLR: Oh, of course it does! Yeah, and I'll tell you where it happens. If you look at the debates around the 1990 Broadcasting Bill, around children's education – I'll send you my Masters' dissertation because I looked through all this. What you can see repeatedly are truth claims being made by politicians who have children, who obviously never see their children and you can tell by the things they're saying. And they would be talking to another person who is very well informed on education, but you can play the trump card **– being a parent is a trump card, being a teacher is a trump card**. And you can throw it down on the table and whatever argument others put forward are absolutely squashed.
> PR: It's an argument of authority...
> HLR: Absolutely, it's a huge statement.
> PR: It takes precedence over everything else?
> HLR: Absolutely. (...)
> PR: Can I pick up on that? And these are you words, that 'knowledge claims' made about children and how people bring that up as an argument to quash all others. Does that happen here as well? Do you also find that happens here when you're having discussions about various projects?
> HLR: (laughs) Most of us don't have kids, actually. I don't know if you've logged it, but who has children here? [The DL] has grown-up children, [the CEO] has grown-up children, [the Head of Production] has grown-up children – that's about it. So no, we don't get too many truth claims like that being made by people in the organization. But we do tend to get a bit of deference... **It then gets interesting because people say 'well when I was at school', so you get a claim being made to your own childhood, from memory. Which I think is actually OK, because if we can start remembering what it was like to be children it is really helpful – we need to be careful not to universalize the statement, or the experiences we had as children. You know, it was one experience.** (Interview, 26 March 2003)

Such comments illustrate the adage popular in business circles, 'It's not what you know, but who you know.' Here, the HLR states that people who have children can invoke this fact to invalidate claims made by others on this basis alone. Credibility in this instance hinges on the experience of a real and ongoing face-to-face relationship with children, as either a parent or education professional. In other words, face-to-face interaction with relevant groups has value in and of itself, regardless of the substantive content of the knowledge claims. Thus, the notion of 'trump card' conveys an amalgamation between the substantive object of one's knowledge (in this case, children) and the status or authority one may derive from it.

The HLR also makes interesting remarks about projections in time, to one's childhood – in some cases they are of limited value because they are too far away. Whereas in a different instance she states that it is perfectly valid to make such projections, as long as one does not generalize from it to children in general.

The status of the Learning Team's members with regard to expertise is not straightforward and, in any case, it is not exclusively founded on formal certifications and the like. Later in the same interview the HLR gives a description of the interplay between personal experience and epistemic authority in the production process proper:

> Head of Learning Research: But in terms of here, authority and right to speak... [the DL] and I do this and we need to be very careful, but what tends to happen is that there is a view of me and [the DL] as the education people, and the people who spend the most time with children, and to some extent we do, but at the same time, that doesn't necessarily mean you have all the answers, or you know all children, or anything like that. So it's not so much a claim to knowing everything, as a perspective that is informed in a particular way. It may sound like a completely academic distinction, but it is an important one for me, because I've seen how arguments get closed down by the sort of waving of the flag of objective, or subjective, experience. So I try to be quite careful about it. But it gets tempting sometimes, and occasionally – everybody does this – you want to win an argument, you pull out every card you got, and it's what everybody does. But actually, being brutally honest about it, you just want to win that argument. Or you want to be able to have something go somewhere, so you will drag that out – but actually you're making a subjective case.
> PR: Even as an education specialist?
> HLR: Yes! Of course! And so is everybody else. You're making a subjective case because you think that is an absolutely brilliant thing to do. And actually your experience with children may have no bearing on the thing that you're talking about. So if you are developing a particular project, you've probably never seen children using it, you've probably never had that experience. **I mean, you've got other experiences that may have a bearing, but you know, the individual person doesn't disappear.** It's always just [me] talking, it's not [me] plus 900 years of... you know. That's it. So, and other people will pull claims out of the bag for other things, so that if you're talking about, say, business strategy, then [the DCE] will say 'I've developed these things, let's do that', or [the DD] will say 'well, in my experience that's not how it works'. And it's exactly the same but what is interesting is **once you start talking about kids, because of this whole social view of children in this separate world apart which we don't really know about, I think it does have more power when someone brings children in as the kind of ace card to play, in a slightly different way from other fields. And that is so tied up with kind of cultural construction of childhood as this separate space that nobody knows – as soon as you've left it, you've left it, and you've no right to talk about it until you've got your own or you're spending time with them as a teacher.** (Interview, 26 February 2003)

In the first part of this quote the HLR stresses an important distinction in relation to her status and the DL's status, as the 'education people' at Futurelab: this affords them a certain perspective (the key elements of which have been detailed in section xx), not 'a claim to knowing everything'. Further, such a perspective does not instate a fracture with their experience as individuals: 'the individual person doesn't disappear'.

The last part of the above quotation in bold provides an explanation as to why first hand experience with children is so highly valued: childhood is perceived as a

separate, mysterious space or at least, one from which most adults are too removed to be able to speak authoritatively about until they either have children or interact with them on a regular basis. There is a parallel to be drawn here between Futurelab's producers' focus on children and production broadly speaking: in this specific case childhood is perceived as a different social world we cannot fully know about, while in the case of media or technology production, it is the uncertainty of user response in the future that is a concern. In both cases one looks to mediators not for the final word on whether or not predictions and anticipations will hold, but for some assurance that any risk is based on reasonably sound foundations. Face-to-face interaction in this context has strong appeal in and of itself, as it brings the audience into the process (cf. Gans 1957; see Chapter 3).

With respect to children and learners specifically, the flipside of the situation the HLR describes above is the fact that the education experts' views are challenged by others, as the Head of Production and Director of Development illustrate:

> PR: [I]f you ask, say, [the DL] for his input as an education professional on some design issue, do you take that for granted without disputing it?
> Head of Production: No, I challenge it. I challenge it. I'd ask him to prove it. And **we're all opinionated buggers** in any case, and that's part of the respect that's there. (Interview, 19 November 2002)

> Development Director: I take issue certainly with some ideas that [the DL] has put forward at times, on the new knowledge era, or the Google Era – any information you need you can just type in and retrieve; you don't need to know facts anymore. I think that is so wrong. You do need to know facts.
> PR: And you've had these discussions with [the DL]?
> DD: Yes, and they're frustrating, because of the status [the DL] has, in terms of he's the learning expert, so he knows best, kind of thing. (...)
> PR: Whereas you would like to dispute some ideas and engage with him?
> DD: Yeah. Because to me, you do need to know facts, because that's how you make the connections in your brain. If two facts are sitting in cyberspace somewhere, you can get to them, but they need to be in your head at the same time for you to connect them. It's just one of those things. That's my take on the whole thing. (Interview, 13 March 2003)

The fact that one feels entitled to contribute on the basis of personal experience can become frustrating when it is confronted with the views of a recognized expert, such as the DL. It leads to a kind of reluctant deference to the experts, which is different from straight acceptance or successful persuasion.[68] In some cases, the experts' views prevail because they are experts, not because their knowledge is

[68] The HLR states elsewhere: '[The DD] would have a problem with [certain learner-centric approaches] because he is a classic objectivist, positivist scientist' (laughs).

accepted *per se*. In fact, internally there is a widely shared acknowledgement of tentativeness:

> Researcher: [I]t's a constant on-going process of learning ourselves. I mean none of us know everything here... Some of us pretend we do (laughs) and **I think when we put our public face on a lot of us pretend about all we do.** You know, we can all sort of wing it to a certain extent but when it comes down to actually do stuff we know we have to invite the expertise in. But you know, if you've got people in who are really good at doing stuff you can learn from them. (Interview, 15 March 2004)

> Head of Production: **The labels probably mean more to other people than within.** The labels mean that everybody comes from a different angle so there are different expectations on what might be delivered, and that's probably a good thing. It means we're not all charging down the same route. (...) I think because we all get on pretty well socially – it's not that we're all in one another's pocket – I think everybody's got a healthy respect. People like each other... I've been in environments where teams have fallen apart... The labels – it's more responsibilities than labels. Because we can't all be expert in interactive education, we've got to be able to divide it up. So me, I'm interested in technology, it's part of my responsibility, but I've got no time to become the expert – and I wouldn't want to be the expert – so I'm quite happy to have somebody to do that design... (Interview, 29 November 2002)

On the inside, Futurelab staff are always learning, yet on the outside they (need to) project a confident image. My argument here is not that there is an 'anything goes' approach or that the producers only ever 'sort of wing it' – it is to show there is a distinction to make between the organization's external display of expertise and an internal, ongoing process of learning, of becoming experts. The Development Director explains:

> PR: Another issue that was discussed a few months back was the need for Futurelab to establish itself as an expert with regard to the users, or the learners more specifically, and the learning experience. Do you feel you've achieved this?
> Development Director: I think that is more tricky. Certainly we've got a report coming out about how we work with users, learners in the process of design software for them. So to that extent we've got a greater confidence in our knowledge on that. (...) **So our own confidence about our expertise is definitely higher**. We haven't really put that out yet and we're waiting until June. And that I think is when we can start doing more work externally about building people's awareness about us being experts in that area. I sincerely think we've got more confidence as being experts in that area, but I wouldn't say... What was the question again?
> PR: Have you managed to establish yourselves...
> DD: Yeah, no, I wouldn't say we've established ourselves in that sense.
> PR: **So you've distinguished between how you are perceived by the outside world and how you perceive yourselves internally. What are the indicators or that confidence on the internal level, would you say?**
> DD: Erm, well I think one is the fact **we are happy and willing to write a report** about and say what we've learned from the projects that we've done. That's the biggest indicator. I think there is also the implicit indicator that we are still confident that there is a **right way of doing things** and all our projects are planned in the same way, forward. And it's not 'we've always done it this way so let's carry on', it's 'this works well so that's why we're going to do it again'. So that's kind of an implicit indicator rather than anything externalized. (Interview, 15 March 2004)

The two key indicators of the staff's growing confidence, according to the DD, are the fact they are happy and willing to produce documents for external audiences, and that they remain convinced about the value or worth of their way of doing things. It appears their confidence is derived from the methodology, not the outcomes as such. In this sense, expertise and confidence are validated internally. But not necessarily in direct line with the formal status of individuals as learning experts or otherwise.

6.3.3. Guises of the producer-user

The data collected for this study provides numerous examples of producer-user overlap. That is, instances where the producers either draw on their social experience with relevant social groups, or effectively conflate their experience with that of the intended users, in order to ground the decision-making process and move forward.

6.3.3.1. Producers as media professionals/professional mediators

In explaining why he, personally, is the right person to take innovative ideas forward at Futurelab, the DL singles out experience and mediation – indeed experience of mediation – as key resources. Tellingly, he believes most of his colleagues are equally well-equipped thanks to their experience in different capacities:

> PR: I asked you 'who is more likely to come up with a good idea?', and you answered, for good reasons and immodestly, 'you'. What makes you, then... why do you feel that good ideas come to you and that you have what it takes to take them forward?
> Director of Learning: A lot of time having bad ideas, is one possibility. Of having had lots of failures, is significant. Both in terms of my interaction with children and trying to teach them things. I'm not going to discount the fact that my role as a reflective practitioner, as a teacher, is adding value here, because I really do think that. **So I think that when you have to come up with ideas of how am I going to explain x to y – now I do think people like [the CEO] has had exactly the same issues within a different profession, as a science filmmaker. I think [the HD] has had similar experiences of having to do it as a designer, trying to look at things visually. And I think [the HLR] has had to do it as a researcher. So there's a lot of that – the fact that we have all had to ask ourselves hard questions of 'how do I mediate this idea to a third party?', and having to do lots of it.** And being aware of previous solutions and previous attempts.
> PR: So it seems to be a mix of first-hand experience with...
> DL: A questioning attitude, I suppose. A reflective attitude. (Interview, 26 February 2003)

Here the DL argues that what makes him a likely candidate to come up with good ideas and move ideas forward is that he has had lots of experience with the

relevant social group of children/learners and he is concerned about the lack of experience of his colleagues with this specific group. However, he broadens the field of relevant experience to include fields or professions in which one mediates ideas to a third party – one might add, more specifically, fields in which one must produce artefacts intended for an absent third party, i.e. documentary films, design in general, research papers, etc. (these fields of relevance are unpacked below). In so doing the DL provides a fitting description of the producers as agents of mediation. In addition to hands-on experience, he underlines the importance of 'a questioning attitude' and '[a] reflective attitude' – as is shown below, these are endemic to the role of reflexive user ('reflective' and 'reflexive' go hand-in-hand).

Later in the same interview the DL elaborates on the benefits of his experience as a teacher in the early stages of the production process:

> Director of Learning: In a sense, I am appropriating a technology and bringing it into another domain. Because in a sense that is my job, isn't it? I mean, broadband technology has not been developed for education. The Internet was not developed for education. Games technology was not developed for education.
> PR: In that case, can you just tell me then, that feeling you experience at that moment, that you have a toy here which might be useful... Where does it come from and what feeds it, before you actually find other technologies that might feed into the process?
> DL: [Gives example of potential partner who came in and presented some ideas] And he said 'we are interested in projected cartoons' and the idea that you can actually walk into an environment where cartoons are projected, and interaction with the characters becomes a significant factor. **I thought, yeah that's a cool idea. What one then does is begin to transplant that into my world. My world is the world of a teacher. And my world as a teacher is about planning learning events for kids. So what kind of learning events might occur with such a tool, with such a toy?** (Interview, 26 February 2003)[69]

Similarly, the report on the feasibility of a project, of which the Researcher is in charge, is already based on an assessment of how the users might interact with a certain artefact and what they might gain from it. This is a form of 'prior feedback'

[69] It is worth noting comments made by the DL in an earlier interview, which, although they emphasize the DL's personality traits, shed further light on the role of mediator and the value of process: 'I went through some occupational testing about two years ago. And they labelled me as an optimist, they labelled me as a good abstract thinker, they labelled me as a planter-coordinator – someone who plants ideas and who coordinates. What they certainly labelled me as not being was what they called a completer-finisher, that is, people who dot all the I's and cross all the T's... I know that's my weakness and I know I need people around me who can give me support in those kinds of ways and I recognize the value of their contribution. I think where I personally get into hot water is when my bosses are completer-finishers and don't recognize the other skills. I'm not saying that is true in Futurelab, but it has been true in other places in my career. What they value is the finished product and a clean register. No botches or alterations. Whereas I am a messy person who is always interested in bringing people to the next idea. I know there are weaknesses in this strategy. But it is also my strength. And the thought process is wonderful. It's just that one doesn't get finished academic papers out of it [laughs].' (MO 79)

that already involves kids, only through various layers of mediation: with external specialists in some cases, but mostly internally with the Learning Team. The Researcher explains:

> Researcher: Increasingly I've become more competent in assessing projects from the learning perspective, with my background, the PGCE and stuff, I do have prior knowledge to fall back on. The first six months was refreshing my memory on those kinds of issues.
> PR: You mean you've revisited that aspect through discussions with [the HLR and DL]?
> Researcher: Yeah. And also in reading materials. I have returned a fair bit to my own lecture notes and back through the bibliography of the materials I used to use. Revisiting some of those, just to kind of gain an idea of the learning theories which [the HLR and DL] tend to work to. But they're not pinned down to one theory as some academics might be – it's more a case of experimenting and exploring. But it's useful to have that in the back of my mind. What I tend to do mainly the production work, when I'm looking at things from a learning perspective, is trying to look at things more pragmatically. **How is this going to influence kids in a classroom setting? A lot of that involves talking to teachers or to specialists in other areas (...).** [And] a lot of it is drawing on the expertise of the others here. And certainly the first people are production and [the HLR and DL] in Learning. They can steer me if they're not sure. (Interview, 5 February 2003)

Earlier the DL stated his concern that his colleagues had little experience with children in an educational context, but he suggested their experience as mediators in different capacities made up for this. His colleagues believe so as well, judging from their own arguments. Indeed, their invocations of relevant experience suggests a strong sense of continuity between their past (mostly professional in this instance) work and their work as producers at Futurelab:

> PR: Can I ask one more question, which you sort of touched on in talking about getting ideas from teachers and from children – what is the difference between giving the users what they want or like, and giving them what is good for them?
> Chief Executive: (laughs) The thing is that... hmm. It was always a challenge for us, making science programmes for the BBC, if somebody said 'nobody will want to watch a programme about x', that was to me a real challenge – how can we make it into something that people will really want to watch? Now there are certain things – black holes, or sharks – which for some reason always attract people's interest. And other things that don't. **So that is a challenge for any producer of educational material or media – how to make it, whatever it is and once you've been given the assignment, attractive to people.** There are more ways of doing that than people have yet found. But then, and this is where the individualizing capacity of digital media can be really helpful (...). [Explains at length his experience of producing science programmes for the BBC in order to attract both potential physicists and laypeople.] So in science we have to ask are we trying to attract people to be scientists? Are we trying to get people to know about science because it's part of democracy? Answer: both. How can you do both? By thinking about how to configure what you do for the individuals. And so, some individuals may want to tackle things which to you or I are really boring and hard and difficult, but actually is very rewarding for them. Others may drop out of school unless you give them something that is really engaging. And I don't think you can come up with a blanket answer to that question. (Interview, 14 February 2003)

According to the CEO's argument, technology has the potential to enable one to better cater to the various segments of the audience he has always been engaged with: learners of science who want to become scientists and learners of science who just need to know about science to be better citizens in a democracy. Conversely and perhaps paradoxically, there is a tension between the general and the specific: although technology here allows one to address individuals, he still has the same general audience in his mind. Indeed, for the CEO there is continuity in his engagement with learners, be it in the form of the audience of the science programmes he used to produce at the BBC and the audience he is working to at Futurelab. In my first interview with the CEO, he gives further credence to the DL's statement on the relevance of his work as mediator: 'In Martin Hughes' keynote lecture he gave up the road [at the University of Bristol], he's famous for talking about informal learning outside schools – and to me it's an old message because I've been in television where you're doing learning outside school all the time.' (Interview, 6 December 2002)

In a related vein, the Head of Production amalgamates Futurelab with what he terms 'the communications industries', which are driven by the creation of appeal. For the HP, Futurelab's production activities are in essence about creativity and learning by doing – the creation of appeal is all about 'gut feeling' and 'you never know if another method might have been better' (Interview, 29 November 2002). The Head of Design offers a similar view in explaining her success as a graphic designer (which the DL deemed based on mediation and thus relevant to Futurelab):

> Head of Design: But I kind of understand, I'm pretty good at hitting the popular kind of... what makes people tick, generally.
> PR: Is it an intuitive thing or does it come to you through experience?
> HD: Well, both I suppose. And I like humour and fun and I can usually pitch myself at different groups and just get on and have a chat and have a laugh.
> PR: Do you think that is key to work as a designer, as an artist? That sort of intuitive understanding of what people will like, basically?
> HD: (sigh) God. Some people would say yes and some people would say no. I would say yes – in a commercial capacity, yes. And that's where I've always worked. Others would say no, you do it for yourself and if other people look in that's fine. That's more if you go with a fine-art mentality. It depends who you are as a person, I think. (Interview, 6 May 2003)

This fits with McQuail's (1987; cf. Chapter 2) assertion that the ability to 'assess public taste' is key to the work of media professionals. One step removed from such a skill, it is interesting to note that the engagement with an audience *per se* is deemed a valid reason to join such a production endeavour as Futurelab. Such is the

DD's case. Here he suggests that the narrowness of the audience for whom he was producing research papers as a PhD student in Chemistry was one of the reasons he rejected a career in the field upon the completion of his degree:

> Development Director: It was esoteric work. It was very hardcore chemistry in that it wasn't at all practical or applied – chemistry for chemistry's sake. I enjoyed while I did it. I did a year of post-doc in France and that's when I realized I don't want to be researching this. (...) You're producing papers that 6 or 8 people in the world are going to read, you know? Pretty narrow field.
> PR: So after the post-doc, did you actually take up a post in chemistry?
> DD: No. During the post-doc I realized that's not what I wanted to do. And there were quite a few people disappointed by this because I had a very good academic record, publications and a bright future in chemistry... For the mentors and supervisors it was disappointing. But I finished off what I was doing. **So I decided that what I wanted to do more was connect with a wider audience.** So science communication is what I turned to, and obviously coming back to the UK was really essential for doing that. (Interview, 13 March 2003)

These comments fit well with his earlier assertion that his main reason for joining Futurelab was to have a voice in the ongoing debate about education in the UK which he deems to be of the highest importance as it concerns the whole of society. In a way that resonates with the CEO's continued engagement with an audience of learners, the DD also deems his work as chairman of a theatre company for young people relevant to his role at Futurelab:

> PR: Is there anything else about your background you feel I should know, to help me understand your contribution to Futurelab?
> Development Director: The other stuff I draw on is probably the more extra-curricular realm of what I do. I'm chairman of a theatre company in Bristol – theatre is a passion that I am into, performance, arts, that kind of thing. And that hasn't really come forward yet, but it's kind of in the background – it might come forward.
> PR: What do you mean? What is the feeling you have?
> DD: The theatre is expanding, and it's not particularly small – it's got a quarter-million turnover a year and 6 full-time staff – and I'm not involved in acting or anything, I'm chairman... But that theatre company uses traditional methods in terms of its education work – it's for young people, I should have said – it's a theatre for young people, not by young people, but for young people. It's called Travelling Light. So they use traditional methods, but they're intrigued or interested in using new technologies for educational resources. The ideas is very young and unformed, but I'd like, somewhere in the next 12 months, to actually bring together Futurelab and Travelling Light through some sort of project. No idea what yet, I haven't thought about it, but there's something there that we might be able to bring forward. (Interview, 13 March 2003)

This illustrates the notion that one particular production endeavour fits within the broader context of an individual's experience. The need to connect with an audience, as such, can be taken as a motivation for work in production. More specifically, the DD's engagement with an audience of young people in a different spatio-temporal setting is acknowledged as an ongoing relationship that pervades his

experience, and which might come in handy at Futurelab at some point, although exactly how and when remains to be seen. The mere fact of acknowledging this source of potentially relevant experience indicates a form of continuity within which his role of producer seems to fit, rather than the producer-user relationship being a strictly punctual one based on a purposive impetus.

On the whole, the means whereby the producers come to know the users in order to increase the likelihood of successful innovation go beyond those engineered interactions that are trials, focus groups, workshops, etc. Their activities of mediation in production hinge to some extent on their previous or concomitant social experience.

One key figure of the reflexive user illustrates this further: the producers as learners.

6.3.3.2. 'Learners like us': producers as learners

In drawing on their experience, the producers make projections both in time and in space, to their previous experience as well as concomitant experience in social spheres outside the production process. The second set of quotes illustrates the producer's recourse to their various experiences as learners.

The Head of Production offers an initial example:

> I learned to use a typeroller, I learned logarithms and things like that... I've use the slide rule, I've never used the logarithms and I certainly won't use algebra again. And I didn't actually learn the fundamentals – but I do now understand a wee bit of it, where it could have helped me, but that was never communicated to me. It wasn't the solving of the algebraic thing, it was actually the process I truly got on board with. And maybe I did learn some of the process... So yeah, lots of things like that. **I'm really open-minded as to what our kids will actually need that will make their lives easier, more rewarding and enable them to, you know... 'equal opportunities'**. I do see that. But there's a lot of people I went to school with who maybe could have gone into drama or something like that, but they were just pushed down the wrong channel. There's a lot of people I know that are in drama, that shouldn't be there – that would have been much better as accountants. So it's equal opportunities in that way: that surely technology is going to stop us pigeonholing everything, trying to funnel people off in ways that restrict... You know, I've been bloody lucky that I've been able to work around the world and in doing that – and you've travelled a bit as well – you can go to new places and start again almost. And you don't carry a lot of baggage with you. I've done all sorts of things I never would have been allowed to do if I had stayed in this country and each of them has been a stepping-stone. So if you can get kids to understand that life is stepping-stones, then you might come from a deprived area and (...). (Interview, 29 November 2002)

The Head of Production reflects on his experience as a learner – and with learners he claims have been failed by the current education system – to make sense of his work at Futurelab. Although his conception that 'life is stepping-stones' stems from personal experience rather than theoretical foundations, it fits well with Futurelab's learner-centric principles detailed in section 5.2.1.3. In his view, technology is key in its capacity to 'stop us pigeonholing everything'.

The Chief Executive elaborates on the potential of technology to enhance learner-centric learning, and he also evokes his personal experience as a learner – this time in a professional capacity – to support his view:

> Chief Executive: (responding to question about Futurelab's will to place the learner at the heart of its activities): But there is a thrust in education towards learner-centric education. But of course meeting individual needs in a classroom, when you've got 30 disruptive kids, is not easy. But one of the joys of interactive media is – and I am not saying anything you don't know, I am just repeating – is that just as you do viral marketing with it, you do viral learning with it. It's like a game with various levels but it is much more than that, because the experience you get is responsive to your history, your attainment level, your preferences. (...) Teachers have a different role, they become guides – to use a cliché, 'guides on the side, not sage on the stage' – and even with young children, the idea is that the learning experience is more effective if you drive it. **My own personal anecdote** is about the BBC safety video, safety system. 10-15 years ago in the BBC, they introduced a safety system on disc, for learning safety. We had been subjected to really boring lectures by safety officers, and we all went to sleep. Now in this imaginative package, you are the producer/director, and your job is to identify the safety hazards in a scene. And you test them and find them. And if you fail, you get bad marks but that is not the point – you are shown footage from genuine accidents in filming, when people were actually badly injured. And it's your fault. You are then in a courtroom situation where you are responsible and found guilty. So in other words, suddenly instead of being subjected to a boring safety lecture where you went to sleep... **My approach, as a film director and producer, to safety was radically changed by that. In fact I would say that experience is one of the ones that gave me a sense – it must be 10 years ago now, or more – that interactive media had something very special to offer.** And I've often said that with the films I made, the choice of the audience was to go to sleep or not – end of message. (...) (Interview, 3 July 2003)

This quote raises two points. First, the CEO's own experience as a learner in a very specific instance while he worked at the BBC gave him a sense of the importance of interactive media in a learning context. Second, one gets a sense of the continuity or coherence from his role as a film director and producer to his role as producer of educational technologies: in both cases he aims to elicit interest and for the audience to get something out of his productions without falling asleep.

In response to a question about how he would set up a hypothetical course for producers of educational technologies, the Director of Learning also stresses his own

learning patterns in rejecting lecture-based pedagogy in favour of 'a need to know' approach tailored to individual learners:

> But the brief for those [workshop as part of this hypothetical course in educational new media] would be challenge and stimulation rather than didactic presentation. **That's the way I've learnt my business essentially**. And so in self-reflection, I've never done well in lectures and lectures have never done well for me. Whereas working in workshop environments and having to go away and do things on a need-to-know basis gives me much more sustained... that gives you the opportunity to learn how to learn. To know when to ask questions, to know who to ask questions of, to know where to find answers. All these issues to me make for a much more interesting course. (Interview, 15 March 2004)

The above comments underline the considerable importance of the producers' experience on their general conception of how learners can and should be engaged through educational technologies. The producers' role of reflexive user (in this case as learners) also plays out in discussions around specific projects. For instance, the Head of Design argues that Futurelab's projects should not be tailored according to age groups, but rather 'levels of understanding':

> PR: And I've been told – I don't remember by whom – I've been told that you were really into children or youth culture in a way. Is that true and what does it mean?
> Head of Design: That I am a child, is probably what they mean (laughs). I don't know what that means.
> PR: I'll have to go back to my sources and verify... But I was told, perhaps it's reflected in your enthusiasm and approach to things, where perhaps you have the capacity to think as a young person would...
> HD: Yeah. What I always say is that, I think there's levels of understanding in a lot of things, as opposed to age. And I think that I've got quibbles about society and one is that people are ageist. I think that's atrocious. And that people are very much short term, in terms of their mentality. And I think that bears itself out in the way the economy is handled, and in the way society is handled. And in terms of the projects we are doing, a lot of the time, like with [the Size Matters project], that can hit levels of understanding as opposed to (in goofy voice) '12 to 15'. Within the science area, my level of understanding, and I'm 37, would be 12 to 15, because I lasted science, formal science training, with my O-levels when I was 15 or 16 years old. So that might be what people mean. (Interview, 6 May 2003)

In deploring the fact that 'people are ageist', the HD argues that there are levels of understanding that transgress age – this effectively allows her to conflate her own experience as a learner (of science in this instance) with that of Futurelab's target audience for the Size Matters project. Indeed, her own knowledge of science is, despite her age, at the level of 12-15 year-olds because she lasted to O-levels. Although she says so somewhat jokingly, this narrows the age gap between herself and Futurelab's audience, notably in her colleagues' eyes ('That I am a child, is probably what they mean'); it adds to her sense of entitlement to contribute to the production process where the users are concerned.

Such correspondence also plays out on a more generic level. Indeed, another way in which the producers conflate themselves with the end users by bridging the age gap, is in establishing a correspondence between childhood and adulthood. Interestingly, this enables them to justify both demanding learning tasks and their opposite, i.e. leisure activities devoid of learning outcomes:

> Researcher: (...) A lot of our projects if you look at their face value is that they contain real little in the way of content and I think that's because a lot of the time our thinking is that children have too much content force-fed to them so the brain is just going to soak it all up like a sponge. Which clearly it's not going to. I mean, who works like that? We don't work like that. We're adults – we know quite well about how we learn and how we do things. You know, we accomplish things through processes, not just by being spoon fed it. (...) (Interview, 15 March 2004)

Similarly, the HLR argues:

> Head of Learning Research: (...) I think that the notion that kids just want to have fun is hugely problematic, because we see quite a lot of kids that actually want to learn things. There's a phrase from MIT which is 'hard fun' – it is a really nice phrase, because it is about something that is challenging but that moves you forward.
> PR: As opposed to 'stealth learning', which everybody seems to hate...
> HLR: Oh yeah, we don't... I bloody hate stealth learning. Hard fun is a much better description. And to refer to this... and not just thinking about myself, but I think about the other people I know who are adults – we get really bored, don't we, if we feel we're not getting anywhere? If you feel you're stuck in the same place. And I don't think it's because I have some kind of puritan work ethic, it's nothing to do with that. It's to do with a sense of self-developing, and wanting to pick up new things. (Interview, 26 March 2003)

Later in the same interview she reiterates the amalgamation of adulthood and childhood, this time emphasizing children's 'entitlement to trash' in a discussion about Futurelab's Digital Childhoods conference:

> I got out of [the conference] seeing Emma Hoon, who created the TV programmes that I grew up with, which was just great. She presented the idea that children should be allowed to have rubbish – they should be allowed to have time when they're just messing around and when it's just complete rubbish. And adults might hate it, but they should be entitled to it. I quite like the notion of entitlement to trash, because as an adult, I require my trash on a regular basis and I just don't see why children should have to spend their entire time being po-faced and virtuous and learning things that are good for them. (Interview, 26 March 2003)

Perhaps the most eloquent conflation of producers and users is uttered by the Chief Executive in discussing the balance between 'giving the users what they want and giving them what is good for them':

> PR: But at the very least, you feel you have a responsibility much like the BBC has, in terms of public service remit? You have a consistent concern of striking a balance between those two elements. The concern of giving them what is good for them, whatever that might mean, is always there. It's not just 'let's give them what they want', as you might do in the commercial sector...
> Chief Executive: Well that's interesting. That's very interesting. I mean, if you go to the science centres these days some of them have places where you record your views on something in science, and it tells you what the majority think. There are even television shows that say 'what does everybody, or this studio audience, think is their favourite leisure time activity?' Cooking... **The right answer is the majority answer. And that of course goes right against those of us who think that education should be about challenging things and teaching people to think for themselves.** So when you say 'what's good for them', you know, looking at science is quite interesting. [Explains that a scientist has just published findings disputing the heretofore consensual role of the Gulf Stream in creating Britain's warm climate.] It's quite nice to think about science in that way, the idea that everybody has learned that this is a fact. It asks you, it raises questions about evidence and so on. It's really interesting, because it's not 'here is the received wisdom, it is good for you to know it'. (...) But what is good for you may not just be the received wisdom, but this is how it was discovered, this is how it can be challenged. You'll only get far in science if you actually are prepared to challenge your assumptions. (...) **So what is good for people? Is it to produce creative thinking, challenging, independent thinkers who might march against Tony Blair tomorrow for instance [in the historic February 2003 anti-war demonstration in London], as I shall, or is it in fact to make 'good citizens' who wouldn't even think that a paedophile might have parts of their humanity in him? You know what I'm saying? You know, what is good for you? Is it independent thinking that can be quite challenging and disturbing? Or is it going along with received wisdom? I don't know. You say 'what is good for you' – I don't know.** [As part of same answer, after talk of role-playing in the classroom, he continues:] We actually, I think, need independent thinkers and that's what is good for you. But the independent thought might be quite different form mine or yours or anybody else's. (Interview, 14 February 2003)

One notes the way in which the CEO conceives of the ideal user (or learner): as someone capable of independent thinking, who questions the received wisdom. Indeed as a moral being in his own image – he can see himself marching alongside these ideal critical thinkers in protest against Tony Blair – despite his assertion that 'the independent thought might be quite different form mine or yours'.

Such invocations of one's experience and the identification with the users serve to demystify, incrementally, what the HLR calls the prevailing 'cultural construction of childhood as this separate space that nobody knows'. They bring the producers closer to their intended audience, in this instance, by defeating the temporal gap between one's current status as producer and one's former role of learner, and between childhood (HLR: 'once you've left it, you've left it') and adulthood. On the whole, the recourse to experience helps the producers to give sense and direction to the technological endeavour, whilst in some specific instances, it makes the reflexive user a more trustworthy stand-in for the absent users.

Interestingly, three instances of 'producers as learners of French', involving different individuals, illustrate further the role of the reflexive user. The first indicates the DD's belief that learning is hard work and his scepticism towards the use of games for educational purposes, thereby disputing the Researcher's earlier claim that games already favour learning outcomes without being 'about education' in the first place:

> Development Director: My view on games is that we need to find what elements of games are attractive, engaging and use those elements. In terms of why people play games, it's because they're fun and they don't have a sense of hard work on the whole.
> PR: 'Stealth learning'?
> DD: I really hate that term and I don't think it's useful. The reward for your achievements in games is so much more immediate than is useful for most educational purposes. Most of the things I've learned and value have been hard to learn. And I value them because they are hard to learn. It's not what most people would view as fun, but it is rewarding. Like to remember all the conjugations of French verbs – it's bloody hard work, but I don't think there's an easy way of doing that. There are other ways of making it more engaging and more rewarding while you're doing it, but it is hard work. Trying to make education fun is dismissing the notion that learning things can be bloody hard work at times, and that it's always going to be bloody hard work with some things. (Interview, 13 March 2003)

The DD's scepticism of games, and his dismissal of the trendy concept (in educational circles) of 'stealth learning', do not stem from theoretical knowledge, but rather his experience as a learner of French. For him, games involve instant gratification, whereas learning can be 'bloody hard work' at times, and, hence, much more rewarding.

The Researcher also invokes his experience as a learner of French, to highlight the need for, and difficulty of, providing teacher support as well as technology to assist learners:

> (...) [B]y the year 2007 most primary schools are going to be teaching another language to children aged 6-7 and up. But there won't be as many teachers who know another language. So one thing is computers could be very useful, but only if they support the teachers as well as the kids, because half the staff won't know another language. It's not like you'll be talking long, complex French sentences, obviously if you are teaching to young children you keep it simple, but God – I am educated and I don't have a clue about French and I did it all the way through GCSE. (Interview, 30 June 2003)

Here, the Researcher is merely highlighting the strain that will be put on both learners and teachers if indeed second languages are taught early on: he is educated but still had a hard time with French as a second language – so imagine the task lying ahead of 6-7 year-olds and their teachers.

The last instance of producer as learner of French features the Head of Design, who voices her entitlement to contribute by stressing her own competence with regard to learners. It is taken from a strategy meeting in which the Futurelab core staff discuss the need to share a common pool of knowledge about the users in order to simplify the decision-making process. It shows how the Learning Team's claimed expertise with regard to learners is contested by others, based on their own experience:

> **Development Director**: The difficulty is when we come together for a project meeting and we are all making decisions about things that aren't particularly our field. So either we spend time to become competent to make those decisions, or the other solution is we actually put into that meeting people who are competent, that aren't necessarily from inside Futurelab.
> **Head of Learning Research**: I think the notion of competence is really interesting, really, because arguably you can put 8 competent people in a room and they still won't agree. So I am not sure that necessarily the external solution is...
> **Head of Design**: And for instance, in terms of modern foreign languages, I feel totally able to make a really sound contribution, and I've been vocal about it, in terms of learning French. And I'll go head-to-head with [the Head of Learning Research] on that, because I can't speak French and I desperately want to, and [she] is fluent. I am a learner and I want to be helped to learn, so I really would jump on that one, because I know from my perspective, I know what is going to help me and what works for me and other people in my class. (Strategic Directorate Meeting, 30 June 2003)

Here, the Head of Design stakes her claim as a more credible source of user-related knowledge on her own experience as a learner of French, while the Learning specialist's credibility in this specific instance is undermined by her fluency in this language. In this case, one producers' claimed membership of a relevant user sub-group – learners of modern languages – is staked as having greater weight than another's vast theoretical knowledge of learning. So who is the expert in such a case? The key point here is that the criteria for access and contribution to decision-making are perhaps related, but in a non-necessary way. Of course the Head of Design was recruited for her technical abilities – but this does not tell the whole story in terms of her contribution to the process of production.

6.4. Summary

This chapter has focused on the forms and uses of user involvement. Ostensibly, the imperative of user-related knowledge is expressed through claims for the direct involvement of actual people (learners, children, parents, teachers, etc.) in Futurelab's activities. This is exemplified by the enrolment of children as 'co-designers', a priority clearly stated in the organization's second business plan and echoed in the interviews.

However, discussions and debates within the lab reveal that such direct interaction is but one variant of user involvement, which is perhaps superseded – brought about, even – by forms of indirect involvement. Here, it is argued that the producers are best conceived as 'experience-based experts' – in representing the users, they draw on their experience in previous and concomitant social contexts.

The key observations made throughout this chapter are summarized in table 6.1 below.

Table 6.1. Key empirical observations made in Chapter 6

SECTION HEADING	PAGE	KEY OBSERVATION(S)
6.2.1. Who should be involved? The tension between openness and constraint	168	Direct user involvement as ideal; users do not have all the answers; FL must remain in charge of this normative endeavour based on principles of pedagogy and social values; FL seeks out like-minded partners or attempts to persuade others; Assessment of useful functioning as closed process, part of what the DD calls 'steering the future'.
6.2.2. The forms and uses of interaction with the users	173	User's contribution is staggered, punctual and controlled by the producers: validation, turn-taking and reality check, NOT co-design proper.
6.2.3. This is not science: objectivity, reflexivity, correspondence	176	'No Eureka! moments': production is not about what producers do not know, but what they do know. Not 'anything goes', but rigour and 'rightness' in FL's methodology; Openness and constraint with regard to user-related knowledge: small-scale fieldwork and non-purposive interactions; recourse to experience and reflexivity.
6.2.4. More or less purposive interaction: the importance of seeing kids	180	Representativeness of user sample has methodological limitations but is not an epistemological issue; Fieldwork meant to establish useful functioning not mass scientific validity; no correspondence in STS terms; School visits allow producers to 'keep in touch' with users and stress importance of f2f interaction in non-purposive contexts.
6.2.5. Acknowledging and living with uncertainty	184	Uncertainty is countered by producers' recourse to experience and reflexivity: their ability to 'think as a child' and a 'we know best' attitude.
6.3.1. Technical awareness, not expertise	187	As far as technical knowledge is concerned, the producers exercise interactional and referred expertise, not contributory expertise as such; As far as social knowledge of the users, contributory expertise is more widely claimed and embraced.

CHAPTER 7

ANALYZING PROBLEMATIZATION AND EXPERIENCE-BASED EXPERTISE

7.1. Introduction

In this chapter the empirical data is discussed in relation to the theoretical and empirical questions. The theoretical question asks: how can one account for the producer-user interface as it manifests itself in production, without positing the direct involvement of users? It is investigated through the following empirical question: who is involved in the technical decision-making process in new media production and in what capacity? The empirical question addresses both the modes of involvement (direct or otherwise) of actors in production, as well as their substantive contributions and the specialist knowledge and expertise that may be said to accrue from these. Both dimensions correspond respectively to the theoretical sub-questions stated at the outset: 1) What (social) mechanisms take the place of direct user/audience involvement in the absence of actual audiences/users and how do these mechanisms shape a technological endeavour? 2) What do these mechanisms tell us about the claimed specialist knowledge of producers and established notions of expertise?

Accordingly, the analysis comprises two thematic sections, in line with the above sub-questions and the hypotheses formulated in chapter 4 (Methodology and Research Design). The first attends to problematization and its ramifications; the second to user involvement, experience and expertise.

7.2. Problematization and its ramifications

In response to the empirical question 'who is involved in new media production and in what capacity?', the first hypothesis states:

Hypothesis 1: Producers and relevant social groups are involved; the former directly, the latter in a mediated capacity. The producers' perceptions of relevant social groups shape the endeavour from the outset.

This hypothesis speaks to the need to locate inquiry upstream from the materialization of an artefact or product, in order to address in all its richness the producer/user interface as it is experienced by the producers, from the earliest possible point in time. The concept of problematization allows one to sidestep the 'use bias' and 'overstated co-design' enforced in 'users-as-designers' approaches (cf. section 2.5).

In so far as problematization consists of the concomitant definition of a technological endeavour and its stakeholders (cf. section 3.4.1), the responses elicited from the Futurelab producers indicate that it is a process which continues well beyond the organization's inauguration and is of crucial importance throughout its first year.

In Callon's (1986; 1991) conception of problematization, the initiators of a technological endeavour first define a project's purpose by formulating questions on the state of the world (e.g. '*how can scallops be made to attach themselves?*'), and then set out to enrol relevant groups in order to bring that project to term. In the latter instance, they seek to convincingly define the concerned actors and their interests and, in so doing, to argue that these interests will be best served through the acceptance, by all concerned, of the proposed research programme or technical artefact. Put simply, a project must be formulated in such a way as to entice those parties thought to be necessary to its realization.

In Futurelab's first year, this sequence is blurred. As I argued in Chapter 4, for the producers a key issue in this timeframe is the interpretation – indeed, the redefinition – of Futurelab's purpose and objectives as formulated in its founding documents. These had framed Futurelab as a production facility with a somewhat secondary learning research component. It was originally assumed that Futurelab's main stakeholders – potential commercial partners and the education sector – would buy into this arrangement. But as analysis moves beyond such prospective texts to the actors' efforts to instantiate Futurelab, one finds sustained self-questioning and debate around 'what the organization is for' and 'who[m] it is for' (HLR).

Futurelab's 'internal soul-searching' (CEO), or 'need to have the big long conversations' about its purpose (HLR), is brought into focus by the producers' perceptions of the lab's stakeholders which inform the endeavour from the outset. Whether this scrutiny is 'real', i.e. revealed to the producers in dealings with potential partners, or 'virtual', i.e. a residue of their previous experiences in either the commercial or education sector (HP: 'Maybe because I come from a production side, I think that Academia will continue to go round and round in circles...'), it exerts pressure on the producers. This is captured by the perceived urgency 'to be seen to be doing something useful' by Futurelab's constituencies (HLR), of 'being seen as (...) doing things properly' (DD), 'to show' outputs to potential partners as soon as possible (DCE, PM) and to 'deliver on what everybody thinks [FL] is already doing' (HP). The Researcher describes this situation as a 'self-perpetuating circle' – the matter of where and how to start Futurelab's activities is problematic.

As later summarized in Futurelab's second business plan, the producers at this point are in danger 'of trying to be all things to all people' and 'of chasing the money'. They are in need of 'sharper focus' – the resolution of Futurelab's soul-searching was deemed necessary to the establishment of the lab's process and outputs and, ultimately, its success in the eyes of the producers. In Chapter 4, two points helped to illustrate this.

First, for the producers, the matter of establishing a purpose and practicable methodology is not just one of technical efficiency or necessity, but rather a dilemma to do with stakeholders. As any specific arrangement of process and outputs may be received favourably by one group of potential partners while alienating another, it involves a perceived trade-off in terms of Futurelab's legitimization. Thus, the 'perceived scrutiny' of Futurelab's 'potential-partners-as-stakeholders' informs the producers' decisions as to which type of activity, between prototype development and learning research, should take the lead and be displayed as Futurelab's main feature. The producers envisage two options in this respect and both entail 'opportunity costs': it can project the image of a production laboratory with a (somewhat secondary) learning component and thus be embraced by industry, while possibly alienating the education community; alternatively, Futurelab can favour learning research and be seen as a research laboratory with the capacity to produce working prototypes. In this

case, it is more likely to make inroads into the education community, but industry would need persuading as to how it could benefit from associating with Futurelab in a context where prototypes are not a necessary outcome.

According to the producers, both relevant groups hold competing conceptions of education: for the former, it is a market; for the latter it is a public good. Crucially, this implies competing conceptions of the role of children. Although both industry and the education community may want 'children to know everything fast and without problems' (HLR), what this entails in the context of educational technology production depends on either perspective. What does industry want? 'To get their stuff into schools' (HLR); therefore they want users for their products, plain and simple. What does the education community want? Better, more effective learners which may in fact mean not using technology at all, i.e. not becoming users. Needless to say, the latter prospect is not attractive to commercial partners. Yet, because of its funding structure, Futurelab needs to bring the two stakeholder groups together.

In the end, the producers chose to make learning research Futurelab's main feature. This turn of events can be appreciated in the light of the second key point that illustrates the interdependence of audiences, process and outputs: the producers display a strong awareness of, and commitment to, a further stakeholder group – the learners, or children ('users-as-stakeholders'). They express this commitment in response to open questions about Futurelab's stakeholders (which make kids a key concern), but it also emerges in discussing the lab's attempt to balance social and economic imperatives, such as when discussing the 'Hollywood of education' allegory (cf. section 5.2.2.1). In both cases, the producers effectively instate an opposition between the interests of both stakeholder groups, children/learners and commercial partners. On the whole, the issue of determining the long-term outcomes of, and who should benefit from, Futurelab's activities, has the hallmarks of a moral dilemma for the producers – whose interests are they 'looking after' (HLR) – industry's or the users'?

Such questioning precedes, or at least is seen to underpin, the discussion of specific technical options. Hence, Futurelab is engaged in what might be termed '*fundamental problematization*' – an open-ended process of negotiation of the social groups deemed relevant in the context of educational technology production, and

which pervades the endeavour. The producers first define relevant groups, they consider their wants and needs and they order them according to their priorities; they then seek to shape the endeavour accordingly. But 'shaping' is not taken in a sense consistent with the 'users-as-designers' approaches of Chapter 2 (section 2.4). Here, shaping and determination are less a set of specific technical prescriptions, and more a set of broad considerations that make some outcomes more likely and others less so.

One corollary of 'fundamental problematization' is that Futurelab's purpose and its stakeholders are not just defined concomitantly, as in Callon's theory (cf. section 3.4.1) – here, they are effectively conflated by the producers. This emerges in their responses to questions such as 'What is Futurelab about', in which social motivations and the projected users figure prominently: Futurelab exists 'to make models of how the world could be different' (CEO); 'to make the world a better place' (HLR); to help 'bring about equal opportunities for children' (HP); and to 'increase human happiness' (DL). The conflation appears more sharply when discussing stakeholders, the producers spontaneously expressing a disdain for the commercial interests of those whose money Futurelab needs, reiterating instead their commitment to the well-being of children and learners, and society in general.

For the producers, the social transformations they hope to bring about outweigh the organization's economic and technological role. The language they use indicates their sense of having a personal stake, and of their active engagement, in the Futurelab endeavour: '[the current system] worries me' (DD); 'I would love for us to have some impact on learning...' (DCE); 'I want a complete change in the national curriculum...' (HLR). They also invoke their personal experience to justify their involvement in Futurelab (HP: 'maybe it will make a difference to my grandchildren'). In several instances the producers spontaneously suggest that Futurelab's social objectives and its commercial objectives are in opposition to each other, or at least that they are a source of sustained and in some case paralyzing tension. This latter rhetorical device was common, as in relation to the 'Hollywood of education' analogy and the producers' perception of Futurelab's stakeholders.

The conflation of purpose and stakeholders expands the notion of problematization and it contrasts with the accounts typically found in studies that

employ translation (e.g. Law and Callon, 1992) (cf. section 3.4.1). As mentioned above, in such studies the initiators of a given endeavour first set out questions on the state of the world to which a specific artefact is a posited answer. They then attempt to enrol potential partners in the production of this artefact by defining it in terms that express the stakeholders' specific needs and interests. It is through this rhetorical exercise that 'the technical' and 'the social' are claimed to be bound in a seamless web (cf. section 3.2.1).

In 'following the actors' in the early days of Futurelab, it appears that the producers do not so much construct socio-technical ensembles in order to bring about a technology, as deconstruct them in order to bring about social change. Indeed, the shift to learning research I recount suggests that, from a starting point which effectively blurs the boundaries between 'the social' and 'the technical' – Futurelab's stated aim of producing educational technologies combines genuine social concern with a conviction of technology's potential – the producers' commitment to a greater social good and to their projected users emerge as the crucial elements from which technical choices are assumed to follow.

This conflation of purpose and stakeholders is in line with Pacey's (1999) 'humanist approach' to technology production, which calls for an understanding of 'how human purposes, aspirations and relationships work themselves out in technological contexts over time' (1999: 11) (cf. section 3.3.1). Futurelab can sensibly be termed a 'technological context'; but it stands to reason that the producers' purposes and aspirations, as expressed in the timeframe of problematization, have roots quite apart from technology. That is, they are not confined to the scientific or technical realm in a first instance, with the expectation that social shaping will follow, such as when STS studies define a project's purpose ('to build a lighting kit'; or 'to make scallops attach themselves'; etc.). In the kind of endeavour that is Futurelab, at this stage of its development, the social and the technical are ostensibly untangled and ordered by the actors, as ends and means, respectively.

Prevailing social constructionist theories – especially proponents of 'general symmetry' (Latour, 1993) – might argue that such an ordering of the social and the technical is a fiction. After all, Futurelab's *raison d'être* has as much to do with

technology as it does education. Perhaps it is a fiction from a macro-social standpoint. But from a micro-social one, it is what Entman and Herbst (2001) might call a 'useful fiction'[70] – one that is entertained by the actors rather than being an artefact of retrospective analysis and which gives sense and direction to their activities as they carry them out. It has ostensible consequences for organizational development and output, as my empirical account illustrates.

However, one key instance emerged which can be seen to undermine the producers' attempt to order social and technical elements as ends and means: their endorsement of learning-by-doing as a way to move the endeavour forward. As discussed in section 5.2.3.2, the producers' endorsement of learning-by-doing (i.e. to learn from the production of prototypes) stems from a rejection of technical determinism and a guarded belief in the potential of technology. Following innovation scholars such as Nelson and Winter (1982) and von Hippel and Tyre (1995), learning by doing can be seen as a way of coping, *by default*, with the complexity and uncertainty that characterize innovation. It is an iterative process in which producers default to the reaction of the users to the affordances of a developing technology. It is arguably a 'technology-driven' process in that the technical affordances are the independent variable (so to speak) which one controls in order to elicit user response (dependent variable).

Learning-by-doing appears to serve such a purpose at Futurelab. Whether the producers see this as an inevitable concession to technology or as a deliberate and selfless way of involving the users in production is unclear on the basis of the gathered data. Either way, in the context of this study a broader theoretical point can be made: for the producers, learning-by-doing effectively devolves responsibility to the projected users in the production process.

In sum, problematization is usefully expanded by the inclusion of 'users-as-stakeholders': the social groups perceived to be relevant to an endeavour comprise not

[70] Entman and Herbst (2001) use the term to describe public opinion, by which they mean 'the loose, usually undefined, and thoroughly protean term used by just about everyone from academics to journalists to citizens and politicians (...)'. In their research, treating public opinion as a useful fiction entails an epistemological investigation of public opinion (what it is) as well as the strategic context of its use (by politicians, the media, academics, etc.) – an exercise similar to my investigation of audience/users.

only the partners one seeks to enrol (Callon, 1986; 1991), but also the ultimate, 'hypothetical' (CEO) beneficiaries of one's activities, whose interests one takes account of without having to enrol them as such. This is most clearly illustrated by the CEO's statement that Futurelab is 'not able to give people instant returns on their investments, and there is a tension there but at the same time, it's very good to be anchored into what the people really want, this is what the market is'. As reported in section 5.2.1.3, such a view pitches against each other two conceptions of stakeholders and 'what they want': the 'potential-partners-as-stakeholders', who want instant returns on their investments; and the 'users-as-stakeholders', who, the producers claim, want the means to enhance learning and education.

The producers' concern with children/learners is more a form of allegiance than a simple awareness, and in order to move production forward, the producers feel they must take sides. But it is not enough to say the actors 'prioritize' or take sides in the matter opposing their two main stakeholder groups, for the producers continue to believe that commercial partners must be enrolled in the endeavour. The trick is therefore to combine the two.

For Callon (1986), problematization entails the 'interdefinition of actors' (cf. section 3.4.1): it validates the identity and interests of the concerned actors, as well as that of the project originators themselves – as obligatory passage points, that is, as the indispensable actors without whom the enterprise would fall apart. In this study, the producers seek to make Futurelab an obligatory point of passage in the field of educational technologies but their efforts to influence and enrol others precede the determination of specific technical artefacts. Therefore, technical mediation (cf. section 2.6), i.e. the use of a specific artefact as a reference point for negotiation, has no currency. Here, it is the projected users of these as-yet-undetermined artefacts who are crucial to Futurelab's efforts – indeed they are built into the very fabric of Futurelab before ever becoming active agents in its activities.

Akrich (1992; 1995) has discussed the role of the users in problematization. However, as indicated in section 3.4.1 of chapter 3, in her model the producers invoke users in order to get support for a product – in this case a lighting kit – that did not yet have a market. That is, once a product exists, it becomes a matter of determining the

right setting for its use and modifying the artefact accordingly. The case of Futurelab introduces a variation to this process. Here, in the absence of a specific artefact, the Futurelab producers invoke a potential market (education) in order to get support for potential users (learners) without a product (educational technology). If Akrich's model is one of technical mediation, then what is described here may be termed 'social mediation in a socio-technical context.'

Beyond the specific wants of the two main social groups relevant to the Futurelab endeavour, this study stresses the relationship that binds them together and with Futurelab. Four instances were noted in which the producers describe Futurelab's two stakeholder groups in the same breath (conflating them in two cases), only to subsequently break them down into two groups to be addressed in sequence (cf. 5.2.2.4). In the first instance, the CEO deplores the impossibility 'to give people instant returns on their investments', yet states that 'it's very good to be anchored into what the people really want, this is what the market is.' 'The people' designates partners in the first instance, and then the users. Similarly, the DCE states that Futurelab must address 'market needs' – a term which applies to the end users at one moment and to Futurelab's partners seconds later. The DD speaks of Futurelab's two key 'audiences' – the first consisting of partners, who must be engaged in order for Futurelab to gain influence in its field, and the second comprising the projected users, who cannot be involved 'yet'. Lastly, the HLR summarizes Futurelab's dealings with its stakeholders as a process of ongoing 'formative assessment of the partners', rather than 'summative assessment of the users'.

These examples indicate that the producers keep both audiences in play simultaneously, while also illustrating the pragmatic need to engage with them in sequence. This is endemic to this study's conception of mediation and it was referred to section 5.2.2.4 as a 'two-step flow' model of influence which the producers knowingly enact. They must first convince partners of the advantages of coming onboard and the projected users, or Futurelab's 'hypothetical market' (CEO), are key to this.

Indeed, the argument here is that the object of mediation between Futurelab and its potential partners is not an artefact as such, but people. More specifically, the children and learners, which the producers define as a potential market for its partners

in order to bring them onboard. By most accounts given by the producers, this is the key asset Futurelab can put forward to entice partners. Thus, mediation rests not on technical knowledge, but, as the DD suggests, social knowledge – 'what [Futurelab producers] know of the outside world' and 'what the future of learning with technology should be'. In the DD's words, the objective is to gain influence in interactions with potential partners – which the producers do by displaying their knowledge of this potential market – in order to ensure that Futurelab may exert influence in the social field of learning in the long term.

There are various ways in which Futurelab's producers go about this, such as marketing methodology or process. One vivid illustration of the way in which Futurelab displays its relationship with the future users in order to entice partners, is provided by the use of so-called 'Hallmark moments' (HLR) (cf. section 5.2.3.4) – images of Futurelab engaging with children 'in the wild' (Callon, 2004) or in a laboratory setting. The purpose of this 'collateral' (DL) output of Futurelab's research activities is to provide potential partners with 'something much more tangible [than research] to buy into us' (DCE), giving them a sense that they are closer to their intended market. This process was likened to, in the Head of Production's words, 'the donkey chasing the carrot' trick – Futurelab's producers 'bend the rules a bit over what [they've] achieved' in order to then 'live up to it'. That is, they display to their partners the users which they subsequently attempt to bring onboard.

However, talk of 'Hallmark moments' also brings into focus the tension the producers perceive between branding and honest research. More specifically, branding – in so far as it is defined as the establishment of a link in the minds of audiences between a brand name and a set of specific products and/or values – is seen as a hindrance to the ideas development cycle, at least one that is genuinely open and socially-grounded. In contrast to branding, there are various instances where the producers evoke the notion of variety – the DCE's comments on variety in technology (the risk of being typecast), the DL's comment about variety in points of view expressed in Futurelab documents (embodied by his endorsement of the 'seminar mode'), the Researcher's view on variety in methodology. Here, variety is not a means of fostering innovation *per se* (as the term is typically employed in innovation studies), but rather to ensure Futurelab is not perceived as subservient to any interest outside

those of the learners (cf. 5.2.3.2). Thus, variety is an ethical or moral safeguard to be displayed to 'the outside world' as part of the Futurelab brand, as much as it may be a means of getting useful information about the users.

On the whole, the 'interdefinition of actors' appears to go beyond defining potential partners and Futurelab itself. Upstream from the production of a specific artefact, there is a three-way relationship involving Futurelab, commercial partners and the projected users, through which all three groups are defined: commercial partners as a necessary source of funding and technical knowledge for Futurelab; projected users as ultimate stakeholders for Futurelab and potential market for commercial partners; and lastly, Futurelab as obligatory passage point in the field of educational technologies and mediator between commercial partners and projected users. This conception means it is Futurelab, as mediator, which brings and holds the network of relations together. This is in line with the discussion in chapter 3, section 3.4.1.

In this sense, the idea of 'formative assessment of the producers' (HLR) and the need to first engage the partners in order to bring about social change for the learners (CEO, DD, DCE), fittingly encapsulate the process of production prior to actual users taking part. Indeed, following Gans (1957) this can be seen as a form of 'prior feedback' (cf. section 3.3.3) through which the partners obtain a useful glimpse of their projected users, only not from them directly, but through Futurelab. As early production is concerned, such a process of mediation seems a more adequate depiction of the means whereby user-related knowledge is gained than that contained in Woolgar's (1993) concept of 'black-boxing the user', MacKay et al's (2000) 'ambassador users' or von Hippel's (1986) 'lead users'. These posit feedback mechanisms involving *actual users as user representatives* – either actual users deemed representative of a wider population (Woolgar, MacKay et al.) or users of existing technologies deemed relevant to the one being developed (von Hippel). In this study, the producers' arguments and attempts to entice partners unfold independently from a specific technological project – the users are merely a projection at this point. They are the object of mediation. One might say they are a 'useful fiction' to the producers.

The hypothetical status of the future users does not seem to be an epistemological issue for the producers – indeed they are driven by a belief and conviction that they exist and have tangible needs. Rather, the issue is a methodological one: demonstrating these needs so that others may recognize them as such and decide to contribute to the enterprise. The potential benefit to commercial partners is a deferred one that can only materialize if they are willing to 'think about the future', which they are hesitant to do.

The problem may be posed in terms of the prospective establishment of useful functioning, that is, the assessment of whether a technology will work and for whom (cf. Bijker, 1995) as is discussed in sections 3.2.4 and 3.4.1. In the Social Construction of Technology (SCOT) paradigm, one assesses the real or anticipated useful functioning of a pre-determined artefact: its technical features are used by both practitioners and analyst to anticipate social effects and consequences. In contrast, as we have seen throughout Chapter 5, at Futurelab the technology variable is as yet undetermined. However, producers have a clear sense of the relevant social groups any artefact they design should work for: industry, education and the end users. For them, it is all a matter of bringing them together. The solution to the producers' moral dilemma lies in rhetorical, if not technical, closure: Futurelab must provide assurances that children will indeed become a viable market.

The Development Director believes that the challenge for Futurelab lies in the bridging of two distinct definitions of success in relation to educational technologies (cf. section 5.2.2.3): a commercial conception premised upon the production of artefacts and their adoption by users ('did people use it, enjoy it and get something out of it?'), and a more social one that need not involve such tangible outcomes at all ('does it challenge our thinking on what education is and could be?'). The former corresponds to industry's priorities, whilst the latter fits with the education community's priorities. As the DD states, the two means of assessment 'are completely separate.' But in order for Futurelab to establish itself in the field of educational technologies, it must reconcile these two conceptions and their attendant stakeholder groups. As the CEO puts it: 'Even if we don't do the final production, [prototypes are useful to show] that we can originate concepts that can change the world of education

and make money for somebody. Because that will attract private and public money in the future.' (cf. section 5.2.1.4)

In sum, the producers' role seems to rest on the mediation between the wants of partners and those of the market, between the present and the future. The CEO suggests that the enrolment of the former depends upon the enrolment of the latter, and vice-versa. That is, for commercial partners to come onboard and contribute to the production of artefacts, children must become users and thus provide a viable market; for the children to become users, commercial partners need to have been enrolled in order for artefacts to be produced. To the designers this is a 'chicken or egg' conundrum, or a 'self-perpetuating circle' (Researcher).

In Akrich's (1992) model of technological inscription, producers make hypotheses and predictions about the social world in which their objects are to be inserted and they set out to 'inscribe' these projections into their artefacts (cf. section 3.4.1). Yet, Futurelab's progress in the early stages is held back not by indecision as to specific artefacts or technical options *per se*, or by strict business objectives, but by a more deeply-rooted problem: the absence of a common set of values that would guide the whole of Futurelab's activities. In the light of the views expressed by producers at Futurelab, projections are made independently of a specified technological product – that is, they are generic rather than specific. Furthermore, the account in chapter 5 indicates that projections as to the contexts of use and the users, are not simply descriptive – they do not appear to consist of mere hypotheses or disinterested predictions about the social world. Rather, they seem to be geared to shaping the social world in line with the producers' values, beliefs and convictions. In short, they are part of a normative undertaking (Gow, 2003).

The CEO's comments reported in section 5.2.1.3 stress this normative dimension. Truth claims about Futurelab's market, whether contemporaneous ('what people really want', 'things that actually work') or projected, seem to go hand-in-hand with, and even dictate, what those involved in production 'ought to be doing'. In other words, inherently contestable claims about a hypothetical market appear to validate certain courses of action in the present. It is revealing that Futurelab is anchored in two concepts the validity of which is highly uncertain: 'what the people really want' and

'what schools and the DfES *ought to be doing*'. This stresses the role of projections in the process. In a related vein, the concept of 'useful functioning', as it appears above, hinges on the normative assessment of designers, and not (exclusively) the perceptions of users – one must produce 'things that actually work', and these may or may not overlap with what '[users] think they should have' [like coffee-table books]'. In other words, it is not simply a matter of building artefacts in direct line with the expressed wants of children. This suggests a distinction between legitimate and illegitimate wants and needs, and the idea that the producers are the ultimate arbiters in such matters.

The producers employ two related tactics in order to move forward: in line with their normative outlook, they make projections as to the needs of users and of society in general; and in line with their strategic imperatives, they set out to persuade partners. Both the strategic and the normative aspects are bridged by the question 'what do people want and/or need?' and the ensuing need to bring these stakeholders together. Such are the dynamics of mediation: it involves the prospective assessment of 'useful functioning' and 'rhetorical closure', rather than the establishment of useful functioning and technical closure in the use phase.

Here, the ultimate arbiters of a technology's 'working' are not internal to the production community, yet they are explicitly acknowledged as such by the producers from the very outset of the innovation process. In essence, individuals who are outside the 'community' of designers can be a party to the closure of an artefact, albeit in a *mediated* capacity. Conversely, those individuals who enact the mediations can be envisaged as aspiring to the status of 'experts' with regard to the users in that they claim to possess more reliable or robust knowledge with regard to the users. This is examined in the following section.

7.3. Stakeholder involvement and the expertise of producers

In the study of technology, two opposed conceptions of producers may be distinguished. On the one hand, historical approaches tend to portray them as technically gifted individuals working in a social vacuum. This is the case whether they are considered as 'inventors' or 'entrepreneurs', as in the influential work of

Schumpeter (Schumpeter, 1934; Freeman, 1992). As a response to this, sociological approaches, including those discussed in section 3.2, depict producers as 'heterogeneous engineers' (Law, 1987) adept at building socio-technical networks through political savvy. In both cases, it is as though producers of science and technology act solely with a technological or entrepreneurial purpose, *as producers* of science and technology. That is, they are seen to mobilize essentially specialist technical knowledge and/or to act in a context which is isolated from their cultural background or other social activities.

In adopting this perspective, STS and innovation studies tend to preclude the breadth of means whereby producers gain and display knowledge of the (lay) public for which they create artefacts. Indeed, it inherently constrains the scope of the producer-user interface to direct and co-present interactions arranged at the producers' discretion, such as in focus groups, usability trials, etc. These constraints were discussed in section 2.x as part of my critique of 'users-as-designers' approaches which enforce 'technical mediation' and its three components (ontological divide, use bias and overstated co-design). Broadly speaking, technical mediation implies that a specific technology must exist for there to be producer-user interface as such.

The second hypothesis suggests an alternative view and speaks to the need to conceptualize the work of new media producers in a social register rather than one of technical finality. It states:

***Hypothesis 2**: Producers act in their capacity as 'experience-based experts' with regard to the projected users, and this takes several forms: audience images, reflexive user, producer-user, etc.*

Through the producers' thoughts and comments, the account of Chapter 6 demonstrated that direct interaction (or co-design), though a principle in which the producers believe, is but one, ideal(ized) variant of user involvement which is more in line with a feedback mechanism (albeit a cyclical one) than a sustained process of co-creation in which users and producers have equal footing. It illustrated the more pervasive practices which instantiate and validate user involvement within Futurelab: through various mechanisms the producers speak for the learners, indeed as learners in

some circumstances. This is the case both when the Futurelab producers engage in discussions with potential partners (externally) and when they discuss amongst themselves (internally).

This study stands as an alternative to 'users-as-designers' approaches not in overlooking the users altogether, but rather in maintaining the focus on the producers as the locus of overlap between contexts of production and use. The producers' work involves demonstrating knowledge which they already hold but which is not acknowledged as legitimate or specialist – such dynamics are at the heart of experience-based expertise.

As discussed in section 3.4.2, a key debate in STS has been around the criteria of access to decision-making as treated through the notion of expertise; one recent development has seen the opening up of decision-making to both certified experts and experience-based experts. But the recourse to experience in the case of Futurelab is problematic for these theories of technology production, for the authority from which the producers claim to speak calls into question what in these theories is termed specialist knowledge or expertise, and the means whereby it may be validated.

Following Bessy and Châteauraynaud (1995), Collins and Evans (2002), Fleck (1998), Faulkner et al. (1998), Stehr (1994), and Bereiter and Scardamalia (1993), individuals come to be recognized as experts by simultaneously defining what constitutes relevant knowledge in the context of their activities and displaying that which makes them experts in this respect. In terms of its substance, Collins and Evans (2002) consider expertise as referring to technical competence, whether formally certified or not, and they focus on the dynamics between people recognized as certified experts and others who aspire to expert status by displaying the same kinds of competence, i.e. the same substantive knowledge, as certified experts. In this sense, the aspiring experts must stake a claim for their 'contributory expertise' in a given field, which typically excludes so-called 'soft' forms of knowledge and experience (e.g. social knowledge).

Drawing on Wynne's (1989) seminal work on 'lay expertise', Collins and Evans make a distinction between 'contributory expertise' and 'referred expertise'.

The former defines an actor's capacity to make substantive contributions to a specific field in the scientific or technical realm, while the latter is defined as expertise 'at one remove': it applies to an actor's 'experience of contributory expertise' in a specific field of practice (Collins and Evans, 2002: 257). Simply put, 'referred expertise' applies to actors who possess a general knowledge of the requirements (technical or otherwise) of specific activities of production and, thus, who know how to delegate responsibilities to various 'contributory experts'.

Collins and Evans' model may be challenged on the basis of their suggestion that the claim to experience-based expertise is done *qua* a claim to contributory expertise – i.e. the display of one's ability to contribute substantively to the field of knowledge at hand – *but that these fields of knowledge exclude soft forms such as social experience.*

The assessment of the producers' ability to contribute substantive knowledge and thus of their status as 'experience-based experts' will depend on one's definition of the field of knowledge at hand – what is new media production *about*? The answer put forward here stems partly from the empirical data discussed in section 7.1, where I argued that 'what is relevant' to the producers in this specific case, at this specific time (problematization), are primarily the projected users, i.e. children and learners. That is a premise for the claim that the producers are 'experience-based experts'. I will go on to argue in this section that their user-related knowledge is largely a matter of 'whom they know or have known' in various contexts.

This premise alone may provide the reader with an initial reason to dismiss my case. Indeed, one may reject the producers' claims that Futurelab 'isn't about technology' (DCE) and that its purpose can be defined independently from technology (cf. the role of mediation in problematization, section 7.1). For instance, because their studies treat the production of technology as the province of engineers, scientists and technologists, STS theorists might argue that such technically-oriented professions are the benchmark of expertise in production and, accordingly, that new media producers should be seen as aspiring to their status in displaying relevant technical competence. If one follows this reasoning and considers the Futurelab producers' technical

competence, the data would suggest that new media producers display something analogous to referred expertise as opposed to contributory expertise.

Indeed, section 6.3.1 showed that in matters pertaining to technical competence the producers – most notably those in charge of the assessment of incoming project ideas – generally feel very limited in their knowledge and are happy to pass on technical issues to outside specialists on an *ad hoc* basis. They claim that technical awareness, rather than expertise proper, is sufficient. When prompted on the basis of their specialism, all the producers, with the possible exception of the Head of Design[71] and the Head of Production (who left the organization early on), emphatically play down their ability to contribute substantively to fields of technical practice.

Thus, a view inspired by Collins and Evans would see no basis for the claim that the Futurelab producers possess a legitimate specialism of their own, i.e. the ability to contribute substantively to the production of new media technology. In addition, Collins and Evans would argue that in such a case of technologies produced for 'wide-scale or mass public use' (2002: 266), it is the external technical consultants and indeed the sample users who possess a form of contributory expertise to offer producers – the latter due to their status as ultimate arbiters of a technology's closure (2002: 266). This argument is consistent with 'users-as-designers' approaches that enforce such conceptions as 'user-led' and 'user-driven' design in assuming: 1) that users may be involved directly and consistently throughout the process of production (cf. overstated co-design); and 2) that the producers seek to dissipate uncertainty through scientific or quasi-scientific means. Indeed, 'users-as-designers' (UAD) and STS both presuppose the producers' belief that that by painstakingly targeting and getting to know certain individuals or groups through market research, trials and so on (e.g. 'lead users', 'ambassador users' – in sum, proxy users), they can make reliable inferences on the wants and needs of future users.

What are we to make of the producers' claims of the importance of user-related knowledge and their recourse to experience and reflexivity? Are Dornfeld's 'popular

[71] Design could be termed a field of technical practice, but the Head of Design herself clearly emphasizes the social (her ability to capture 'what makes people tick generally') and artistic aspects of her profession, whilst minimizing her understanding of technical issues (cf. section 6.3.3.1).

anthropology' and Bardini's 'implicit sociology' merely informal activities not worthy of the label 'expertise'?

Alternatively, if one accepts the producers' 'useful fiction' (cf. section 7.1) – i.e. their view that Futurelab is not about technology but about the well-being of children and that their work in problematization involves persuading their stakeholders 'to think of the learner first' (HLR) – as legitimate and as having a decisive effect on the production endeavour, then the case for their experience-based expertise can be made.

The data presented in Chapter 6 tell a different story as to what the producers feel is relevant and reliable knowledge. It is a story which contrasts with the typical object of 'users-as-designers' approaches – either the design of bespoke technology for pre-determined social groups (e.g. organizations) or the implementation of a specific artefact. Here, the ultimate stakeholders and arbiters of a technology's closure are acknowledged as crucial actors by the producers, yet they are not sustained, active participants in production. The users are not contributory experts and the producers do not employ positivist reasoning to define their preferences. Because, in ontological terms, the users do not yet exist as such. But even when the producers speak of the users as a group about whose existence they are certain, their sustained co-participation is deemed impossible for logistical reasons. This imposes a new perspective on both the substance of production (soft K) and the (non-scientific) means whereby it is gained and legitimated.

Section 6.2.1 showed that although the direct involvement of users (learners, kids, etc.) in Futurelab's research activities is claimed as a principle, in practice it is acknowledged as being of limited use – one of the 'inevitable contradictions' of production as described by the Director of Learning. Because the learners 'don't have all the answers' but also because, as it is validated independently from them, knowledge elicited from the users has no worth on its own and/or it can be interpreted in many ways. On the whole, the producers' thoughts on the need to open the doors of Futurelab to potential contributors highlight the tension between, on the one hand, transparency and openness in granting stakeholders access to the production process and, on the other hand, the constraint that is necessary in order to engender the desired

(social) results. This was most forcefully expressed by the Development Director who, speaking about Futurelab's 'call for ideas' process (CFI), asserted that 'anybody can be president', a statement which is qualified by the proviso that 'the criteria of selection are very strict on that'.

Section 6.2.2 illustrated how this tension (or contradiction) between openness and constraint translates in terms of their broad conception of producer-user interactions. The notion that sample users provide 'validation' of ideas and concepts as part of a broader process of 'turn-taking' (DL) suggests that the users' contributions to production are staggered, punctual and controlled by the producers. That is, they are solicited at certain key points in the development process in order to provide a reality check to the producers, rather than being part of a sustained process of co-design, as 'users-as-designers' approaches would have it (cf. section 2.5).

The distinction may seem trite to advocates of user-led design but in the context of this study, notions such as 'validation', 'turn-taking' and 'reality check' underscore the authoritative status of the producers as initiators and developers of concepts and the subordination of any additional parties. In this sense, the users are less co-pilots who guide decision-making every step of the way, and more to be conceived as a compass or roadmap which the producers may consult as and when they see fit – if at all. The Director of Learning's thoughts on the salience of the users' input (or lack thereof) in the *Savannah* project, for instance, further suggest that the role of children as proper co-designers might be overstated.

Futurelab's fieldwork with learners, as shown in section 6.2.4, reflects the producers' rejection of positivist tenets such as objectivity and correspondence that are implicit to UAD approaches. It does not aim to assess scientific validity but rather to establish useful functioning: technology X works for users Y in setting Z (cf. section 7.2). No claim is made that the laboratory conditions – be they artificial (at Futurelab) or 'in the wild' (trials in schools; cf. Callon 2004) – are designed to be a scientifically sound reproduction of real-world conditions. This contrasts further with Collins and Evans' claim in that user-related knowledge gained in face-to-face interactions with sample users is treated as soft, not hard, by the producers. That is, the posited correspondence – that laboratory conditions are a valid representation of 'the real users

out there' – which one would expect to find in production activities driven by market research, is not paramount here.

Instead, the Futurelab producers use small-scale interactions with learners that are readily available to them. In the early days of Futurelab, the producers' inductive reasoning (from the groups with whom they interact to the projected users) is not disinterested; it is part of a value-laden exercise (cf. section 5.2.1). Accordingly, the producers claim Futurelab's methodologies to be 'principled', 'transparent' (DL), 'rigorous' (HLR), 'open and honest' (Researcher) rather than, strictly speaking, heuristic or as they put it, objective. This is illustrated by their comments on the representativeness of their sampling: that it is 'methodologically unsound' (Researcher) to generalize their findings on this 'default set of users' is but a minor inconvenience. It may limit the conclusions which can be drawn in scientific terms, but then the producers do not assume, nor do they set out to *prove scientifically*, that their sample users are representative of the wider population they hope to enrol or that the users will indeed materialize.

According to the producers, they already *know* 'well enough' (DD) the users they want to bring about – what they need is to demonstrate them, i.e. provide some assurances as to their existence. Thus, representativeness and correspondence are perhaps acknowledged as a methodological issue, but they are not an epistemological issue to the producers. As the CEO claims, Futurelab is not about uncovering new facts on the learners; it is about 'demonstrating them, and making them real and making them vivid and proving[72] their worth to the point that the world decides they're valuable and takes off with them.'

This raises a second challenge to Collins and Evans' model, as the producers not only emphasize the importance of so-called 'soft', social knowledge in production – they also display contributory expertise in this respect. In so doing they embrace a variety of means whereby user-related knowledge may be gained (the recourse to their own reflexivity and experience, interactions with learners in non-purposive contexts)

[72] In the context of the CEO's argument, which denies the applicability of a scientific model to Futurelab's activities, the significance of 'proof' is not to be taken literally. Rather, it is in line with his talk of demonstration and illustration.

as valid and useful in production. If, as Collins and Evans argue, experience-based expertise is claimed *qua* contributory expertise, then the Futurelab producers appear to be experience-based experts with regard to the users.

The producers' minimizing of their technical competence and the involvement of sample users do not imply that inductive reasoning plays no part in the producers' work. Inductive reasoning is endemic to laboratory research and Futurelab is no exception. As the DL asserts, '(...) you have to make assumptions that people in one environment are a proxy for people in other environments.' In a first instance the role of proxy is played by the 'default set of users' (Director of Learning) employed in Futurelab's fieldwork (i.e. those accessible to them in Bristol schools), but this proxy was just described as being of limited use.

A host of comments illustrate a second kind of 'proxy' employed by the producers: themselves. The DL's assertion does not apply exclusively or even primarily to inferences made from direct interactions with 'sample users' in the lab. Rather, inferences are made from a range of contexts that include the small-scale interactions with learners discussed above, but that extend to non-purposive interactions with relevant groups and the producers' reflexivity. All yield relevant user-related knowledge which can be seen as an alternative to sustained user involvement in that it gives sense and direction to the producers' work in production.

Media and communication theory is useful here: 'end users' are present in the decision-making process in the guise of the 'projected audience', or 'intended users'. These are conceptual entities rooted in the experience of producers and of whose virtual scrutiny producers are very much aware, but which resist the kinds of characterizations usually applied to fellow scientists (i.e. real people). As Fourez puts it: 'Science mainly works within a paradigm and a laboratory, whereas technology (...) is meant to deal with, and survive in, society at large' (1997: 922). Society at large has the power to defeat the designers' claims by refusing to validate them through adoption (cf. diffusionist theory). Perhaps more significantly, social relations may be seen to inform the work of producers from the outset.

In lieu of co-design as treated in 'users-as-designers' approaches, at Futurelab a more pervasive practice is the mediation of the users' presence by the producers. The CEO's 'unkind analogy' on the involvement of kids in production and the DL's insistence on the producers' capacity to produce 'what ifs' and 'maybes' in order to move production forward, discussed in section 6.2.2, both underscore the producers' recourse to their own experience in the absence of certainties. Section 6.2.3 provides a backdrop for these assertions in discussing the epistemological and methodological aspects of the producers' work. Here, the production process and the fieldwork it requires are characterized as being more about what the producers know than about what they do not know.

That is, the Futurelab producers' talk paints their engagement with users as being less about the discovery of new facts than about bearing out one's beliefs and convictions, if not pre-existing knowledge proper: 'I don't think there is some piece of research you could do in a school with something or other and you can come back and say, Eureka!, you know (laughs), look! This is new, we didn't know this before'; 'you can know something a long way before it suddenly takes off in society and it's not to do with what you don't know' (CEO); '[this is] a social activity of determining goals which are done within a social cultural framework rather than being determined by the notion that there really is something objectively out there that we go for' (DL); '(...) we are setting parameters, we are setting a framework, a filter for what we are looking at' (HLR).

Likewise, in section 6.2.5 it was reported that the producers' belief in the irreducible diversity of children and learners seems offset by their own ability to think about the activities (DL) and needs (HLR) of children in their stead, indeed their capacity to think like a child (Researcher: 'you try and think, what if I were 6 years old...') and to adopt a 'we know best' attitude (Researcher: '...we should know this just from our experience and stuff.').

The claim that production is about what the producers know rather than what they do not know evokes the vast literature on the codification of knowledge and the role of 'tacit knowledge' which some claim is a key factor in the process of innovation (Collins, 2001; Cowan et al., 2000; Polanyi, 1967; Senker, 1998; Steinmueller, 2000).

These concepts describe the process whereby tacit knowledge may be 'codified' (i.e. made explicit) in order to be shared by the actors involved, thus increasing the likelihood of an innovation's success, notably in cases of 'technology transfer' or inter-organizational collaboration. As such, they are pertinent to the process as described by CEO's claim that Futurelab's role is not to uncover new insights in education, but rather to 'demonstrat[e] them, and mak[e] them real and mak[e] them vivid and prov[e] their worth to the point that the world decides they're valuable and takes off with them.'

The point I want to make, however, is less related to such a deliberate and systematic process of 'explicitation' and more to do with the very substance of the producers' knowledge and its origins, which make the object of this study distinct from that of science and technology studies and broaden one's conception of the producer-user interface. It is that, perhaps surprisingly, the fact that the substance of relevant knowledge in a context of early production is soft not hard, social not technical, entails a broader acceptance of the potential contribution of those already involved in production – the producers –, not a 'democratization' of production that would involve increasing numbers of people who are external to it, i.e. users or other experts.

The point may be explained through the notion of proximity, which I define as that which is close and/or accessible to the producers. In discussing Futurelab's fieldwork, 'proximity' was used in its spatial sense, to designate an accessible 'default set of users'. Such a view fits with the 'users-as-designers' approaches criticized in section 2.5 and the relativist theories of innovation discussed in section 3.2, in constraining from the outset the kinds of social interactions that can be seen to yield relevant user-related knowledge. Indeed, 'what is relevant' in this perspective is limited to knowledge gained via technical artefacts (cf. 'technical mediation') and at the producers' express initiative, i.e. in a *purposive context* engineered by them in order to solicit the collaboration of users, such as when they carry out market research or trials with known socio-demographic groups.

However, as I illustrated in section 6.2.3, the role of proxy is also played by the producers themselves and here a different interpretation of proximity applies. It can be seen to have a symbolic, rather than spatial, dimension: the producers draw on what is

familiar to them, such as their own experience with relevant social groups in past or concomitant social settings, in addition to, or instead of, involving people who are close or accessible to them physically.

'Experiential proximity' seems an apt description of the producers' recourse to experience as an alternative to the apparently positivist outlook endorsed by UAD and STS. It is instantiated by two kinds of producer-user interactions. The first is engineered by Futurelab and as such it is purposive in nature, but it is still one step removed from the field trials carried out in the context of specific projects: the means whereby Futurelab producers maintain a sense of contact with their projected users. It is represented by the school visits that took place in the early days of Futurelab, at the HLR's initiative (cf. section 6.2.4).

Organized in the very early days of Futurelab and independently from the development of a specific artefact, these visits served two related objectives. The first evokes proximity: to enable all Futurelab producers to move closer to their projected users and gain relevant knowledge of the projected context of use by witnessing learners firsthand. That the school visits took place 'in the wild' (cf. Callon, 2004), i.e. settings that have little to do with a specific artefact is notable, but this was discussed previously – section 7.1 refuted the 'use bias' in arguing that generic, rather than specific, user-related knowledge plays a key part in mediation by establishing Futurelab's purpose, a fact echoed here by the DCE who asserts that school visits were 'a wonderful reminder of why we're here'.

The second function of the school visits is more pertinent here: to enable all Futurelab producers, regardless of their functions within the organization, to feel entitled to contribute to the endeavour by gaining condensed user-related knowledge. Such was the HLR's motivation in initiating the event – to broaden the criteria of relevant contribution beyond that of belonging to the Learning Team. The 'brainstorming sessions' organized by the Head of Design serve this same purpose. Of course, the learning specialists enjoy special status in this respect, especially in discussions with external partners, who see in them the key to access unexplored markets. This status also holds within the laboratory, where they are acknowledged as having greater epistemic authority in matters pertaining to learners.

However, their views of educational technologies and knowledge of its intended users are neither claimed as infallible or absolute (HLR: despite their occasional use of status as a 'trump card' to defeat competing user claims, 'it's more a certain perspective than a claim to knowing everything'), nor is it recognized by their colleagues as being so (they may express a 'reluctant deference' to their status as opposed to a wholesale acceptance of their ideas, and they contest their views outright such as when the Head of Design stakes her claim to be a more credible source of user-related knowledge on her own experience as a learner of French, whilst the Learning specialist's credibility is undermined by her fluency in this language). As the Head of Production put it: '[t]he labels probably mean more to other people than within.' This leads to the observation that in terms of expertise, two distinct situations overlap: the need to display expertise to the outside world while simultaneously becoming experts internally.

The acknowledgement that all producers potentially have contributory expertise begins to substantiate the argument that access and contribution to decision-making are not related in a causal way (cf. Stehr); that is, one's status or position within an endeavour does not rigorously explain one's contribution to production. The argument is made stronger through the second kind of producer-user interaction that instantiates experiential proximity, this one non-purposive in nature: the *ad hoc* reactivation of experience and reflexivity in production, whereby the producers effectively assert their contributory expertise.

The reactivation of experience and reflexivity was discussed in section 6.3.3 through an illustration of the various guises of the producer-user: 'producers as media professionals or professional mediators' and 'producers as learners'. The first underscored the producers' recourse to relevant experience *with* the relevant social group of learners/children, while the second stressed their reflexivity proper, that is, their relevant experience *as* learners in various circumstances, as children, as moral beings and so on. It was argued that both devices serve the same purpose in enabling the producers to demystify incrementally the notion that the learners' social space is distinct from that of the producers and that it is inaccessible to them. In other words, they tend to instate a reassuring sense of proximity.

In sum, the reactivation of experience and reflexivity is the basis for this study's strongest claim for the producers' experience-based expertise, in illustrating that: a crucial object of debate is soft and social knowledge; the producer-user interactions from which it is gained is mostly non-purposive; the producers' claims aim to establish their ability to contribute substantively to a relevant field of knowledge, i.e. their contributory expertise; and these claims are emergent and open to all producers in principle, as there is no pre-existing benchmark which they aspire to (e.g. professional certifications, technical knowledge, etc.).

Thus producers are neither genius inventors working in a social vacuum, nor exclusively heterogeneous engineers keen to enrol others in the production of a specific artefact. Their specialism lies somewhere between these two extremes, in their experience broadly conceived. That is not to say that technical expertise is unimportant or irrelevant – but the producers' experience-based expertise appears to underlie the work of all producers, it is the common trait of their work, whether they are working on the development of content or strict design issues. It is worth rehearsing the Development Director's assertion that no matter which part of the endeavour one is working on it is necessary to keep the ultimate user in mind.

Furthermore, the *ad hoc* reactivation of experience provides the clearest extension of the producer-user interface beyond the conception endorsed by 'users-as-designers' approaches, to include all social situations in which user-related knowledge is gained, through whatever means. Bardini and Dornfeld argue that producers make inferences from their various interactions with people they can observe directly to a putative group of people they hope will eventually make up the audience/user group of a given artefact. Such a perspective entails, as McQuail (1987) has put it, that the audience is both the cause and consequence of production. This circular reasoning forms the basis of the producers' experience-based expertise.

As I have argued, mediation is a social process whereby producers represent actors who are absent. Perhaps Collins and Evans' claim that sample users are 'contributory experts' can be reconciled with Dornfeld's and Bardini's models of 'producer-user overlap' and 'reflexive users', respectively. Indeed, producers may be

seen to 'refer' certain production decisions to absent, expert users (through invocations of audience images or indeed the involvement of real people in usability trials, etc.), as Collins and Evans argue. But such instances of mediation entail more a blurring of the boundary between holder and object of knowledge, between producer and user, than an act of referred expertise by which external, contributory experts are brought in as such.

This evokes the final criticism of 'users-as-designers' approaches – the ontological divide between producers and users – which is discussed here in relation to the synthetic role of producer-user (cf. Goffman and Meyrowitz).

The 'users-as-designers' approaches criticized in section 2.5 and the relativist theories of innovation discussed in section 3.2 claim that Technology and Society are inextricable, yet I have argued that in endorsing essentialist, rather neat conceptions of producers and users, these approaches depict the social spheres of production and reception as populated by essentially distinct individuals – this is what I term the 'ontological divide.'

By and large the evidence discussed in the foregoing supports an alternative to this view: production is particular kind of social situation in Goffman's (1959) and Meyrowitz's (1985) sense, one resolutely oriented towards an absent third-party – the projected audience – of whose virtual scrutiny participants are acutely aware. As a social situation, it is part of the continuity of individual producers' social experience, of their being in the world.

If production is a social situation in Meyrowitz's and Goffman's sense – a pattern of access to other people – then clearly this pattern goes beyond the direct interactions engineered with sample users and the like. In many ways, the meaning and effectiveness of the producers' work hinges not on their ability to observe and reproduce in a disinterested, pre-meditated, purposive and objective fashion, social contexts which are distinct from that of production, as UAD and STS approaches suggest. Rather, it appears to hinge on the reactivation of social experiences which they may have gained in prior or concomitant settings which may or may not have anything to do with any specific artefact. In some of the instances noted in the foregoing, their work as producers rests on its conflation with the role of user.

Such an overlap is endemic to mediation and it speaks to Goffman and Meyrowitz's conception of synthetic roles – in this case that of producer-user. More specifically, the experience-based expertise of producers calls into question their assertion that there must be a distance between the various stages on which one performs roles in order for synthetic roles to be performed efficiently. Indeed, the producers appear to stake their claim as legitimate spokespersons for the users – i.e. as mediators – on the display of their proximity to, indeed their belonging to, social groups that are relevant to the projected users. The producers are encouraged to remember what it was like to be a child; they reactivate their previous experience as producers of science documentaries which, in hindsight, are (re)defined as 'learning outside school' (CEO); they draw on their experiences as learners in various contexts in order to move production on.

By invoking their social experience, the producers can be seen to enact a process similar to Katz and Lazarsfeld's *two-step flow model,* but in reverse. That is, whilst information about the audience can be gathered by the producers through means of direct or purposive interaction such as market research and usability trials, it also makes its way into production through indirect, 'non-purposive' channels. Namely, the producers' social interactions broadly speaking. And these interactions are reactivated in unpredictable ways in production, becoming the object of debates on the establishment of expertise. At least this is the case in an early, pre-market setting.

A further interpretation inspired by media and communications theory can help defeat the ontological divide by shedding light on the dynamics of the synthetic role of producer-user. Drawing on Thompson (1995), one may frame the exercise of this synthetic role as the exercise of mediated quasi-interaction, which was described in section 3.3.1 as a form of 'action at a distance'. In his mode of interactions, Thompson says little if anything about what goes on in production or pre-production, where the projected audience of a television programme may have been first considered with its perceived needs, tastes, expectations and so on. Yet, if the mass media are a feature unique to modernity, the advent of which prompts a reappraisal of the forms of human interaction, then in addition to how these are manifested in the social contexts of reception (i.e. contexts in which individuals are engaged as receivers or users) – the

object of Thompson's concern – it is worth considering whether and how these forms of interaction play out in the production of new media or technologies. The mere possibility of individuals being involved in media production is also, arguably, new, and it has not received the same sustained attention as reception.

The Futurelab producers' synthetic role of producer-user suggests that the involvement in sites of production engages individuals in a different variant of 'action at a distance' than that discussed by Thompson: to act *in the absence of,* indeed *in the name of,* distant, projected others. In acting *in the name of* certain absent social groups, the producers can be said to effectively simulate an interaction between themselves, partners and the audiences/users – the very definition of mediated quasi-interaction. In addition to informing one's own representations of the projected audience, the personal experience of producers in prior and/or concomitant social settings is perceived by others as a key source of credibility and trust that a given technological project will be embraced by the end-users. In this sense, production can be seen as a form of mediated quasi-interaction involving actors dispersed in space and time: the producers, the relevant social groups with whom they socialize outside the laboratory, their potential partners, and, in the event a technology is indeed produced, the actual users of this technology.

On the whole, experience-based expertise in new media production can be seen to occupy the middle-ground between technological and social determinism, in as much as it stresses that producers and users are not the distinct ontological entities implied by UAD and STS studies, but rather actor categories which individuals come to occupy in certain circumstances. For those people who eventually step up to play either role may be said to interact in spatio-temporal settings dislocated from a specific production endeavour. The traces of these interactions are manifested in various ways in production and, as was argued in the previous section, a precondition to uncovering the influence of these interactions is to treat producers as more than just producers: one cannot presume exactly what resources they draw upon in establishing their expertise. 'Designers do not pre-exist', as Christine Hine (2001) has put it. That is, they should not be black-boxed by the analyst – no more than the technology or its users.

CHAPTER 8

REFLECTIONS ON THEORY AND METHODOLOGY

8.1. Introduction

This chapter comprises a discussion of some of the key theoretical, analytical and methodological positions taken in this thesis. Section 8.2 reassesses some of the conceptual considerations that led to the theoretical commitments made in Chapter 3 and discussed subsequently in relation to the empirical analysis in Chapter 7. Section 8.3 re-examines the research design mobilized in this study and some of the practical decisions that were made in the course of carrying out the fieldwork. The rationale for decisions to pursue certain research opportunities and the compromises these decisions entailed are considered in the light of the way they may have influenced the findings of this study.

8.2. Reflections on theory

This section reflects upon the key theoretical and analytical commitments made in this thesis. The conceptual issues raised and addressed in the previous chapters are considered in the light of the broader context of relevant scholarship in order to locate this study within on-going debates in the social sciences. The discussion in this chapter presents links with additional literatures and approaches that intersect with the analysis in the earlier chapters.

8.2.1. General theoretical/analytical aims

The theoretical and analytical commitments made in the earlier chapters of this thesis reflected my desire first and foremost to account for new media producers' actions in, and experience of, a particular technological endeavour without positing its isolation from, or strictly instrumental/purposive relation to, their social experience and relationships broadly conceived. Building upon the assumption that 'producer' and 'user' are roles which are played in given social situations rather than distinct

categories of people instantiated by the existence of a given artefact, my approach sought to uncover the varied connections between producers and audiences/users and to account for some of their ostensible effects on production. This was an attempt to conceptualize the producer-audience/user relationship in broad social terms rather than to measure the effective alignment or otherwise of producers and users in relation to a specific artefact. However, it was still thought necessary to account for the very real implications that various manifestations of this relationship were having for Futurelab's development during its first year, as well as what the implications were for the nature of the producers' work in such a context.

This aim led me to take a position against the 'technical mediation' perspective that is characteristic of what I termed the 'users-as-designers' (UAD) paradigm in the social studies of science and technology. This was deemed to be flawed in its endorsement of a 'use bias' and 'overstated co-design' and in its conception of an 'ontological divide' between producers and users.

My central claim in this thesis is that the epistemological and methodological commitment of constructionist scholars to treating the shape and meaning of artefacts as contingent and open-ended is not so consistently upheld when it comes to the 'relevant social groups' involved with technologies at various stages of their life-cycle.[73] This thesis argues that such a state of affairs undermines the fundamental constructionist claim of a non-causal, non-linear relationship between Technology and Society and that it entails an accordingly constrained conception of the nature of the specialist knowledge of producers.

The overriding theoretical commitment made so far in this thesis has been to introduce strands of media and communications theory to enrich and contrast this perceived shortcoming. However, a reconsideration of debates in STS and cognate fields suggests that the conceptual gap between social studies of technology literatures and media and communications theory may not be as large as suggested in the previous chapters, especially regarding the crucial break from the teleological view

[73] These groups and their relationships tend to be considered – by the actors but also by the analyst – as a function of a more or less stabilised, yet identifiable, set of technical objectives and/or material constraints, resulting in a technically-bound, largely teleological/instrumental conception of the social circumstances in which producers can be said to gain useful knowledge of the users.

endorsed by the UAD approaches (criticized in Chapter 2) to the non-purposive, experience-based framework proposed in earlier chapters. Indeed, upstream conceptually from UAD, some theories of technological and cultural production point to the complex and varied social mechanisms, enacted by individual and collective actors, which sustain a relationship between production and use (or consumption), indeed, between producers and users (or consumers). In what follows, these theories are used to further develop the arguments that led to some of the theoretical and analytical positions taken earlier in this thesis and to highlight alternatives which help to broaden the contribution of this study.

8.2.2. Discussion of commitments in relation to the literature

My exploration of the producer-user interface can be set in the context of debates in evolutionary economics/industrial innovation management around the complex interaction of supply and demand which are carried through in STS as the study of the relationship between technology supply and use.

In particular, it is enlightening to consider the 'Systems of Innovation' (SOI) approach which has evolved in response to the linear, production-side approaches of innovation based, notably, on the work of Schumpeter. In one of SOI's founding studies, concerned specifically with national or regional systems of innovation, Freeman (1987) described these as 'network[s] of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies' (1987: 1). But beyond 'the "research system" of industrial R&D, public research institutes and universities' (Andersen and Lundvall, 1992: 14) – in other words, purposive research activities – SOI takes as its object the complex, *continuous* channels of communication that link the production and consumption of technology.

In one of its theoretical iterations (Edquist, 1997: 4), Lundvall described systems of innovation as 'social', 'dynamic (...) characterised both by positive feedback' and, importantly, by the 'reproduction of the knowledge of individuals or collective agents (through remembering)' (Lundvall, 1992a: 2). In this context, '[a]lmost all innovations reflect already existing knowledge, combined in new ways' (ibid: 8). Such an evolutionary perspective is captured by Johnson (1992), who defines

SOI as a model in which technological change is seen as 'an open-ended, cumulative sequence of events containing a certain element of randomness or chance' (1992: 37). The 'biological metaphor' (Williams et al., 2005) is similarly expanded by Edquist (1997), for whom 'technological change is an open-ended and path-dependent process where no optimal solution to a technical problem can be identified [in an absolute sense]' (1997: 6).

One notes the themes of circularity ('cumulative causation, virtuous and vicious circles'; 'reproduction of knowledge'; new combinations) and contingency ('open-ended'; 'randomness or chance'; 'path-dependent') that are key to an evolutionary perspective seeking to contest the linear, neo-classical view of innovation in which new ideas are the work of genius inventors (or entrepreneurs, cf. Schumpeter, 1934) and are treated as exogenous events which upset the prevailing economic or social system (Andersen and Lundvall, 1988; Lundvall, 1992a), rather than as endogenous forces which shape it in a more gradual, 'organic' manner.

The inherent circularity and contingency of technological change as viewed through the SOI lens is even more salient when one focuses on producer-user relationships, the most basic function of which is 'to communicate qualitative information about both technological opportunities and user needs' (Lundvall, 1992b: 51). However, this relationship is far from straightforward. Lundvall explains: 'innovation is a ubiquitous process going on almost everywhere, almost all the time. (...) Most activities aiming at innovation take place in the formal sector of the economy, where producers produce, not for themselves, but for others' (Lundvall 1992b: 49). These 'starting points' introduce the key problem of coordination between the 'new ideas of producers' and 'the needs of potential users', between 'markets and organisations' (ibid.).

Producer-user linkages may be a prerequisite of innovation (Andersen and Lundvall 1988; Lundvall, 1992b), but the irreducible uncertainty in innovation outlined above imposes a conceptual 'break with instrumental and strategic rationality' (Lundvall, 1992b: 47) in conceiving of the connections between production and use. That is, these connections are no longer perceived as hinging on the producers' express

initiative; instead, one adopts a systemic conception of the links between technological opportunities and social needs.

These concepts are relevant to my earlier analysis in this thesis. Before moving on to discuss how such a break has played out in social studies of science and technology, I briefly flag ideas put forward in the sociology of cultural production which share with SOI a 'systemic' or holistic conception of the production-consumption relationship, as well as the rejection of instrumental rationality – i.e. the purposive actions of individuals – as its impetus. In particular, the works of Bourdieu and Becker provide different avenues for thinking about how one may shed the view of cultural producers as 'unique creators irreducible to any condition or conditioning' (Bourdieu, 1983: 312) and, instead, consider the structural factors that sustain cultural production and consumption (specifically art and, in the case of Bourdieu, literature).

Where the Systems of Innovation approach stresses circularity but also contingency to account for the coordination of the spheres of production and consumption of technologies, Bourdieu's sociology of culture stresses structural factors such as class to account for the reproduction of social order through the production and consumption of artefacts. For Bourdieu, the 'orchestration of production and consumption' is operated not by the intentional research or 'cynical calculations' of individuals (Bourdieu, 1979: 266), but by the functional and structural 'homologies' between two systems of difference (production and consumption) – that is, the alignment between socially classified people and the socially classified people and/or objects associated with them (ibid.: 267; author's translation). The status of cultural products as both material and symbolic objects dictates that one 'has to consider as contributing to production not only the direct producers of the work in its materiality (artist, writer, etc.) but also the producers of the meaning and value of the work – critics, publishers, gallery directors, and the whole set of agents whose combined efforts produce consumers capable of knowing and recognizing the work of art as such (...)' (1983: 318).

Though similar to Bourdieu's in some respects, Becker's sociological conception of art appears more tractable analytically, as it mobilizes a network conception very much in line with the spirit of SOI and STS. Indeed, he asserts: 'We

can focus on any event (the more general term which encompasses the production of an art work as a special case) and look for the network of people (...) whose collective activity made it possible (...)' (Becker, 1974: 775). This conception forms the basis of his subsequent definition of 'art worlds' (Becker, 1976: 703) which, much like Bourdieu's notion of 'field of production', comprise 'people who conceive the idea of the work (...); people who execute it (...); people who provide the necessary equipment and materials (...); and people who make up the audience for the work (...)' (ibid.). Becker (1976) goes on to draw a typology of 'social types' who take part in production according to the level of competence required for the accomplishment of specific tasks (professional artist, maverick, naïve artist, folk artist).

One finds traces of Bourdieu and Becker in the studies of media production discussed in Chapter 4 (e.g. Burns, 1977; Glevarec, 2001; Negus, 1992; Schlesinger, 1978; Silverstone, 1985), which I criticised on the basis that they tied the contribution of producers too rigidly to their technical and/or established professional capacity, especially journalism (Glevarec, 2001), and failed to take account of the producer-audience relationship in terms other than those of instrumental rationality.[74] The sociology of cultural production offers useful considerations, but their relevance to the production of ICTs or new media – artefacts which, unlike art and literature, are meant for 'the mass' and, hence, must be treated as having some degree of openness and flexibility built-in – seems limited. Indeed, they seem better equipped to analyze continuity than the possibility of disruptive innovation.

The Systems of Innovation approach bears some resemblance to certain aspects of Bourdieu's theorizing of the systemic conditioning of production by consumption (and vice versa), and to Becker's network conception of production as 'collective

[74] One possible exception is Burns' (1977) 'thick description' of activities of production at the BBC. Burns raises both issues of the professional status of media practitioners and the relationship between them and the audience, but he does not bring both strands together in a comprehensive way. He discusses the struggles of practitioners to establish themselves as professionals/specialists in the eyes of their employers and/or fellow workers, but mostly in terms of their 'technical' contribution to activities of production and how they fit within an established hierarchy. Conversely, when he addresses the broadcaster-audience relationship, Burns uses this same hierarchy to justify the relative 'absence' of the audience from the producers' discussions: in short, producers assume that conceptions of the audience are the responsibility of their superiors (Burns, 1977: 134). Glevarec's (2001) study of *France Culture* offers a different approach: using a framework of professionalization of cultural mediators, the author offers a rigorous analysis of the (technical) process of public radio broadcasting, depicting the work of radio producers in the light of their claim to distinctiveness vis-à-vis journalists.

action'. Its empirical focus is mainly on industrial innovation/management contexts in which 'producer-user relationships' typically designate organisations involved in industrial production and collaboration, and SOI is notable for the process it conceives as the driver of producer-user linkages and innovation systems: interactive or social learning (Andersen and Lundvall, 1988; Edquist, 1997; Johnson, 1992; Lundvall, 1992a, 1992b; Williams et al., 2005). Indeed, SOI stresses the importance of routines – institutionalised regularities of behaviour (Johnson, 1992) – and the everyday experience of actors (albeit in a mainly professional capacity) in yielding the knowledge that is crucial to innovation (Lundvall, 1992a: 9). Thus, interactive and social learning offer an alternative conception to the instrumental rationality long ascribed to the actors of innovation, but it does not endorse the opposite extreme – what might be perceived as the social determinism of Bourdieu's framework.

Lundvall (1992a) founds his theory of innovation and interactive learning on two assumptions: '(...) that the most fundamental resource in the modern economy is knowledge and, accordingly, that the most important process is learning'; second, 'that learning is predominantly an interactive and, therefore, a socially embedded process which cannot be understood without taking into consideration its institutional and cultural context.' (Lundvall, 1992a: 1). Empirically SOI is mainly concerned with industrial innovation and management and the role of institutions therein, and Williams et al. (2005) have applied the concept to Information and Communication Technologies (ICT) in order to understand 'the detailed process of innovation: how learning by interacting takes place in relation to particular technologies and in relation to particular groups of actors' (2005: 53). They develop an 'appropriation framework' combining concepts from STS (e.g. Fleck's 'innofusion' and 'diffusation') and media and communications (Silverstone and Hirsch's notion of 'domestication').

Their framework purposely blurs the demarcation between production and use/reception and they point to 'two arenas' in which social learning plays out: 1. the representation of the user in design ('learning-by-interacting'); and 2. the appropriation of the designed artefact (learning-by-using) (ibid.: 58).[75] For Williams et al. (2005),

[75] This distinction flows from the one between 'intermediate appropriation' and 'final appropriation': the former designates the 'ways in which generic technological capabilities are applied and incorporated into products and services intended for particular social settings' (Williams et al., 2005: 55); and the

both 'learning-by-interacting' and 'learning-by-using' signal a 'micro' analytical focus, but one which seeks to shed light on micro-meso interactions (a third form of interacting – 'interacting-by-regulating' – signals a focus on meso-macro interactions). The object and aims of this thesis motivated a principal interest in the former 'arena' and the crucial role of intermediaries therein, which, it was argued in Chapter 2, is afforded relatively little space in the literature when compared to studies of the role of intermediaries in the appropriation of designed artefacts.

The role of intermediaries in bridging supply and use at various stages of design has been studied by scholars in STS and cognate fields such as Human-Computer Interaction, Computer Supported Cooperative Work and Organizational Innovation. Although these are nominally concerned with the representation of users in design, my discussion of technical mediation in Chapter 2 showed how they effectively belong in the second of Williams et al.'s categories: appropriation of the designed artefact.

As a category of social actor, intermediaries are a central feature of relations founded on the notion of trust, such as economic transactions necessitating third parties (Coleman, 1990: 180). In innovation, the recourse to intermediaries is brought about by a lack of reliable knowledge, whether in production or consumption. Such notions are at the heart of Valente's (1995) 'threshold' and 'critical mass' models of the diffusion of innovations, which has roots in Granovetter's theories on the epidemiology of ideas (1973) and his threshold model of collective behaviour (1978) in addition to Rogers' (1983) seminal work on innovation. In studies of production, the recourse to intermediaries is motivated by the impossibility of reliably defining and engaging the intended users (Akrich, 1992; 1995; Bardini and Horvath, 1995; Hennion, 1989; Oudshoorn et al., 2004; Williams et al., 2005). Williams et al. (2005) share with SOI the idea that social learning is brought about by this fundamental uncertainty of innovation – what they term 'the serendipity of innovation'. For them, intermediaries are key to the process of social learning.

---

latter 'the related processes by which these products and services are incorporated into particular uses in these settings' (ibid.).

The starting point of my theoretical exploration was the argument that 'users-as-designers' studies generally exert some degree of control on the uncertainty of innovation in studying materially stable technologies and/or, more importantly, their appropriation by pre-identified, bound social groups (notably, organizations). Implicit in most of these studies is the notion that producers have some form of reliable knowledge on which to fall back in identifying relevant intermediaries at any given stage of innovation, whether it is derived from existing products or known markets.

On the whole, UAD approaches control uncertainty by 'bracketing out' one or more of the three instances in which, Williams et al. 2005 argue, the serendipity of innovation and, consequently, the crucial role of intermediaries, are increased. These instances are: 'radical innovation' (cf. Schumpeter, 1934; Freeman, 1994; Lundvall, 1992a) such as ICTs, as these introduce a break with both existing artefacts and publics, thereby decreasing the available reliable knowledge (Williams et al., 2005: 6); mass produced consumer goods intended for a dispersed mass, as supplier-user relations are inherently problematic in such cases (ibid.: 52); and the early, pre-project stages of innovation, as technical choices are not yet 'locked-in' and the users not yet defined (ibid.: 81). At the outset of my investigation, all three conditions appeared to converge in the Futurelab context and, therefore, a commitment was made primarily to theorizing how mediation operated in such a context rather than principally to the examination of the uncertainty of user responses.

The intention has not been to imply that all UAD approaches can be regarded as enforcing a use bias, as overstating co-design and as conceptualizing an ontological gap between producers and users. It needs to be acknowledged that conceptions of intermediaries such as 'lead users' (von Hippel, 1986) and 'ambassador users' (Mackay et al., 2000), although they can be criticised for favouring a theoretical and methodological 'use bias' (or 'appropriation perspective', cf. Williams et al., 2005) and of overstating the extent of 'co-design', nevertheless resist the criticism of 'ontological gap' as they explicitly problematize the producer-user interface in the early stages of design.

It may be that these concepts are better suited to the innovation activities of established groups working in a defined sector of production, rather than to an

emergent organization seeking to make social needs the starting point of its activities. As such, they may be better suited to a context of incremental, as opposed to radical, innovation (Freeman, 1994; Schumpeter, 1934).[76] The approach developed earlier in this thesis sought to reconcile the acknowledgement of irreducible uncertainty with the concomitant requirement for endeavours such as Futurelab to convince others to come onboard in the absence of specific technical artefacts or known users – this appeared to be a central issue in FL's first year.

Such an approach seemed to require a turn to the producers themselves as intermediaries, based on the assumption that 'users' could not be fully observed or engaged at this point in time – they were essentially putative. This was the key justification for the commitment to Callon's (1991) framework of 'problematization', as well as to media and communication theory and theories of experience-based expertise. However, in developing this line of inquiry, some studies of user representations in design, issuing from STS are also relevant. Such studies attend to the links (and, crucially, discrepancies) between, on the one hand, the producers' discourse on user needs and the imperative of user-centred design and, on the other, their actual design or enrolment practices.

For instance, Akrich (1995) stresses the contradiction between the producers' endorsement of 'explicit techniques' of engaging the users (market surveys, consumer testing and feedback on experience) – the actual effectiveness of which her case studies do not substantiate –, and the more powerful effects of 'implicit techniques' which 'rely on spokespersons of three general types: designers, expert consultants and other products' (Akrich 1995: 173). In the first of these techniques, designers rely on their personal experience in order to bridge differing user representations – this has been termed the 'I-methodology' (Oudshoorn et al. 2004; Williams et al. 2005).

Taking up Akrich's concept of 'I-methodology', Oudshoorn et al. (2004) invoke the uncertainty of user response in the design stage to justify their analytical

[76] Following Freeman (1994), radical innovation is defined as discontinuous events which (attempt to) depart significantly from existing practices. It distinguishes itself from incremental innovation – i.e. the modest improvement of existing technologies or processes – in that it consists of distinctly exploratory practices which do not function 'within established techno-cultural genres' (Century, 1999: 10) As Williams et al. suggest (2005: 6), a crucial feature of radical innovations (such as the World Wide Web) is that at the stage of production, knowledge of existing products and markets is not reliable.

focus on the producer's 'semiotic' (users as imagined by the producers), as opposed to 'sociological' (users as identifiable persons), representations of the users. Their comparative study of the development of two distinct 'digital cities' projects in the Netherlands demonstrates how the producers' claimed desire to cater to as wide an audience as possible ('the user as everybody') is effectively undercut by the implicit (gender-related) user assumptions which are built into their designs – notably, that of technically proficient, thus male, users – ultimately defeating the projects' initial 'generalist' objective. In this sense, the producers' more or less conscious use of the 'I-methodology' has an essentially constraining effect on their actions in production.

In sum, in both studies the 'I-methodology' is construed as having a constraining effect on the specific choices that are made in design proper, which may ultimately compromise the enrolment of the intended users. This contrasts with conceptions of the 'reflexive user' (Bardini, 2000; Bardini and Horvath, 1995) and of 'mediators' (Hennion, 1989) in which the reflexive capacities of producers are seen to serve an empowering function in production, enabling the producers effectively to arbitrate between technical choices which might otherwise be paralyzing. Although both sets of studies stress the pervasive character of reflexivity, the latter interpretation seemed to fit more closely with my interpretation of Futurelab's priorities, where experience seemed to be treated as something to embrace and which led to most staff being invited to have a say in the process – at least to a certain extent. Crucially, Akrich's suggestion that the 'I-methodology' exposes the producers' isolation from those people who have relevant knowledge of the intended users – indeed, form the users themselves – runs counter to my argument that the recourse to social experience signals the producers' social embeddedness, i.e. their proximity to the users in a spatial and 'experiential' sense.

Beyond the function of user representations in relation to specific design choices, Nicoll (2000) demonstrates the importance of (semiotic) user representations in the strategic coordination of constituencies in pre-material stages, in this case, trials. As such, his approach contrasts with Akrich's (1992) study discussed in the previous chapters. He explains: '(...) the "consumer-user" is largely a fiction in the proposal stage of many of these projects. As rhetoric, consumer-users are used as currency for legitimating not only particular operational visions of the technology but, more

essentially, the visions of the overall viability of the project (Nicoll, 2000: 303)[77]. Nicoll's work owes much to Molina's (1994) 'sociotechnical constituencies' perspective. In contrast to Hughes' (1986) 'system-builders' and Law's (1987) 'heterogeneous engineers', Molina seeks to move beyond these concepts, 'which suggest a high degree of rational, calculated design and direction by the 'engineers' building up the systems' (Molina, 1994: 106), by positing the bounded rationality of agents (cf. Lundvall, 1992a). Thus, one focuses instead on the actions of the 'constituency-builders' whose work it is to realise a 'perception-alignment' amongst a number of constituencies, i.e. to devise 'a feasible programme "satisficing" the interests of each and every one of them' (Molina 1994: 109). Nicoll's (2000) study stresses the key importance of the 'users as currency' in the process of perception-alignment.

These approaches provide a complement to my use of Callon's (1991) notion of problematization to characterize the early stages of Futurelab's development and, more specifically, the evolving relationship between the organization and its audiences – both stakeholders and end users (cf. 'two-step flow' conception). Indeed, they put user representations – not just technical choices – at the core of the negotiations which define a technological endeavour initially as a hypothesis, in order to assess its 'overall viability' (Nicoll 2000). Further, they can be applied to strengthen my endorsement of Pinch and Bijker's (1984) notion of 'rhetorical closure' as opposed to 'technical closure' to account for the stabilization of technology in the early stages, allowing the synthesis of the speculative aspects of project development with the strategic aspect of enrolment of allies. The notions of semiotic, rather than sociological, user representations (Oudshoorn et al. 2004), brought to the fore by implicit, rather than explicit, techniques of engaging the users (Akrich, 1995), are key to this.

The attention given so far in this thesis to the pervasive, enabling function of experience resulted in a tendency to downplay the constraining effects of experience (cf. Oudshoorn et al., 2004). The emphasis given to accounting for the 'implicit

[77] Nicoll demonstrates the interrelatedness of two factors: the elicitation of user responses through trials; and how this may shape a particular project by demonstrating the endeavour's competencies and developing partnerships. He argues: 'the promise of the mass forms a major part of the currency used at the inception of [a] project to enrol and entice corporate and financial support' (Nicoll, 2000: 305), and stresses the role played by the producers in the first stage of trials, in which they act as trialists.

techniques' of engaging the users also meant that less attention was given to 'explicit techniques' that were mobilized by Futurelab such as focus groups, workshops, usability trials. A sharper focus on the links between the two techniques could have been provided by observing discussions geared to selecting specific user groups for workshops and trials, in addition to the interview questions on methodology and the representativeness of user samples. (This links to the decision to focus on key organizational staff and strategy meetings at the expense of specific projects and project meetings; see section 8.3.1, below).

The overriding theoretical commitment as indicated earlier has been to introduce strands of media and communications theory to provide a link between the STS debates (contingency, circularity, uncertainty, mediation) and more recent debates on experience and expertise which some claim are key to the future development of STS. Specifically, I argued that it is helpful to put the core object of media and communications theory – the relationship between sender and receiver, or media producers and audiences – at the heart of my investigation. This was done in order to propose a more dynamic conception of the relationship based on 'prior feedback' and mediation, social mechanisms which can be seen to constitute the core of the producers' specialism, especially in the stages of production from which 'real users' are absent.

The empirical results indicated that the actors themselves appeared to share the assumption of irreducible uncertainty with regard to the users, a theme discussed in Chapter 6 as their endorsement of a relativist point of view and methodology. In other words, the 'design fallacy' noted by Williams et al. (2005: 68, 105) – the belief that the key to design is 'to build ever more extensive knowledge about the specific context and purposes of various users into the design' – seemed to have little currency at Futurelab, at least in the form of 'explicit techniques' of engaging the users (cf. Akrich, 1995). An alternative 'pragmatic' approach was used to suggest that the producers were able to acknowledge uncertainty in epistemological terms (i.e. to question the absolute worth of user-related knowledge gained through 'explicit techniques') and to work around it, whether consciously or not. This pragmatic approach aimed to counter the UAD presumption – implicit in its endorsement of the 'use bias', 'overstated co-design' and 'ontological divide' – that the analyst knows

something the actors do not, namely, that it is impossible to forecast the wants and needs of users with absolute certainty.

Some strands of media and communications theory, which with few exceptions are absent from STS debates, offer conceptual and analytical tools to bear out this argument. Most notably, a view of production as a 'social situation' (Goffman) and the laboratory as an information system consisting of 'patterns of access to the users' (Meyrowitz) in which 'mediated quasi-interaction' (Thompson) is played out – to complement the STS-inspired conception of production as 'legitimization of experience-based expertise' (Collins and Evans, 2002, Wynne 1989). This discussion was set against the background of notable parallels between the work on production of some major scholars in the sociology of media and communication (e.g. Gans, de Sola Pool, McQuail, Silverstone, Thompson) and that of scholars in what is acknowledged as the STS canon (e.g. Akrich, Bijker, Callon, Pinch). Both have sought to highlight the import of social experience and knowledge, political savvy, speculation and the role of the producer as intermediary.[78]

My emphasis on the enabling role of experience in production entailed a downplaying of its constraining effects. The recourse to media theory to analyze the producer-user relationship in broad social terms also gave less emphasis to the importance of formal forms of knowledge in the process of innovation, notably the technical expertise of Futurelab's partners which was a factor in securing mutually beneficial partnerships. An alternative might have been to give more attention to the

[78] The aim to treat production and the specialism of producers in line with the social resources mobilized by the actors therein had led me to consider approaches such as ethnomethodology (Garfinkel, 1967; Lynch, 1993) and more recent variants of 'Practice Theory' (Schatzki et al. 2001), both of which are deployed by some prominent STS scholars in their studies of science and technology (e.g. Collins, 2001; Lynch, 1993; Turner, 2001). These seemed relevant to my enterprise but they offered a framework which appeared to be better suited to the analysis of well-established institutions or ritualised practices, than to the fledgling organizational setting I was studying and, more importantly, my assumption that the producers draw their user-related knowledge from social contexts which may have little to do with the specific technical endeavour at hand (i.e. the emergent nature of the producers' specialism). Indeed, this assumption called for a heuristic and flexible framework to problematize the contingent connections between the various social contexts in which individuals move (which are reactivated in production), rather than treating the context under study as containing all the cognitive references necessary to its understanding as an (established) set of methods and practices – which is what these approaches offered. The theories of Marcus, Goffman, Meyrowitz and Thompson yielded such heuristic tools.

role of various actors in the innovation process, both within an organization such as FL and between FL and its institutional context.[79]

This study's use of the labels 'lay' vs. 'expert' and 'social' vs. 'technical' to analyze the user-related knowledge mobilized by the producers in the establishment of their specialism, was justified by the desire to contrast Collins and Evans (2002) model of experience and expertise (i.e. the dynamics of relational vs. contributory expertise) if it was to be applicable to the production of technologies meant for public or mass use – a key subgroup of technologies they do not address fully in their programmatic paper. This discussion was crucial in highlighting the conceptual difficulties of treating social knowledge as the object of expertise and pointed to the potentially helpful contribution of media and communication theory. This discussion could also have benefited from a consideration of taxonomies of knowledge in science and technology studies (e.g. Faulkner, 1994[80]), most notably those employed by Fleck (1997)[81] and Constant (1999)[82], as these share a concern for the varying ways in which the nature of knowledge and the status and legitimacy of its possessors are configured through social processes. This would have provided a basis to examine the weight afforded to the diverse forms of knowledge in production.

In this thesis, specific forms of user representations (e.g. Oudshoorn, 2004) beyond the dichotomy between the educational and commercial perspectives have not

---

[79] However, FL's original, claimed status as producer of educational new media, as well as its initial structure, arguably justified maintaining this label throughout analysis, despite the recounted shift through which the organization effectively shed its production capabilities. Indeed, the shift can be read as stressing the importance of user-related knowledge and mediation to production activities. The fact that FL may be an extreme example of the organizational changes that such an acknowledgement can bring about does not invalidate its claim to production, at least within a 'systemic' conception of innovation. Of course, a more thorough examination of the kinds of institutions involved in innovation would have made for a stronger argument in this regard.

[80] Much like Collins and Evans' (2002) later article, Faulkner presents an insightful discussion on the forms of knowledge in innovation but one which seemed constrained by its reluctance to address technologies meant for public/mass consumption rather than known groups such as organizations. I have tried to illustrate that this distinction gains in complexity but also in pertinence with regard to notions of expertise and legitimacy when the technologies in question are new media or ICTs.

[81] In particular, his notion of 'contingent knowledge' bears close resemblance to the *ad hoc* reactivation of experience deployed in this study, notably in its departure from the formal/informal and tacit/codified dichotomies debated elsewhere in the literature and discussed here. As 'contingent knowledge' arises in relation to specific technical constraints, however, its relevance to user-related knowledge upstream from such constraints remains open to discussion.

[82] His discussion of the foundations of 'reliable knowledge' – the basis of collective action – is particularly relevant to emergent contexts of expertise such as the early stages of innovation discussed in this study.

been examined. This study's aim was 'to work backwards' from the producers' claims to their social experience, broadly conceived, rather than 'forwards' to contexts of implementation and use. Nevertheless, an analysis of the link from prior/concomitant social experience to production to implementation/use might have been made explicit rather than being only implied – by the producers, who are depicted as believing that their experience is a somewhat reliable form of user-related knowledge (see section 8.3 for a reflection on the methodology). This might have been addressed through a consideration of the circumstances which lead producers to reactivate particular fields of their social experience, whether tied to general considerations of the Futurelab endeavour or design choices proper in the context of specific projects (cf. Dornfeld's categorization).

In this context, it is enlightening to consider Schön's (1983) writings on the reflective practice of professionals. In a manner very much in line with the discussion of this chapter, Schön grounds his conceptual framework in a criticism of Technical Rationality, that is, the 'positivist epistemology of practice' (Schön, 1983: 31) which from the 18th Century has served to distinguish minor from major professions by dictating a specific relation between a (scientific) knowledge base and its mobilization in practice. His claim is that Technical Rationality enforces a view of this relation as the 'instrumental adjustment of means to ends', which presupposes two things: that the ends of one's activities are always known; and that one need only apply to particular circumstances the general (theoretical) principles best suited to the known ends (ibid.: 23). Such a conception, argues Schön, is untenable given the acknowledged 'importance to actual practice of phenomena [such as] complexity, uncertainty, instability, uniqueness, and value-conflict' (ibid.: 39).

Indeed, these phenomena entail a conceptual shift that is of crucial relevance to the argument developed in this thesis: from the positivist focus on (technical) 'problem solving' as the core feature of professional practice, Schön stresses the crucial importance of 'problem-setting', that is, 'the process by which we define the decision to be made, the ends to be achieved, the means which may be chosen' (ibid.: 40). Such a focus is resonant with my analysis of FL's activities in Year 1 as 'fundamental problematization'. What is more, it turns the relation between knowledge-as-general-principles and knowledge-as-practical-know-how (which under Technical Rationality

is an instrumental, linear relation) on its head, as it requires the recognition that 'although problem setting is a necessary condition for technical problem solving, it is not in itself technical' (ibid.: 40). This argument distils to its essence the justification for focussing on (user-related) social knowledge and mediation as the specialism of new media producers – especially in the absence of technical artefacts. It stresses that it is 'through the non-technical process of framing the problematic situation that we may organize and clarify both the ends to be achieved and the possible means of achieving them' (ibid.: 41). In other words, the non-technical process of 'problem setting' can be seen to create the conditions for the practice of technical expertise. This distances the analysis from the dilemma of 'rigor or relevance' – an artefact of the positivist perspective – in which practitioners must choose either the application of general principles or the use of practical knowledge derived from particular circumstances; it leads Schön to develop the notion of 'reflection-in-action'.

If 'knowing-in-action' designates the practical cognitive devices that enable actors to carry out specific tasks without being able fully to articulate how they do it (cf. the notion of tacit knowledge discussed in Chapter 7), 'reflecting-in-action'[83] is a more dynamic process involving the actors' deliberate attempts to formulate and understand these implicit devices in the course of their actions, in order better to define its ends and suitable means through a form of dialogue.[84] Schön's discussion of relfection-in-action in the context of 'science-based' professions such as engineering is particularly relevant to this study's concern with the producer's knowledge of the intended users (or lack thereof). Indeed, this discussion stresses the process of 'modelling the unfamiliar on the familiar' (ibid.: 184) – whereby hunches and intuition trigger 'reflection-in-action' – a process consistent with this study's arguments about the recourse to social experience as a means whereby the FL producers were found to first establish the endeavour's meaning and then its activities.

---

[83] Schön (1983) uses 'reflection-in-action' and 'reflection-in-practice' to designate the same devices, but as used in 'ordinary action' and by 'professionals' respectively. As I address the new media producers' specialism throughout this thesis without claiming their status as 'professionals' in the way Schön conceives of them, I prefer to use the former term.

[84] Schön explains: 'when someone reflects-in-action, he becomes a researcher in the practice context. He is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case. His inquiry is not limited to a deliberation about means which depends on a prior agreement about ends. He does not keep means and ends separate, but defines them interactively as he frames a problematic situation. (...) Thus reflection-in-action can proceed, even in situations of uncertainty or uniqueness, because it is not bound by the dichotomies of Technical Rationality.' (ibid.: 68)

The methodology employed by Futurelab staff to elicit user-related knowledge can be framed by a conception of reflective practice, as a way of expanding my characterization and analysis of production as a process of 'turn-taking' in which the producers' claim legitimacy as spokespersons for the users in mobilizing a certain conception of ('experiential') proximity, and in which the users provide a form of 'validation' or 'reality check' with regard to the producers' user-related claims (cf. Section 6.2.2). In the first instance, it is helpful to pose FL's use of implicit techniques, non-scientific methods (e.g. the use of non-representative samples) and learning-by-doing as the practitioners' response to the dilemma of 'rigor or relevance': in a context of great uncertainty, they clearly seemed to favour relevance. However, for the producers– as argued in section 7.3., they do make claims to a process which is 'principled', 'transparent', 'rigorous', 'open and honest'. This suggests that it is helpful to think of relevance as the starting point of FL's methodology, rather than as the whole story.

Schön's conception of 'reflection-in-action' enables a systematic reconciliation of the principles of rigor and relevance by treating the producers' activities in production as a process in which hunches, intuition and familiarity generate images of the intended users which can subsequently be addressed through the mobilization of technical knowledge. In particular, it is enlightening to consider the producers' use of 'seeing as' and 'generative metaphors' in order to examine if and indeed how their reflexivity is the starting point of a process whereby representations of the users are either rejected or refined and ultimately met with specific technical options. For instance, how does *seeing* children *as* keen learners in their own image allow the producers to generate perceptions of the users which can then be addressed through specific technical features and content? If the producers' reflexivity in such cases does not generate new perceptions but merely reinforces preconceptions, does that make the recourse to experience a dead end for both actor and analyst (as Akrich and Oudshoorn et al. might want to argue)?

Such issues were discussed in the previous chapters. From the standpoint of this study the answer to the latter question is that this does not appear to be so, as the producers' reflexivity played a key role in the general 'problem setting' activities

which contributed to Futurelab's development in Year 1. But, the dynamic interplay of implicit techniques (relevance) and explicit ones (rigor) might have been analysed using Schön's framework and the conceptual considerations discussed here as a means of strengthening the case for media producers as experience-based experts.

8.3. Methodology and research design

This section attends to aspects of the research design and fieldwork for this study. It reflects on some of the methodological decisions that were made and discusses some potential alternatives.

8.3.1. Reflections on research design and opportunities for research

An important aspect of the research design for this study is that Futurelab's claimed status as mediator between its various audiences (stakeholders and users), as well as the individual producers' perceived legitimacy as (experience-based) experts with regard to the users – both of which appeared to be crucial factors in Year 1 – were not considered in the light of the views of relevant third parties. This choice was a reflection of three features of the initial research design: its strictly internal Futurelab perspective; its exclusive focus on the organization's first year of operations; and its reliance on the views of key organizational members rather than on other actors who were present in the organisation. These features resulted in the exclusion of data that might have shed light on the alignment or otherwise of the individual producers' representations with those of potential or actual partners, funders (DfES, NESTA), indeed, those of the intended or end users.

First, the decision to adopt a strictly internal Futurelab perspective flowed mainly from this study's theoretical focus on individual, as opposed to organizational/institutional, new media producers, in order to account for the continuity of their social experience as manifested in production. The primary unit of

analysis being the individual[85], it was felt that a group of individuals acting in an ostensibly stable (if changing) setting of collective action (an organization), and displaying the characteristics discussed in Chapters 2 and 4 (variety of background, newness of the enterprise and indeterminacy of its activities, etc.), would yield the most useful data in relation to my research questions and hypotheses and, ultimately, provide a basis to contrast with the theoretical approaches that were critiqued. This position was justified through a discussion of the key advantage of a 'multi-sited ethnography' (cf. Marcus, 1998; Couldry, 2003a) deployed in the form of 'strategically situated (single site) ethnography' (Marcus, 1998: 98) – namely, its ability to tease out the individual producers' 'sensed, partially articulated awareness of specific other sites and agents to which particular [they] have (not always tangible) relationships' (Marcus, 1998: 96), as this awareness is expressed in early production.

As a major organizational change was identified as the main narrative thread of my account of mediation, a case could be made for a broadening of the focus to consider institutional actors external to Futurelab to situate the observed micro-level interactions in a meso-level context. In regard to the producers' role of mediators, the strict internal perspective might be perceived as betraying a susceptibility to 'taking the producers' word for it' – to 'going native' – which is particularly important for the empirical account of Chapter 5.

However, the decision to retain the internal organisational focus was taken as Chapter 5 was developed to set the stage for the subsequent treatment of experience-based expertise by throwing light on the 'mechanics' of mediation in the context of an endeavour such as Futurelab. This was done through the framework of problematization, i.e. highlighting the tension arising from the conflicting interests of stakeholders and end users and how the two types of audience are kept in play. The purpose of Chapter 5 was to offer a diachronic (or longitudinal) account in which to anchor the synchronic (or in-depth) account focussing on the individual treatment of experience-based expertise (Chapter 6). In addition, the inclusion in the empirical account of FL's second business plan enabled the 'triangulation' of the individuals' perception of the key issues that marked Year 1. Implicit in this was the assumption

[85] In order to explore patterns and regularities across actors in a similar setting of production.

that FL's official new direction (as symbolized by the revised business plan) reflected the wishes of partners and, especially, those of the funders (DfES and NESTA).

If a choice had been made to collect the views of Futurelab's prospective and actual partners on their reasons for collaborating with the organization, as well as those of NESTA and the DfES for their continued support of its activities, a more contrasted picture might have been drawn of the specific contribution of Futurelab – as an organization, but as a collection of individuals with varying skills and knowledge, as well – to the production of educational new media in the UK context. Moreover, this might have led to a more detailed account of the interplay between the normative and strategic factors underpinning the shift from production to learning research as discussed in Chapters 5 and 7.

For instance, by conducting interviews with FL's interlocutors at the DfES and NESTA, it would have been feasible to gain a more complete appreciation of the structural and institutional aspects of the environment in which FL operated and which would have had some import in the major change which occurred in its first year. Had this been done, it would have been possible to address FL's position at the intersection of NESTA's remit and strategy for promoting innovation in the UK, and the British government's policy on matters of technology in learning (or 'e-strategy')[86]. What exactly were the expectations entertained in these higher-level instances with regard to Futurelab upon its launch, and how did these evolve alongside the organization's concrete actions? These remain questions for future research.

Judging from some of the comments of the FL staff in interviews (e.g. the Director of Development and Head of Learning Research), Futurelab's particular position relative to the DfES and NESTA entailed some overlap between its activities (especially prototype development and public events such as conferences) and those of similar public organizations, including NESTA itself (through its Education department) but most notably BECTA (the British Educational Communications and Technology Agency), acknowledged as the key institutional player in the field.[87] There

[86] The latest of which is titled 'Harnessing Technology: Transforming learning and children's services' (2005). It is available online at: http://www.dfes.gov.uk/publications/e-strategy/

[87] Its website bills BECTA as 'the Government's lead partner in the strategic development and delivery of its e-strategy for the schools and the learning and skills sectors.' (cf. http://www.becta.org.uk/)

was also a passing suggestion by FL's CEO, in the interview conducted after his dismissal, that FL's research activities were especially useful in establishing its distinctiveness vis-à-vis BECTA.[88] This is one illustration of FL's location within a network of (in this case, public) institutions, and analysis of what could have been superimposed on the network of audiences considered in this study. A follow-up of such issues would provide more insight into FL's claimed distinctiveness and the external factors for its transformation.

The DfES and NESTA did not have a role to play as stakeholders in the same capacity as FL's prospective partners, whose views FL were free to consider or otherwise. The former organisations appeared to be in a position of authority whose views had prescriptive status. In this sense, FL's development might have been framed not just as a reaction to perceived market needs – albeit those of two distinct markets: of stakeholders and end users – but also as the result of institutional pressures from those who, in principle, were allies in the noble endeavour to enhance education through technology. The account of Chapter 5 may be read as one that downplays the structural and institutional constraints and limits the extent to which these were examined in this study (see section 8.3.2, below, on institutional/organizational change).

The second constraining feature of the research design in this study was its focus on the first year of Futurelab's activities. This choice was motivated theoretically by the commitment to analyzing how mediation functions in the absence of real users (specifically, how mediators keep in play the audiences of stakeholders and users), a perspective less prevalent in the literature than mediation in implementation and use stages. This choice of a focus on Year 1 as a timeframe of fundamental problematization was taken on the one hand, because of the desire to ground discussions around mediation and experience-based expertise in specific outcomes (ideally, specific prototypes) and their actual users; and on the other hand, due to the pressure to make the best of a case study which, after a substantial investment on my

[88] CEO: '(...) if you develop something like Futurelab, and you see that the learning research side becomes respected, and is doing something that nobody and not even BECTA is really doing, clearly you play to your strengths. If projects are running slow and communications is doing fine, and learning, everybody says my gosh that's special, then you emphasize learning. And I don't see anything wrong with that.' (Interview, 3 July 2003)

part, seemed in real danger of disappearing. Indeed, there was a fear, following the dismissal of the Head of Technology and especially, the Head of Production and the CEO (who had been my main champion at Futurelab) in early Spring 2003, that people were 'abandoning ship', thereby signalling Futurelab's imminent demise before any of the ongoing projects could be brought to term.

These considerations prompted the research focus on the activities and tensions involved in bringing together Futurelab's various audiences as a 'problematic' in its own right. Futurelab's second business plan, released in May 2003, substantiated the expectations of Futurelab's various audiences as a key source of the observed tensions and enabled me to put these into perspective by analyzing them as part of a gradual organizational restructuring initiated 'from the ground-up', that is, brought about as the actors' pragmatic response to the conflicting expectations and interests of its stakeholders and the end users.

The third constraining feature of the research design – the reliance on key organizational members for data collection – was related to the previous two features. The decision to focus on these actors exclusively was partly the result of theoretical commitments (the focus on mediation and the recourse to experience in the absence of users, the treatment of 'audiences' in a broad sense), and partly an adaptation to the empirical developments which were affecting Futurelab during the fieldwork.

The focus on key organizational members (i.e. executives and department heads as distinct from 'lower level' actors) can be considered in the light of the fact that it included individuals who were technology producers, that is, part of a Production Team which included a Head of Technology, Head of Production, Head of Design, Project Manager and IT technician. Also, Futurelab was endowed with a state-of-the-art multimedia production and editing suite, as well as other technical devices (software and hardware) to aid in the design and production of ICTs.[89]

[89] As discussed in previous chapters, Futurelab's structure was such that those people involved in the nuts and bolts of research, design and production, happened to be executives or department heads as well; in one case, with no other staff working under their supervision (e.g. Head of Design, who was the sole designer) and in another, the department consisted of two Heads with different titles (Director of Learning and Head of Learning Research).

This initial situation changed as more employees were recruited and in line with the recounted shift which resulted in FL losing its production capabilities. But, at the outset, the focus on key organizational members effectively meant excluding five of 17 members of Futurelab's original full-time staff, namely, the Personal Assistant to the Chief Executive, External Relations Assistant, Finance and Business Assistant, Receptionist and Director of Technology. With the exception of the Head of Technology, who resigned early in 2003 before I could interview him, they were excluded on the grounds that they had no ostensible input in Futurelab's production activities and strategic planning, as measured by the criteria of attendance to Strategy and/or Project Meetings (cf. Section 4.4.2).

Given this initial situation, the focus on key organizational members rather than production teams was a consequence of the gradual transformation of Futurelab's structure and activities which entailed the 'contracting out' of its production capabilities, on the one hand, and my concomitant decision to focus exclusively on actors internal to Futurelab, on the other. This was a decision grounded in the desire to account fully for the transformation that was occurring, by treating the crucial interplay between FL and its audiences (potential partners and end users) as a 'problematic' in its own right – that is, as an issue perceived by the actors as a precondition to the production of prototypes, rather than as one sub-plot to the production of prototypes. (This commitment to a pragmatic approach was carried through to the empirical treatment and analysis in the form of the 'where do we start?' conundrum faced by the producers. In the light of Schön's theories discussed the previous section, this can be seen as an issue of 'problem setting' which precedes technical 'problem solving'.)

The commitment to a pragmatic approach was best carried out by focussing on those actors who had a general appreciation of Futurelab's relationships with its various audiences, rather than the geographically (and substantively) dispersed production teams that were largely isolated from the Futurelab environment and which, consequently, had limited knowledge of the other parts of the overall endeavour.[90] I focused on those persons enacting the mediations, as this offered a means of

[90] This explanation underlines the pertinence of Robin Williams's suggestion that the mediators' task in such circumstances is not so much to act as a bridge between the various audiences, as it is to keep them separate (personal communication).

generating a coherent understanding of the Futurelab producers' contribution to production and of the organization's transformation. [91]

This is in line with the focus, in STS studies, on such actors as 'system builders' (Hughes, 1986), 'heterogeneous engineers' (Law, 1987) or 'project initiators' (Callon, 1991) as methodological and analytical entry points into the networks of technological development. It also echoes Molina's (1994) interest in the 'constituency builders' who enable the perception-alignment of the various interests of relevant groups, and one of the key findings of Nicoll's (2000) study on the Cambridge Interactive Television Trial – namely, the importance of having one organization with a grasp of the 'big picture' of relevant constituencies in order to strengthen strategic alliances and drive the endeavour forward. Indeed, Nicoll's study stresses the reluctance of the one organization which fit this description (Acorn Om) to assume leadership responsibilities, as a key cause of the confused governance of projects and, ultimately, the breakdown of coordination between the various constituencies.

This rationale also applies to the decision to prioritize the Strategic Directorate Meetings and the data generated therein, rather than the Project Meetings. It was in the Strategy Meetings that Futurelab staff made explicit the links between the organization's purpose, outputs and audiences, whether in discussing prospective partnerships, activities (such as conferences and the Call for Ideas process) and internal issues, or issues of (business) strategy proper as discussed in Chapter 4. The focus on the strategy meetings was appropriate because they were a naturally occurring setting in which key issues and tensions were explicitly problematized by the actors themselves. This contrasted markedly with the fragmented discussions held in Project Meetings which, in addition, were much less consistent in terms of timetabling (cf. Chapter 4).

The research design for this study might have been more open to identifying activities (meetings or otherwise) where more concrete discussions relevant to mediation and the recourse to experience and expertise, and involving a broader range of actors, were held. Time considerations notwithstanding it might have been feasible to pursue more opportunities for observation that did not present themselves during the

[91] This need not have been an either/or dilemma between FL and the technical experts.

fieldwork due to communication issues (e.g. Project Meetings) and difficulties in planning (e.g. projects received through the CFI process).

The commitment to focussing on the problematic interplay between Futurelab's audiences (stakeholders and users) is not to suggest an endorsement of a dichotomy between the production and appropriation perspectives. However, the neglect of projects as such and of the teams responsible for much of the technical work made it difficult to put the producers' claimed experience-based expertise to the test by examining the alignment or otherwise of their projections with the perceptions of the intermediate and final users of these projects (cf. Akrich, 1995; Bardini, 2000; Nicoll, 2000; Oudshoorn, 2004). As a result, the analysis in this thesis does not give detailed consideration to specific technical considerations. It also may suggest to some readers that the FL producers were understood to act in strict accordance with their prior/concomitant social experience, with little consideration for the opportunities for adjustment (feedback) which would arise in confrontations with other kinds of actors (partners, funders, intermediate and real users). It is worth reiterating the characterization of production as a process of 'turn-taking' rather than co-design, in which the users provide a form of 'validation' or 'reality check' (cf. Section 6.2.2). Nevertheless, the data used to substantiate this view came from the producers and, thus, it is at one remove from the actual interactions. The data collected from these events was used in the design of ongoing interviews to inform themes and questions. Further analysis of first-hand data derived from producer-user interactions (i.e. the workshops, usability trials, conferences and project meetings) could yield a different interpretation of the research results.[92]

8.3.2. Further reflections on the shift in organisational figures and strategy

The narrative of Chapter 5 is presented so as to demonstrate the strong link between the actors' perceptions and Futurelab's structure and strategic orientation. It did not seek to frame the emergence of learning research as *either* an internal impetus (e.g.

[92] One, Size Matters (see Appendix A) was followed closely but was not analysed in detail for a number of practical reasons mainly concerned with access to its originator.

realignment brought about by workplace politics) *or* the direct result of business strategy (e.g. the appearance of a market opportunity).[93] For it appeared that a consensus among the core staff on the lab's purpose gradually informed the way the staff went about their activities – which to a large extent were yet to be defined given the organization's young age. If the organization is deemed to be instated by the actors' perceptions and actions, then one interpretation of the data is that what occurred was not so much a shift in strategy as a shift in structure and operations and that this reflected the social construction of Futurelab. A consensus on Futurelab's reason for being and the means whereby it would attain its objectives appeared to emerge, which effectively filled the void left by its initially stated objective – to unite all stakeholders in the production of prototypes. This objective was deemed unattainable in the context in which they were operating. This point is central to my argument presented in chapter 5 on the mechanics of the three-way relationship between producers and their two audiences.

As discussed in Chapter 5, once the organization's second business plan had been produced, I invited FL staff to reflect (and be reflexive) on what the external observer might perceive as a shift in strategy, suggesting that the 'new strategy' outlined in the official document ('to make the user the driver of all FL's activities') had had consistent manifestations in the internal discussions and 'soul-searching' observed from the beginning of the fieldwork.[94] Therefore, from an internal standpoint, the 'seismic shift' can be seen as having been one year in the making and the empirical narrative reflected on the long process of which the revised strategic positioning was the end result – as packaged 'for public consumption'. Thus, the second business plan seemed to crystallize what had been emerging in Year 1 – that is, the view of FL's staff that their main expertise was in their ability to act as proxy users in relationships with their prospective partners, not in their ability to build artefacts *per se*.

---

[93] For instance, the increasing influence of Futurelab's Head of Learning Research could be invoked in support of the former perspective. As mentioned, her post was created as a result of the case she put forward in her interview for the lone research position originally planned – that of Director of Learning. The position of Head of Learning Research was created so that both she and the then Director of Learning could be accommodated (Interview with Head of Research, 18 December 2002). As for the latter perspective (business opportunity), it is supported by much of the empirical data presented in Chapter 5 in relation to Futurelab's business partners and their expectations.

[94] In the 'first year review' interviews, the question 'Why state that 'the users WILL be made the driver of FL's activities when clearly they have been a major concern of yours from the outset? – prompted telling responses on the complexity of FL's engagement with its two kinds of audience, notably the Deputy Chief Executive's conflation of FL's 'markets' (of prospective partners; of end users).

This of course may not be a complete picture as it is not set against insights that might have been yielded by interviewing external actors. Some additional information was elicited, most notably from the CEO in an interview conducted after his departure, significant parts of which he requested be treated confidentially. In the light of what was revealed but which cannot be reported in this thesis, in the analytical phase of the research I was sensitised to what appeared to be two factions within Futurelab: one which maintained that the production of prototypes was of crucial importance, and another which argued that research needed to be privileged, whether it led to prototypes or not. Signs of this tension are present in the analysis in earlier chapters most notably in the discussion of the perceived expectations of Futurelab's various audiences and the status of prototypes as a means to attain certain objectives rather than an end as such.

That empirical account is strengthened by noting that the CEO appeared to be the sole member of the former camp (pro-artefact) who remained at Futurelab during my fieldwork (the other likely member, the Head of Production, left before such tensions were revealed). Following the CEO's departure from FL, I observed in the course of the empirical analysis that some substantive differences of opinion were coupled with conflicts of personality between the CEO and other executives. I elected not to press the remaining FL staff too strongly in the subsequent interviews on the matter of the CEO's departure in the interests of respecting my agreement to maintain confidentiality with respect to the one interview referred to above. In chapter 5 it was possible therefore only to hint at the complex situation with regard to the expectations of the various audiences and how Futurelab's structure evolved accordingly, reflecting important commitments (but also concessions) to its audiences and in respect to its claimed expertise.

The departure of FL's Head of Technology provided an opportunity to use the resulting gap to explore what he had meant to the organization (his perceive skill-set) and to explore the contrast between FL's requirements as far as technical expertise vs. social expertise. It is important to note here that his post (Head of Technology) was not left vacant. It was filled, initially on an interim basis and then permanently, by the person previously responsible for FL's internal IT services. By most accounts the new

position of Head of Technology was a diminished one, no longer comprising the responsibilities of technological foresight and strategic orientation that had been within the remit of the previous HT, who was referred to in several instances as a 'technology guru'. For this reason, this change is interpreted in Chapter 7 as a 'net loss' as far as Futurelab's technological capabilities were concerned (the Head of Production was also a 'net loss', as his position was abolished upon his departure).

The above elaboration of the circumstances encountered by FL's staff may be considered in the light of organizational and management studies literatures concerned with the concept of change in organizations, which has been a key issue of concern to scholars in these fields (Van de Ven and Poole, 1995; Weick and Quinn, 1999). The general conception of organizational change put forward by Lewin (1951) – change as a three stage process in which the organization is unfrozen, changed and refrozen – is still influential in the literature, if only as the paradigmatic conception against which alternatives are measured (Greenwood and Hinings, 1996; Dutton et al., 2001; Ginsberg and Abrahamson, 1991; Weick and Quinn, 1999). Numerous frameworks for the study of change have been proposed, each highlighting key factors such as its causes or triggers, units of measure, motors of implementation and so on. These are often discussed as part of a dialectical framework, for instance: planned vs. improvised change (Orlikowski, 1996; Weick, 1993); continuous vs. episodic change (Weick and Quinn, 1999); incremental vs. radical or fundamental change (Greenwood and Hinings, 1996; Mohrman et al., 2003); lastly, first-order vs. second-order change (Watzlawick et al., 1974 in Van de Ven and Poole, 1995).

Van de Ven and Poole's (1995) comprehensive and influential typology of approaches to organizational change (Weick and Quinn, 1999) produced four 'ideal-type theories', each grounded in conceptions of social change as mobilized in the social sciences. These theories are: life-cycle, teleological, dialectical and evolutionary (Van de Ven and Poole, 1995).[95] In the light of this typology, the account given of

[95] Van de Ven and Poole define the models as follows: '1. A *life-cycle model* depicts the process of change in an entity as progressing through a necessary sequence of stages. An institutional, natural, or logical program prescribes the specific contents of these stages; 2. A *teleological model* views development as a cycle of goal formulation, implementation, evaluation, and modification of goals based on what was learned by the entity. This sequence emerges through the purposeful social construction among individuals within the entity; 3. In *dialectical models* of development, conflicts emerge between entities espousing opposing thesis and antithesis that collide to produce a synthesis,

Futurelab's development in Year 1 in the preceding chapters may be seen as introducing a teleological conception of change. However, as discussed earlier in this section, my analysis of the data suggests that such a conception would be simplistic, and that alternative views are available. Specifically, while the empirical account in this thesis stresses the FL producers' social construction of the organization as a response to the environment of which it was perceived to be a part, greater consideration of this environment, that is, FL's institutional context and its affiliation to the DfES and NESTA, might be expected to give rise to a different view.

Of the remaining three models drawn up by Van de Ven and Poole, two consider factors external to the organization to explain change: the evolutionary and dialectical models. The evolutionary model often is applied to conceive of change as being prescribed and enacted in a top-down manner, and the dialectical model generally is applied to understand change in long-standing organizations, over longer periods of time. Van de Ven and Poole suggest that it is useful to consider how two different models of change may be combined in order to yield more powerful explanatory tools.[96] For example, this would allow one to consider whether it is feasible to reconcile a teleological conception which makes the FL's staff's perceptions the impetus of organizational change, with an evolutionary conception of FL's institutional environment in which its transformation could also be seen as the result of a year-long process of variation, selection and retention endorsed by FL's parent organizations, rather than a decision imposed from the top.

Greenwood and Hinings' (1996) conceptual framework offers a way forward as it addresses the interplay of 'exogenous (market context, institutional context) and endogenous dynamics (interests, values, power dependencies and capacity for action)' (1996: 1033) in bringing about radical organizational change. Of particular importance

---

which in time becomes the thesis for the next cycle of dialectical progression. Confrontation and conflict between opposing entities generate this dialectical cycle; 4. An *evolutionary model* of development consists of a repetitive sequence of variation, selection, and retention events among entities in a designated population. Competition for scarce environmental resources between entities inhabiting a population generates this evolutionary cycle.' (1995: 521-522; emphasis added)

[96] There is a broader conceptual problem than the remarks made above. As Weick and Quinn (1999) have argued, change is widely perceived as occurring when an organization shows signs of failure to adapt to its changing environment. Though this seems to have been the case at FL, one cannot look to inertia or resistance for the reasons for this failure, as the organization was less that one year old and, thus, its methods and culture were arguably not sufficiently 'frozen' so that a process of 'unfreezing' would be necessary. It seems likely that there was a different kind of dynamic at play.

to this interplay is the role of interests and 'value commitments'.[97] They assert that the single, most critical factor in explaining the possibility of radical organizational change is the pattern of value commitments within the organization, of which they flag four generic patterns: status quo commitment, indifferent commitment, competitive commitment and reformative commitment (ibid.: 1035).[98] Radical change can only occur, they argue, 'if interests become associated with a competitive or reformative pattern of value commitment' (ibid.: 1036) in which the organization's 'template-in-use' is questioned. This, in turn, is made all the more likely in 'situations of inconsistent cues and the absence of reinforcing institutional mechanisms' (ibid.: 1037) – arguably, a new organization with only a nascent culture provides a salient exemplar. Thus, insofar as Futurelab's 'template-in-use' at the beginning of this study was the expectation, formulated in its original business plan, that all of its activities would be subordinated to the production of prototypes and that this would please all its stakeholders, then Chapter 5 provides insight into how a pattern of competitive value commitment (between Production and Learning) gradually became one of reformative value commitment, as the lab's learning research capabilities were asserted as its key asset.

Greenwood and Hinings' framework applies mainly to large organizations and the internal power struggles of established subgroups in putting their interests and values forward – a model far more entrenched than FL's structure in Year 1. However, insofar as FL was dependent upon NESTA and the DfES for its core-funding and the allocation of various other resources and that it was in the last instance accountable to them, considering FL as a subgroup of these institutions helps to shed a somewhat different light on the various tensions within FL that have been discussed in earlier chapters. From this vantage point, FL's founding CEO appears more clearly as the

---

[97] They explain: 'Functionally differentiated groups [within the same organization] are not neutral and indifferent to other groups. (...) [I]n any organization are the seeds of alternative ways of viewing the purposes of that organization, the ways in which it might be appropriately organized, and the ways in which actions might be evaluated. (...) One outcome of such organizational differentiation is that groups seek to translate their interests into favourable allocations of scarce and valued organizational resources.' (ibid.)

[98] '1. *Status quo commitment*, in which all groups are committed to the prevailing institutionalized template-in-use. 2. *Indifferent commitment*, in which groups are neither committed nor opposed to the template-in-use. This situation is frequently one of unwitting acquiescence. 3. *Competitive commitment*, in which some groups support the template-in-use, whereas others prefer an articulated alternative. (This articulated alternative would have its origins in the institutional context.) 4. *Reformative commitment*, in which all groups are opposed to the template-in-use and prefer an articulated alternative.' (Greenwood and Hinings, 1996: 1035)

lone proponent of FL's status as a production facility, an observation that opens additional questions about the dynamic of the change process which occurred over a period of one year.

The research for this study might have given greater attention to the role of change agents (or 'champions of change', cf. Ginsberg and Abrahamson, 1991) in 'issue-selling' – the process whereby middle managers and other lower level actors persuade top management of the importance of certain issues (Dutton et al., 2001). However, while the research gave me an appreciation of how individuals presented issues to others in meetings and interviews, the research design made it difficult to address how the perceived need to bring about a fundamental change at FL was presented to institutions such as NESTA and the DfES in the months leading to the revised strategic orientation.

In sum, consideration of Futurelab's wider institutional context could have contributed to the analysis of the internal aspects of the change process and provided a basis for analysing the ways that NESTA and the DfES may have influenced the shift to research from production so early in Futurelab's existence.

8.4. Conclusion

This chapter has reflected on the theoretical, analytical and methodological commitments made in this thesis in order to further flesh out the approach and to highlight its limitations, thereby suggesting alternative avenues for future analysis. In particular, it discusses theoretical approaches that provide a basis for potentially complementary or alternative interpretations of the data presented in earlier chapters and methodological options that might have provided a basis for alternative interpretations of Futurelab's development and the role of mediators therein. These considerations inform the presentation of the study's general conclusions which follow in the next chapter.

CHAPTER 9

CONCLUSIONS

In setting out on this investigation, I sought to account for the manifestations of the producer-user interface in the production of new media technologies, that is, the means whereby the producers obtain knowledge of their intended recipients in order to enlighten decision-making in production and hence reduce the uncertainty that is endemic to innovation. My initial motivation stemmed from two widely accepted ideas in the social studies of science and technology: the impossibility to establish with absolute certainty that the intended recipients of a technology-in-the-making will indeed materialize and make the endeavour a success; and the notion that producers do not operate in a social vacuum. However, there is an extrapolation from these two premises which the conceptual approaches I term 'users-as-designers' make without hesitation, but which is at the heart of my reflection on production: that the intended users of a given artefact may be involved as active and consistent contributors in production in order to increase its likelihood of success.

I chose to account for the producer-user interface without positing the latter's direct involvement in production, based on the following suppositions: perhaps direct interaction is not strictly possible or even desirable in the eyes of producers in some circumstances, i.e. in some kinds of activities at certain times; conversely, perhaps in such circumstances the lay public *already is involved* through means other than direct interaction, but which by and large serve the same normative and practical function – to ensure the development of technologies based on the perceived wants and needs of users and guard against the excess of innovation for its own sake. The first supposition stemmed mainly from common sense, the second from media and communications theory, especially theories to do with the 'implied audience' and the social process of mediation.

These suppositions seemed perfectly in line with the spirit of social constructionism and its study of science and technology 'in the making' (or 'in action')

by 'following the actors', as they did not lose sight of the fact that, in the final analysis and despite their claims to 'co-design', 'user-led design' and the like, the decision-making process behind the production of technologies is driven by a limited number of individuals working within the four walls of a studio or laboratory. In other words, I wanted to maintain the focus of investigation on the producers themselves – who are, strictly speaking, the only actors who actually exist prior to a given artefact's instantiation – and to consider the users as perceived by them, not as a given analytically.

The need to focus on producers and to follow these actors above any others seemed obvious to me, yet it was not reflected in the social studies of science and technology literature. Indeed, in claiming the defeat of essentialism at the hands of historical and social contingency, social constructionist approaches have downplayed teleology and the intentions of individual producers in favour of interpretative flexibility and such notions. In the case of technologies meant for public use or mass diffusion, this shift has emphasized the relative autonomy of relevant social groups (i.e. potential users) in shaping a given artefact. Such developments have been useful for our understanding of the relationship between Technology and Society. However, they result in a distribution of power between all actors, producers and users alike, which did not seem reflected in practice or at least did not appear to me to be typical of production activities. The epistemological assumptions and practical consequences of such a distribution of power between producers and users – the use bias, overstated co-design and ontological divide – were criticized as being part of a paradigm of technical mediation and, thus, a hindrance to the study of contexts such as early innovation, so-called 'socially-driven' innovation and new media, in which no artefact exists and in which the users are essentially putative.

My criticism of technical mediation took account of more recent developments in STS which tackle the distribution of power (or epistemic authority) amongst social actors by questioning the criteria of participation in the spheres of scientific and technological decision-making through notions of experience and expertise, as well as conceptual elements of media and communications theory which treat the producers' relationship with their (putative) audiences. These presented a different set of problems in addition to their conceptual relevance, namely, the difficulty of treating knowledge

of people, not technical competence *per se*, as the key to the producers' specialism. Perhaps this study's greatest strength lies in the establishment of a dialogue between these two largely exclusive bodies of research (STS and media studies), such that both may be usefully extended as a result.

The above considerations were captured by this study's theoretical questions. The main theoretical question was: How can one account for the producer-user interface as it manifests itself in production, without positing the direct involvement of users? Its sub-questions were: 1) What (social) mechanisms take the place of direct user/audience involvement in the absence of actual audiences/users and how do these mechanisms shape a technological endeavour? 2) What do these mechanisms tell us about the claimed specialist knowledge of producers and prevailing notions of expertise?

In the first instance, this study claims to be a theoretical contribution to the social studies of technology and one way of taking up the challenge for sociological approaches to technology outlined by Saskia Sassen (2002: 365), which is 'not so much to deny the weight of technology, but rather to develop analytic categories that allow us to capture the complex imbrications of technology and society'. Indeed, it overcomes the limitations of technical mediation in proposing and illustrating alternatives to its three components which, taken together, enable a broader conception of the producer-user interface.

First, in response to the **use bias** which implies that the producer-user interface can be verified only in use, the study of Futurelab focussed on the timeframe of problematization and demonstrated that all the stakeholders/audiences concerned by the endeavour – most notably its projected users – have a hand in its shaping from the outset. Indeed, the producers' perceptions of their audiences pre-exist any specific artefact and determine the decisions that are made as to the organization's purpose, structure, methodology and outputs.

Second, the **overstated co-design** endemic to 'users-as-designers' approaches is countered by uncovering the producers' downplaying of the usefulness of direct user involvement in production and, instead, by stressing the more pervasive practice of

mediation whereby they speak on behalf of the absent users in order to give sense and direction to their work. This was further conceptualized through their portrayal as 'experience-based experts' – the producers claim the ability to contribute substantively to production by virtue of their relevant social experience gained in various contexts, not (primarily) their technical competence.

Third and in a related vein, the presumed **ontological divide** between producers and users was contested by illustrating that the spheres of production and reception overlap in the producers' experience, which is reactivated on an *ad hoc* basis in production (reflexivity). The most notable instances of overlap were captured by the producers' playing of the synthetic role of producer-user, which rests precisely on the claimed proximity between the social situation of production and other relevant social situations in which they can be said to be users.

On the whole, these findings challenge prevailing relativist characterizations of 1) the nature and forms of user involvement – users are seldom the object of social constructionist investigation proper, as technological artefacts are; in this study they are not taken for granted but rather their emergence is as uncertain as the materialization of artefacts; 2) the nature of the work of producers, which appears to hinge in a large measure on soft, social knowledge and not exclusively on technical capacities; and 3) the extent of the producer-user/audience interface, which through notions such as 'prior feedback', 'producer-user overlap', 'mediated quasi-interaction' and 'experience-based expertise' can be inscribed in the continuity of producers' social experience rather than being seen as an interaction purposely and strategically instated at a discrete moment, i.e. once a specific technology is materialized or when a technology is commissioned for a pre-defined group of users. The producer-user interface, and its various mediations, is more complex than prevailing 'users-as-designers' approaches allowed heretofore.

My findings are also a contribution to media and communication studies in demonstrating the importance of mediation *in* production, rather than *through* media products. In media studies, the term 'mediation' refers to the media's role – as a powerful purveyor of cultural products – in bridging the audience member's personal, subjective experience of the world with that of the wider community of which s/he is a

part, which thus takes on the status of objective reality. In the context of this study, the social process of mediation applies not to the macro-level media-as-institution, nor to the cognitive implications for the receivers. Rather, it applies to the individual producers who mediate between their own personal experience in various social contexts, on the one hand, and the context of production in which the 'reality' of audiences/users is collectively discussed and debated, on the other. Its integration with concepts borrowed from STS reconfigures mediation in such a way as to enable the characterization and analysis of what McQuail calls the 'elusive media skill' which he describes rather vaguely as pertaining to the producers' ability to engage with their audiences.

In so doing, 'mediation in production' helps to redress the imbalance, in media and communications theory, between approaches of reception which are predominantly micro-social in scope and approaches of production which remain largely macro-social. Indeed, approaches to reception stress the variability and social aspects of decoding, while theories of production still largely attribute technological and cultural products to structures, institutions, market forces and so on, by conducting political economic inquiries and/or content analyses of media texts. Such approaches may claim to address the encoding of technologies, yet in these cases encoding almost invariably designates a product rather than the process through which it was engendered. In short, although the symbolic power of media institutions is undeniable, this study suggests there is a layer of individual experience and action in production that must be accounted for as it has an ostensible and momentous effect on production. My conception of mediation *in* production rather than *through* media products enables such an analysis.

This study also claims to make a methodological contribution to studies of media and technology production. It stands as an argument for the necessary consideration of 'problematization in action' in order to capture what the producers consider to be the key issues to be sorted in this period of time. This implies the observation of meetings and interviews conducted in real time as opposed to a distillation of problematization into documents and retrospective interviews. Arguably, little of the data used in this study would have been available to me had I chosen either

retrospective analysis or to work exclusively using Futurelab's outputs (documents, project descriptions, etc.). There are two reasons for this.

The first is epistemological. As soft, social knowledge is generally treated by STS as a source of 'noise' to be reduced as opposed to a legitimate object of reliable knowledge, it is liable to elude the methodological net cast through the use of such 'inscription devices' and thus remain unaccounted for. The second reason is the sensitive nature of the data. The key tensions discussed in Futurelab's first year (purpose, methodology, outputs, etc.) were viewed as a potential hindrance to the image it projects to the outside world and thus were not deemed suitable for public consumption. Yet, this 'internal soul-searching' was by most accounts a necessary condition to Futurelab's 'focus' and eventually, to its working. Similarly, much of the data discussed in relation to the producers' methods of engaging with users and their recourse to social experience and reflexivity could conceivably be seen to undermine the image Futurelab sought to project to the outside world – commercial partners and the education sector could have construed these as indicative of a lack of organization and their vague talk about the users as ignorance of the market in which they sought to operate. Yet, these devices were shown to be crucial to the producers' specialism.

The methodological importance of access to the sites of problematization in action, in real time and in a sustained fashion (if not immersion proper), has implications for the replicability of this study. In the first instance, as the problems and issues were evolved through a process of grounded theory, I believe it would have been difficult for an external researcher to replicate the findings of this study without having first considered Futurelab at the specific time that I did and spent the time that I did at the organization, considering the same processes and speaking to the same individuals. For, although I had set out on this investigation with the same objective in mind that is stated throughout this thesis, the directions it took and the specific questions it engendered are inevitably bound to this specific set of circumstances. However, I am confident that with my coding tools and data in hand, an external researcher would draw broadly similar conclusions to mine with respect to this study's essential questions on the devices and substance of mediation and expertise. The narrative through which the findings were presented may well differ, but the results would be consistent with the ones presented here.

In focussing on a period of time in which the considered endeavour was fledgling and to some extent disorganized (as the DL put it: 'we are inventing ourselves'), this study could be seen to be hindered by a (arguably inevitable) trade-off: the relative absence of concrete technical artefacts to which to link the debates and decision-making process analyzed in depth. I originally intended to follow at least one specific project from beginning to end in order to explore the relevance of establishing such a link but for practical reasons I was unsuccessful. As mentioned in Chapter 4, it proved difficult to track Futurelab's projects as the use of 'project diaries' had not yet been implemented; I experienced communications problems with my interlocutors at Futurelab which made it difficult to stay up to date in terms of the incoming projects; in cases where projects were identified early enough, Futurelab's relevant partners seemed reluctant to be the object of my focus. Lastly, there *were* few artefacts to speak of, if any, as the discussions within the lab made clear (the DCE's acknowledgement of this situation; the producers panicking at the DfES' request to view outputs; the use of 'Hallmark moments' as an alternative to prototypes to entice partners).

But in the course of my research a justification for the lack of technical artefacts emerged: I had a nagging belief – which became an epistemological stance – that to claim a (causal) link between the resolution of specific debates and specific technical artefacts would be to endorse the very subtle positivist reasoning this thesis contests. Indeed, it would be (both 'going native' and) a breach of the STS tenet of symmetry in implying that the result of innovation explains the process.[99] I do not take the producers' accounts as complete and thorough accounts of the process, nor do I want to claim the completeness of my own account (could a specific artefact not be partly the result of discussions which I had not witnessed?).

[99] If I were to push the argument further, I would claim the need to take a page out of media studies: in the analysis of reception, researchers are content to consider the people's digested views on their consumption practices (rather than observing their consumption as such), while some ethnographic accounts observe the interactions of group members (e.g. family) on the topic of specific media content. But it is not required of these studies that the respondents' descriptions of their practices (e.g. how they use various media) be supported by evidence of their actual practice in order for them to be considered meaningful. We take their word for it, taking account of the inherent limitations this entails (they are an interpretation of given activities, not objective reality). So why require such material proof for accounts of production practices?

Instead, my study aimed to refute the completeness which 'users-as-designers' studies claim in establishing a causal link between user input and technical artefacts, between political savvy and technical artefacts. I wanted to show that soft forms of knowledge are not insignificant or illegitimate and that producers are not *just* producers (technologists, professionals, etc.) – they are social beings too. And in so doing I wanted to argue that debates around issues of access to technical decision-making and expertise are deficient if they do not take account of the pervasive, varied ways in which the producers represent the users in their absence. In sum, I do not claim to explain technology, but rather to shed light on certain social processes without which no sociological explanation of technology and/or the actors who drive it, would seem complete.

Accordingly, with regard to the production of specific technical artefacts the evidence in this study supports a case for the use of 'shaping' or 'determination' in a weak sense, as the latter is used in the political economy of communication (Garnham, 1990; cf. section 3.4.1). The producers' stance appears to make some future developments more likely than others. It may be seen to constrain, rather than dictate, subsequent technical developments. The producers' role as mediators does not appear to imply adopting an objective, disinterested approach to production – it is not only about discovering the learner's needs and then attempting to provide for them through technology. On the contrary, in order to drive projects, Futurelab's producers must have an overarching, clear sense of what they are setting out to achieve – and 'who it is for'. As I have illustrated, this has an impact on the organizations' structure and outputs and also the kinds of projects and partners that are valued.

These considerations notwithstanding, I would have liked to be in a position to make a stronger claim with respect to the material outcomes of the processes analyzed in this study, if only to short-circuit the criticism mentioned above and further define the empirical object of this research. Perhaps an avenue for future inquiry would be to start the analysis of such an endeavour at a similar period but to follow it for a longer length of time, at least to usability trials and, if possible, through to contexts of actual use. In so doing, the weak conception of 'determination' borrowed from political economy could be combined with the notions of material and symbolic 'shaping' used in social studies of technology to enable an assessment of the correspondence or

otherwise between what the producers had anticipated based on their experience and who the users effectively turned out to be. In carrying analysis through from production, then upstream to the producers' experience and then forward to reception (rather than just from production to reception), such an inquiry would extend the producer-user interface further in examining the relevance of the producers' experience, not just the effectiveness of their sampling methods and controlled experiments.

Does the relative absence of specific artefacts from this study hinder the generalisability of my findings? If problematization is primarily about user-related knowledge instead of technical decisions as such and the producers claim (contributory) expertise in this respect, then to what other contexts of production can this study's findings be extended? In terms of the specificity of Futurelab as a case study and hence the generalisability of this investigation's findings, a number of remarks can be made, in line with the dimensions of space and time (cf. chapter 2).

On the one hand, the findings around the concept of problematization and experience-based expertise are symptomatic of Futurelab's status as a 'studio laboratory' (Century, 1999), i.e. an endeavour premised upon socially-driven innovation, whose participants have varied backgrounds, whose social objectives are broadly defined (the enhancement of learning) and the anticipated material outcomes of which are largely open (digital technologies). On the other hand, the findings also flow from the particular timeframe of this inquiry, i.e. Futurelab's first year of activities as it seeks to come to grips with a product, but also to define its audience(s).

Both interpretations share a common denominator: the putative status of the users. Whether because all users cannot conceivably be involved (as for technologies meant for mass, public or wide-scale use) and/or because it is 'too early' in the process for users to actually be involved (pre-material settings), I want to argue that what makes this case study specific in respect to similar studies done within 'users-as-designers' approaches – and that which determines its generalisability – is *the need to mediate the users' presence in production*, which arises from their putative status.

My findings can be extended in line with this specificity, in both space (to what kinds of institutions can the findings be extended?) and time (to what period of innovation can they apply?). Indeed, they can be extended to similar institutions or endeavours (i.e. spatial contexts of production) which claim to be socially-driven and or aim to produce artefacts for public or wide-scale use. They may also apply to similar temporal contexts of production such as pre-production in media production or the early, pre-material stages of fledgling technological endeavours or established institutions (RD&D, blue skies research, etc.). These share the common denominator of putative users whose presence must be mediated in order to move forward.

In the absence of users and pre-determined technical constraints, the producers' attempts to identify relevant social groups are not amenable to market research whereby some subsets of a known population are gradually targeted and others dismissed. Nor do these attempts consist solely of the strategic identification and enrolment of partners into a process of design meant to address their own wants and needs, commercial or otherwise. Rather, the tension described by the producers in this study arises somewhere between these two models, from the need simultaneously to keep in play two groups with uncertain contours and which are dispersed temporally – the 'current' wants of prospective partners and the future wants of users. Or, more accurately, the wants of future users. The innovation process has been shown in this case study to require the enrolment of two sets of relevant groups that are dispersed in time, making it difficult for the producers reliably to premise one upon the other. The way forward was shown to lie in mediation, which was analyzed through the notion of experience-based expertise.

These remarks prompt a second response to the possible criticism that I treat new media technologies as a monolithic whole without unpacking their specificity, thus limiting this study's relevance. I want to argue that it is sufficient for this study to be nominally about the production of new media and/or 'socially-driven' technologies for it to shed light on that to which the producers turn for assurances as to the users' wants and needs in the absence of real users. The first reason is that those involved in 'socially-driven' innovation endeavours claim to make user needs their starting point. As such, regardless of the material form through which these needs may subsequently be addressed, the epistemological and social foundations of the producers' perceptions

are valid objects in their own right. Second, as argued in the introduction, the advent of new media makes a truism of the STS tenet that technologies are socially constructed, as surely the producers of digital, interactive, multimedia and content-rich technologies assume that their products will be put to a variety of uses, indeed, might be reinvented by the users. As a consequence, the management in production of putative uses and especially users is an issue worthy of investigation in its own right.

I would not want to be seen to neglect the producers' technical competence altogether as this would unduly skew the findings in relation to the producers' expertise and thus impede the conclusions that can be drawn from this study. But I do not believe that the arguments presented in this thesis would lead the reader to such a conclusion. Whether one makes user-related knowledge THE key to production or one treats it as a complement to technical competence, one thing is clear: studies of technology production – especially the production of technologies meant for a range of putative users, what in this study is termed (educational) new media – must include social knowledge as a legitimate object of their specialism.

In order to dissipate this ambiguity, another possible avenue for further inquiry lies in the refinement of analytical tools to better account for the intermingling of technical and social elements in production, in the spirit of Sassen's call discussed earlier. If, in the early stages of production, a crucial problem to be solved is that of identifying projected users and, as the foregoing suggests, the producers draw on their previous or concomitant social experience in doing so, then this calls into question the very distinction between contributory expertise and referred expertise, as the producer is both the holder and the object, in a sense, of the knowledge that is claimed. Perhaps experience-based expertise could reflect the producers' synthetic role of producer-user and allow for cumulative specialisms: the experts 'major' in one substantive field (in this case, social knowledge) and have a 'minor' in another (referred expertise in technical knowledge), perhaps depending on the state of the endeavour under study and the provenance of the of user-related claims.

In this respect, another set of analytical tools might be useful. As individuals draw on their experience with various social groups in settings removed spatially and/or temporally from their current 'technological' endeavour and which may or may

not have anything to do with technology as such, one could explore the varying degrees to which the audiences/users – as represented by the producers – emerge from social and/or technical considerations. For instance, in line with McQuail's (1987) characterization of the 'dual character' of the audience and building upon his typology of the 'origination' ('media-' vs. 'society-originated') and social features of audiences (mass, market, aggregate and/or social group), one could envisage a categorization of user-related knowledge according to its provenance. It would comprise: actual users of existing technologies (past or current); users in a generic sense (of 'technology' broadly conceived); people with no necessary link to technology, but conceived in relation to a specific cultural practice; people broadly conceived, with no necessary link to technology. Such a continuum could encompass figures of the user that range from the 'audience images' invoked by producers, to market research and the actual people who take part in tests and trials.

Such an enterprise would conceivably enhance our understanding of the complex imbrications of Technology and Society through the experience and expertise of the producers. As it now stands, this study is a useful step in this direction.

Since the mid-eighties relativist scholars have problematized the cognitive and political resources actors mobilize in carrying out scientific and technological endeavours. In his seminal paper on the sociology of translation, Callon (1986) argued that the origins of a technological project and its agents are irrelevant to its subsequent development. Fifteen years on, STS theorists, including Callon (2001; 2004) with his model of technical democracy, propose normative conceptions which establish the criteria of participation in the spheres of scientific and technological decision-making. These make technical competence the benchmark of legitimate contributions to decision-making. Similarly, in other areas of innovation studies, determinist conceptions of innovation such as Rogers' (1980) diffusionist paradigm have been widely shed, in recent years, in favour of approaches that stress the imperative of involving the users in the production process.

On the basis of this study, such assessments are just as well left to the actors.

REFERENCES

Akrich, M. (1995). 'User Representations: Practices, Methods and Sociology', in *Managing Technology in Society: The Approach of Constructive Technology Assessment,* Rip, A. T. Misa, and J. Schot (eds), New York: St. Martin's Press, pp. 167-184.

Akrich, M. (1992), 'The De-Scription of Technical Objects', in *Shaping Technology / Building Society: Studies in Sociotechnical Change*, Bijker, W. E. and J. Law (eds), Cambridge, MA: The MIT Press, pp. 205-224.

Allor, M. (1996), 'The Politics of Producing Audiences', in *The Audience and its Landscape*, Hay, J., L. Grossberg and E. Wartella (eds), Boulder, CO: Westview Press, pp. 209-219.

Alvarez, R. (2001), '"It was a great system": Face-work and the Discursive Construction of Technology during Information Systems Development', *Information Technology & People*, Vol. 14, No. 4, pp. 385-405.

Andersen, E. S. (1992), 'Approaching National Systems of Innovation', in *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*, Lundvall, B.-A. (ed), London and New York: Pinter Publishers, pp. 68-94.

Andersen, E. S. and B.-A. Lundvall (1988), 'Small National Systems of Innovation Facing Technological Revolutions: An Analytical Framework', in *Small Countries Facing the Technological Revolution*, Freeman, C. and B.-A. Lundvall (eds), London and New York: Pinter Publishers, pp. 9-36.

Anderson, B. (1983), *Imagined Communities: Reflections on the Origin and Spread of Nationalism*, London: Verso.

Ang, I. (1995), *Living Room Wars: Rethinking Media Audiences for a Postmodern World*, London and New York: Routledge.

Ang, I. (1991), *Desperately Seeking the Audience*, London: Routledge.

Appadurai, A. (1990), 'Disjuncture and Difference in the Global Cultural Economy', in *Global Culture*, Featherstone, M. (ed), London: Sage, pp. 295-310.

Bardini, T. (2000), *Bootstrapping : Douglas Engelbart, Coevolution, and the Origins of Personal Computing*, Stanford, CA: Stanford University Press.

Bardini, T., S. Proulx and D. Bélanger (2000), 'Des nouvelles de l'interacteur: phénomènes de convergence entre la télévision et Internet', *Sociétés et Représentations*, numéro 9, Paris: CREDHESS, pp. 161-180.

Bardini, T. (1996), 'Changement et réseaux sociotechniques: de l'inscription à l'affordance', *Réseaux,* numéro 76, Paris : CNET, pp. 125-155.

Bardini, T. and A. T. Horvath (1995), 'The Social Construction of the Personal Computer User: Rise of the Reflexive User', *Journal of Communication*, 45 (3), pp. 40-65.

Barnes, B. (1982), 'The Science-Technology Relationship: A Model and a Query', *Social Studies of Science*, Vol. 12, Issue 1 (February), pp. 166-172.

Becker, H. S. (1976), 'Art Worlds and Social Types', *American Behavioral Scientist*, Vol. 19, No. 6, pp. 703-718.

Becker, H. S. (1974), 'Art as Collective Action', *American Sociological Review*, Vol. 39, No. 6, pp. 767-776.

Beirne, M., H. Ramsay and A. Panteli (1998), 'Participating Informally: Opportunities and Dilemmas in User-Driven Design', *Behaviour & Information Technology*, Vol. 17, No. 5, pp. 301-310.

Bélanger, P. C. and P. Ross (1997), 'Vers une pédagogie de l'hyper-savoir?', *Journal of Distance Education*, Vol. XII (1/2), pp. 29-48.

Bereiter, C. and M. Scardamalia (1993), *Surpassing Ourselves: An Inquiry into the Nature and Implications of Expertise*, Peru (Illinois): Open Court Publishing.

Berger, P. and T. Luckmann (1966), *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, London: Doubleday.

Bessy, C. and F. Châteauraynaud (1995), *Experts et Faussaires. Pour une sociologie de la perception*, Paris: Éditions Métailié.

Bijker, W. E. (1995), *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*, Cambridge, MA: The MIT Press.

Bijker, W. E. and J. Law (1992a), 'General Introduction', in *Shaping Technology / Building Society : Studies in Sociotechnical Change*, Cambridge, MA: The MIT Press, pp. 1-14.

Bijker, W. E. and J. Law (1992b), 'Postscript: Technology, Stability and Social Theory', in *Shaping Technology / Building Society: Studies in Sociotechnical Change*, Cambridge, MA: The MIT Press, pp. 290-308.

Bijker, W. E., T. P. Hughes and T. J. Pinch (eds) (1987), *The Social Shaping of Technological Systems: New Directions in the Sociology and history of Technology*, Cambridge, MA: The MIT Press.

Bloor, D. (1976), *Knowledge and Social Imagery*, Chicago: The University of Chicago Press.

Bouiller, D. (1989), 'Du bon usage d'une critique du modèle diffusionniste: discussion-prétexte des concepts de Everett M. Rogers', *Réseaux*, numéro 36, Paris: CNET, pp. 31-51.

Bourdieu, P. (1985), 'The Market of Symbolic Goods', *Poetics*, Vol. 14, pp. 313-344.

Bourdieu, P. (1983), 'The Field of Cultural Production, or: The Economic World Reversed', *Poetics*, Vol. 12, pp. 311-356.

Bourdieu, P. (1979), *La distinction. Critique sociale du jugement*, Paris: Éditions de Minuit.

Brown, J.S. and P. Duguid (1994), 'Borderline Issues: Social and Material Aspects of Design', *Human-Computer Interaction*, Vol. 9, pp. 3-36.

Buckingham, D. (2000), *After the Death of Childhood: Growing Up in the Age of Electronic Media*, Cambridge: Polity Press.

Burgess, R. G. (1984), *In the Field: An Introduction to Field Research*, London: Routledge.

Burns, T. (1977), *The BBC: Public Institution and Private World*, London and Basingstoke: The MacMillan Press.

Burt, R. S. (1999), 'The Social Capital of Opinion Leaders', *The Annals of the American Academy*, AAPSS, Vol. 566 (November), pp. 37-54.

Burt, R. S. (1992), *Structural Holes: The Social Structure of Competition*, Cambridge, MA: Harvard University Press.

Button, G. and W. Sharrock (1998), 'The Organizational Accountability of Technological Work', *Social Studies of Science*, Vol. 28, No. 1, London, Thousand Oaks, CA and New Delhi: Sage, pp. 73-102.

Callon, M. (2004), 'The increasing involvement of concerned groups in R&D policies: what lessons for public powers?' in *Science and Innovation: Rethinking the rationales for funding and governance*, Geuna, A., A. J. Salter and W. E Steinmueller (eds), Aldershot: Edward Elgar.

Callon, M., P. Lascoumes and Y. Barthe (2001), *Agir dans un monde incertain. Essai sur la démocratie technique*, Paris: Seuil.

Callon, M. (1991), 'Techno-economic networks and irreversibility', in *A Sociology of Monsters: essays on power, technology and domination*, Law, J. (ed), London: Routledge, pp. 132-161.

Callon, M. (1986), 'Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of Saint Brieuc Bay', in *Power, Action and Belief: a new Sociology of Knowledge?*, Law, J. (ed.), Sociological Review Monograph 32, London: Routledge and Kegan Paul: pp. 196-233.

Century, P. (1999), 'Pathways to Innovation in Digital Culture', paper available at: http://www.music.mcgill.ca/~mcentury/PI/PImain.html.

Ciborra, C. (2002), *The Labyrinths of Information: Challenging the Wisdom of Systems,* Oxford: Oxford University Press.

Cicourel, A. and K. Knorr-Cetina (eds) (1981), *Advances in social theory and methodology: toward an integration of micro- and macro-sociologies*, Boston, MA: Routledge and Kegan Paul.

Clayton, N. (2002), 'SCOT: Does it Answer?', *Technology and Culture*, Vol. 43 (April), pp. 351-360.

Coleman, J. S. (1990), *Foundations of Social Theory*, Cambridge, MA and London: the Belknap Press of Harvard University Press.

Coleman, J. S., E. Katz and H. Menzel (1966), *Medical Innovation: A Diffusion Study*, New York: Bobs Merrill.

Coleman, J. S., H. Menzel and E. Katz (1957), 'The Diffusion of an Innovation Among Physicians', *Sociometry*, No. 20, pp. 253-270.

Collins, H. M. and R. Evans (2002), 'The Third Wave of Science Studies: Studies of Expertise and Experience', *Social Studies of Science*, Vol. 32, No. 2, pp. 235-296.

Collins, H. M. (2001), 'Tacit Knowledge, Trust and the Q of Sapphire', *Social Studies of Science*, Vol. 31, No. 1 (February), pp. 71-85.

Collins, H. M. and S. Yearley (1992), 'Epistemological Chicken', in *Science as Practice and Culture*, Pickering, A. (ed.), Chicago, IL: The University of Chicago Press, pp. 301-326.

Collins, H. M. (1981), 'Stages in the Empirical Programme of Relativism', *Social Studies of Science*, Vol. 11, pp. 3-10.

Constant, E. W. (1999), 'Reliable Knowledge and Unreliable Stuff: On the Practical Role of Rational Beliefs', *Technology and Culture*, Vol. 40 No. 2, pp. 324-357.

Cooper, G. and S. Woolgar (1993), *Software is Society made Malleable: The Importance of Conceptions of Audience in Software and Research Practice*, Policy Research Paper No. 25, Economic and Social Research Council/Centre for Research in Innovation Culture and Technology (CRICT).

Couldry, N. (2003a), 'Being Elsewhere: The Politics and Methods of Researching Symbolic Exclusion', in *The Politics of Place*, T. Cresswell and G. Verstraete (eds), Amsterdam: Rodopi Press, pp. 109-124.

Couldry, N. (2003b), 'Passing Ethnographies: Rethinking the Sites of Agency and Reflexivity in a Mediated World', in *Global Media Studies: Ethnographic Perspectives*, P. Murphy and M. Kraidy (eds), New York and London: Routledge, pp. 40-56.

Cowan, R., P. A. David and D. Foray (2000), 'The Explicit Economics of Knowledge Codification and Tacitness', *Industrial and Corporate Change,* Vol. 9, No. 2, pp. 211-253.

Cowan, R. and D. Foray (1997), "The Economics of Codification and the Diffusion of Knowledge", *Industrial and Corporate Change*, Vol. 6, No. 3, pp. 595-622.

Cutcliffe, S. H. and C. Mitcham (eds) (2001), *Visions of STS: counterpoints in science, technology and society studies*, Albany, NY: State University of New York Press.

Darking, M. L. (2004), *Integrating on-line learning technologies into higher education: a case study of two UK universities*, Unpublished PhD Thesis, London: The London School of Economics and Political Science.

Dornfeld, B. (1998), *Producing Public Television, Producing Public Culture*, Princeton, NJ: Princeton University Press.

Dutton, J. E., S. J. Ashford, R. M. O'Neill and K. A. Lawrence (2001), 'Moves That Matter: Issue Selling and Organizational Change', *Academy of Management Journal*, Vol. 44, No. 4, pp. 716-736.

Edquist, C. (1997), 'Systems of Innovation Approaches – Their Emergence and Characteristics', in *Systems of Innovation: Technologies, Institutions and Organizations*, Edquist, C. (ed), London and Washington: Pinter, pp. 1-35.

Eisenstein, E. (1993), *The Printing Revolution in Early Modern Europe*, Oxford: Oxford University Press.

Elliott, P. (1978), *The Making of a Television Series*, London: Constable.

Entman, R. and S. Herbst (2001), 'Reframing Public Opinion as We Have Known It', in *Mediated Politics*, L. Bennett and R. Entman (eds), Cambridge: Cambridge University Press, pp. 203-225.

Esquenazi, J.-P. (2003), *Sociologie des publics*, Paris: La Découverte.

Etzioni, A. and O. Etzioni (1999), 'Face-to-face and computer-mediated communication: A comparative analysis', *The Information Society*, Vol. 15, pp. 241-248.

Faulkner, W., J. Fleck and R. Williams (1998), 'Exploring Expertise: Issues and Perspectives' [introduction], in *Exploring Expertise: Issues and Perspectives*, R. Williams, W. Faulkner and J. Fleck (eds), London: MacMillan, pp. 1-28.

Faulkner, W. (1994), 'Conceptualizing Knowledge Used in Innovation: A Second Look at the Science-Technology Distinction and Industrial Innovation', *Science, Technology & Human Values*, Vol. 19, No. 4, pp. 425-458.

Fleck, J. (1998), 'Expertise: Knowledge, Power and Tradeability', in *Exploring Expertise. Issues and Perspectives*, Williams, R., W. Faulkner and J. Fleck (eds), London: MacMillan, pp. 143-172.

Fleck, J. (1997), 'Contingent Knowledge and Technology Development', *Technology Analysis & Strategic Management*, Vol. 9, No. 4, pp. 383-397.

Fleck, J. (1994), 'Continuous Evolution – Corporate Configurations of Information Technology', in *Management of Information and Communication Technologies: Emerging Patterns of Control*, Mansell, R. (ed), London: ASLIB, pp. 178-206.

Flichy, P. (2002), 'New Media History', in *Handbook of New Media: Social Shaping and Consequences of ICTs*, Lievrouw, L. A. and S. Livingstone (eds), London, Thousand Oaks, CA and New Delhi: Sage, pp. 136-162.

Flichy, P. (1999), 'The Construction of New Digital Media', *New Media & Society*, Vol. 1, No. 1, pp. 33-39.

Flichy, P. (1995), *L'innovation technique. Récents développements en sciences sociales. Vers une nouvelles théorie de l'innovation*, Paris: Éditions La Découverte.

Fourez, G. (1997), 'Scientific and Technological Literacy as a Social Practice', *Social Studies of Science*, Vol. 27, pp. 903-936.

Freeman, C. (1994), 'The Diffusion of Information and Communication Technology in the World Economy in the 1990s', in *Management of Information and Communication Technologies: Emerging Patterns of Control*, Mansell, R. (ed), London: ASLIB, pp. 336-347.

Freeman, C. (1992), *The Economics of Hope: Essays on Technical Change, Economic Growth and the Environment*, London and New York: Pinter Publishers.

Freeman, C. (1987), *Technology Policy and Economic Performance: Lessons from Japan*, London: Frances Pinter.

Freeth, M. and K. Henning (2000), *The NESTA Future Learning Lab: Business Plan*, prepared for the Department for Education and Employment, transmitted electronically to author, in confidence.

Fulk, J. and G. DeSanctis (1995), 'Electronic Communication and Changing Organizational Forms', *Organization Science*, Vol. 6, No. 4, pp. 337-349.

Gans, H. J. (1957), 'The Creator-Audience Relationship in the Mass-Media: An Analysis of Movie Making', in *Mass Culture: The Popular Arts in America*, Rosenberg, B. and D. Manning White (eds), Glencoe, IL: The Free Press, pp. 315-324.

Garfinkel, H. (1967), *Studies in Ethnomethodology*, Englewood Cliffs, NJ: Prentice-Hall.

Garnham, N. (1990), 'Media Theory and the Political Future of Mass Communication', in *Capitalism and communication: global culture and the economics of information*, Inglis, F. (ed), London: Sage, pp. 1-19.

Giddens, A. (1979), *Central Problems in Social Theory. Action, Structure and Contradiction in Social Analysis*, London: MacMillan.

Gingras, Y. (1995), 'Un air de radicalisme. Sur quelques tendances récentes en sociologie de la science et de la technologie', *Actes*, numéro 108, pp. 3-17.

Ginsberg, A. and E. Abrahamson (1991), 'Champions of Change and Strategic Shifts: The Role of Internal and External Change Advocates', *Journal of Management Studies*, Vol. 28, No. 2, pp. 173-190.

Glevarec, H. (2001), *France Culture à l'œuvre. Dynamique des professions et mise en forme radiophonique*, Paris: CNRS Éditions.

Goffman, E. (1959), *The Presentation of Self in Everyday Life*, London: Penguin Books.

Goody, J. (1987), *The Logic of Writing and the Organization of Society*, Cambridge: Cambridge University Press.

Gow, G. A. (2003), *Canadian Telecommunications Policy and the National Disaster Mitigation Strategy: Observing Wireless E9-1-1*, Unpublished PhD Dissertation, Burnaby, BC: Simon Fraser University.

Granovetter, M. S. (1978), 'Threshold Models of Collective Behavior', *American Journal of Sociology*, Vol. 83, No. 6, pp. 1420-1443.

Granovetter, M. S. (1973), 'The Strength of Weak Ties', *American Journal of Sociology*, Vol. 78, No. 6, pp. 1360-1380.

Green, N. (2001), 'How Everyday Life Became Virtual: Mundane Work at the Juncture of Production and Consumption', *Journal of Consumer Culture*, Vol. 1 No. 1, pp. 73-92.

Greenwood, R. and C. R. Hinings (1996), 'Understanding Radical Organizational Change: Bringing Together the Old and the New Institutionalism', *Academy of Management Review*, Vol. 21, No. 4, pp. 1022-1054.

Hacking, I. (1999), *The Social Construction of What?*, Cambridge, MA and London: Harvard University Press.

Hacking, I. (2002), 'Inaugural lecture: Chair of Philosophy and history of Scientific concepts at the Collège de France, 16 January 2001', *Economy and Society*, Vol. 31, No. 1, pp. 1-14.

Hall, S. (1986), 'On Postmodernism and Articulation: An Interview with Stuart Hall', by L. Grossberg, *Journal of communication Inquiry*, Vol. 10, No. 2, pp. 45-60.

Hall, S. (1980 [1973]), 'Encoding/Decoding', in *Culture, Media, Language: Working Papers in Cultural Studies, 1972-79*, Centre for Contemporary Cultural Studies (Ed.), London: Hutchinson, pp. 128-38.

Hartley, J. (1992), *Tele-ology*, London: Routledge.

Henning, K. (2000), *'The Learning Game.' Educational Software in the UK: Challenges and Opportunities*, commissioned by NESTA and transmitted electronically to author, in confidence.

Hennion, A. (1989), 'An Intermediary between Production and Consumption: the Producer of Popular Music', *Science, Technology and Human Values,* Vol. 14, pp. 400-424.

Hine, C. (2001), 'Web Pages, Authors and Audiences: The Meaning of a Mouse Click', in *Information, Communication & Society*, Vol. 4, No. 2, pp. 182-198.

Hoffman, R. R. (1998), 'How Can Expertise Be Defined? Implications of Research from Cognitive Psychology', in *Exploring Expertise. Issues and Perspectives*, Williams, R., W. Faulkner and J. Fleck (eds), London: MacMillan, pp. 81-100.

Holstein, J. and J. Gubrium (1997), 'Active Interviewing', in *Qualitative Research: Theory, Method, and Practice,* Silverman, D. (ed) London: Sage, pp. 113-129.

Hughes, T. P. (1986), 'The Seamless Web: Technology, Science, Etcetera, Etcetera', *Social Studies of Science*, Vol. 16, Issue 2 (May), pp. 281-292.

Hughes, T. P. (1983), *Networks of Power: Electrification in Western Society, 1880-1930*, Baltimore, MD: Johns Hopkins University Press.

Innis, H. A. (1999), *The Bias of Communication*, Toronto: University of Toronto Press.

Johnson, B. (1992), 'Institutional Learning', in *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*, Lundvall, B.-A. (ed), London and New York: Pinter Publishers, pp. 23-44.

Katz, E. and P. Lazarsfeld (1955), *Personal Influence: The Part Played by People in the Flow of Mass Communications*, New York: Free Press.

Katz, E. (1957), 'The Two-Step Flow of Communication: An Up-To-Date Report on a Hypothesis', *Public Opinion Quarterly*, Vol. 21, pp. 61-78.

Kleinman, D. L. (1998), 'Untangling Context: Understanding a University Laboratory in the Commercial World', *Science, Technology and Human Values*, Vol. 23, No. 3, pp. 285-314.

Kling, R. (2000), 'Learning about Information Technologies and Social Change: The Contribution of Social Informatics, *The Information Society*, Vol. 16, pp. 217-232.

Knorr-Cetina, K. (1999), *Epistemic Cultures: How the Sciences Make Knowledge,* Cambridge, MA: Harvard University Press.

Kotamraju, N. P. (2002), 'Keeping Up: Web Design Skill and the Reinvented Worker', in *Information, Communication and Society*, Vol. 5, No. 1, pp. 1-26.

Kuhn, T. (1970), *The Structure of Scientific Revolutions*, Chicago, IL: University of Chicago Press.

Latour, B. (1991), *Nous n'avons jamais été modernes. Essai d'anthropologie symétrique*, Paris: La Découverte.

Latour, B. (1991), 'Technology is Society Made Durable', in *A Sociology of Monsters: Essays on Power, Technology and Domination*, Law, j. (ed), London and New York: Routledge, pp. 103-131.

Latour, B. (1989), *La science en action. Introduction à la sociologie des sciences*, Paris: Gallimard.

Latour, B. (1988), 'The Politics of Explanation: An Alternative', in *Knowledge and Reflexivity : New Frontiers in the Sociology of Knowledge*, Woolgar, S. (ed), Newbury Park, CA: Sage Publications, pp. 155-177.

Latour, B. and S. Woolgar (1986) [1979], *Laboratory Life: The Construction of Scientific Facts*, Princeton, NJ: Princeton University Press.

Law, J. and V. Singleton (2000), 'Performing Technology's Stories: On Social Constructivism, Performance and Performativity', *Technology and Culture,* Vol. 41, No. 4, pp. 765-775.

Law, J. and J. Hassard (eds) (1999), *Actor Network Theory and After*, Oxford: Blackwell Publishers/The Sociological Review.

Law, J. and M. Callon (1992), 'The Life and Death of an Aircraft: A Network Analysis of Technical Change', in *Shaping Technology / Building Society: Studies in Sociotechnical Change*, Bijker, W. E. and J. Law (eds), Cambridge, MA: The MIT Press, pp. 21-52.

Law, J. (1991), *A Sociology of Monsters: Essays on Power, Technology and Domination*, London: Routledge.

Law, J. (1987), 'Technology and Heterogeneous Engineering: The Case of Portuguese Expansion', in *The Social Construction of Technological Systems*, Bijker, W. E., T. P. Hughes and T. Pinch, (eds), Cambridge, MA: MIT Press, pp. 111-134.

Lazarsfeld, P. (1944), 'Remarks on Administrative and Critical Communications Research', *Studies in Philosophy and Science*, Vol. 9, pp. 3-16.

Lenoir, T. (1994), 'Was the Last Turn the Right Turn? The Semiotic Turn and A.J. Greimas', *Configurations*, Vol. 1, pp. 119-136.

Leonard-Barton, D. (1988), 'Implementation as Mutual Adoption of Technology and Organization', *Research Policy*, Vol. 17, pp. 251-267.

Lievrouw, L. A. (2002), 'Determination and Contingency in New Media Development: Diffusion of Innovations and Social Shaping of Technology Perspectives', in *Handbook of New Media: Social Shaping and Consequences of ICTs*, Lievrouw, L. A. and S. Livingstone (eds), London, Thousand Oaks, CA and New Delhi: Sage, pp. 183-199.

Livingstone, S. (2004), 'The Challenge of Changing Audiences: Or, What is the Audience Researcher to do in the Age of the Internet?', *European Journal of Communication*, Vol. 19, No. 1, pp. 75-86.

Livingstone, S. (1999), 'New media, new audiences?', *New Media & Society*, Vol. 1, No. 1, pp. 59-66.

Livingstone, S. (1998), 'Audience Research at the Crossroads: The "Implied Audience" in Media and Cultural Theory', *European Journal of Cultural Studies*, Vol. 1, No. 2, pp. 193-217.

Livingstone, S. and P. K. Lunt (1994), *Talk on Television: Audience Participation and Public Debate,* London and New York: Routledge.

Lundvall, B.-A. (1992a), 'Introduction', in *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*, Lundvall, B.-A. (ed), London and New York: Pinter Publishers, pp. 1-22.

Lundvall, B.-A. (1992b), 'User-Producer Relationships, National Systems of Innovation and Internationalisation', in *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*, Lundvall, B.-A. (ed), London and New York: Pinter Publishers, pp. 45-67.

Lynch, M. (1993), *Scientific Practice and Ordinary Action: Ethnomethodology and Social Studies of Science*, Cambridge: Cambridge University Press.

Mackay, H., C. Carne, P. Beynon-Davies and D. Tudhope (2000), 'Reconfiguring the User: Using Rapid Application Development', *Social Studies of Science*, Vol. 30, No. 5 (October), pp. 737-757.

MacKay, H. and G. Gillespie (1992), 'Extending the Social Shaping of Technology Approach: Ideology and Appropriation', *Social Studies of Science*, Vol. 22, No. 4 (November), pp. 685-716.

Mackenzie, D. and J. Wajcman, (eds) (1999), *The Social Shaping of Technology*, Buckingham: Open University Press.

Mackenzie, D. (1989), 'From Kwajalein to Armageddon? Testing and the social construction of missile accuracy, in *The Uses of Experiment*, Gooding, D., T. J. Pinch and S. Schaffer (eds), Cambridge: Cambridge University Press, pp. 409-436.

Mansell, R. (2002), "From Digital Divides to Digital Entitlements in Knowledge Societies", in *Current Sociology*, Vol. 50, No. 3, London, Thousand Oaks, CA and New Delhi: Sage, pp. 407-426.

Mansell, R. (1994), 'Negotiating the Management of ICTs – Emerging Patterns of Control', in *Management of Information and Communication Technologies: Emerging Patterns of Control*, Mansell, R. (ed), London: ASLIB, pp. 336-347.

Mansell, R. (1993). *The New Telecommunications: A Political Economy of Network Evolution*. London: SAGE.

Mansell, R., and R. Silverstone (eds.) (1996), *Communication by Design*, Oxford: Oxford University Press.

Marcus, G. E. (1998), *Ethnography Through Thick and Thin*, Princeton, NJ: Princeton University Press.

Martin-Barbero, J. (1993), *Communication, Culture and Hegemony: From the Media to Mediations,* London: Sage Publications.

Mason, J. (1996), *Qualitative Researching*, London, Thousand Oaks, New Delhi: Sage.

McLuhan, M. (1962), *Understanding Media: the extensions of man*, London: Routledge.

McQuail, D. (1997), *Audience Analysis*, London, Thousand Oaks, CA and New Delhi: Sage Publications.

McQuail, D. (1987), *Mass Communication Theory: An Introduction* (Second Edition), London: Sage.

Merton, R. K. (1968), *Social Theory and Social Structure* (enlarged edition), New York: The Free Press.

Meyrowitz, J. (1985), *No Sense of Place: The Impact of Electronic Media on Social Behavior*, Oxford: Oxford University Press.

Miller, D. and D. Slater, (2000), *The Internet: An Ethnographic Approach,* Oxford: Berg.

Miller, J. and B. Glassner (1997), 'The "Inside" and the "Outside": Finding Realities in Interviews', in *Qualitative Research,* Silverman, D. (ed), London: Sage Publications, pp. 99-112.

Mohrman, S. A., R. V. Tenkasi and A. M. Mohrman Jr (2003), 'The Role of Networks in Fundamental Organizational Change: A Grounded Analysis', *The Journal of Applied Behavioral Science*, Vol. 39, No. 3, pp. 301-323.

Molina, A. H. (1994), 'The Generation of Large-Scale Capability-Building Initiatives – Extending the Sociotechnical Constituencies Perspective', in *Management of Information and Communication Technologies: Emerging Patterns of Control*, Mansell, R. (ed), London: ASLIB, pp. 90-120.

Monge, P. R. and N. Contractor (1999), 'Emergence of Communication Networks', in *Handbook of Organizational Communication* (2nd Edition), Jablin, F. M. and L. L. Putnam (eds), Thousand Oaks, CA: Sage Publications.

Monge, P. R., J. Fulk, M. E. Kalman, A. J. Flanagin, C. Parnassa and S. Rumsey (1998), 'Production of Collective Action in Alliance-Based Interorganizational Communication and Information Systems', *Organization Science*, Vol. 9 No. 3, pp. 411-433.

Monge, P. R., M. Cozzens and N. Contractor (1992), 'Communication and Motivational Predictors of the Dynamics of Organizational Innovation', *Organization Science*, Vol. 3, No. 2, pp. 250-274.

Morley, D. (1992), *Television, Audiences and Cultural Studies*, London: Routledge.

Negus, K. (1992), *Producing Pop: Culture and Conflict in the Popular Music Industry*, London: E. Arnold.

Nelson, R. R. and S. Winter (1982), *An evolutionary theory of economic change*, Cambridge, MA: Belknap Press.

NESTA Futurelab (2003), *Business Plan 2003-04*, transmitted electronically to author, in confidence.

NESTA Futurelab (2002a), *Futurelab*, promotional brochure obtained by author in November 2002.

NESTA Futurelab (2002b), *Strategic Aims*, promotional brochure obtained by author in November 2002.

Nicoll, D. W. (2000), 'Users as Currecy: Technology and Marketing Trials as Naturalistic Environments', *The Information Society*, Vol. 16, pp. 303-310.

Nowotny, H., P. Scott and M. Gibbons (2001), *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty*, Cambridge: Polity Press.

Orlikowski, W. J. (1996), 'Improvising Organizational Transformation Over Time: A Situated Change Perspective', *Information Systems Research*, Vol. 7, No. 1, pp. 63-92.

Orlikowski, W. J. (1992), 'The duality of technology: Rethinking the concepts of technology in organizations', *Organization Science*, Vol. 3, No. 3, pp. 398-427.

Oudshoorn, N., E. Rommes and M. Stienstra (2004), 'Configuring the User as Everybody: Gender and Design Cultures in Information and Communication Technologies', *Science, Technology & Human Values*, Vol. 29, No. 1, pp. 30-63.

Pacey, A. (1999), *Meaning in Technology*, Cambridge, MA: The MIT Press.

Pacey, A. (1980), *The Culture of Technology*, Oxford: Basil Blackwell.

Parker, C. and M. Sinclair (2001), 'User-Centred Design Does Make a Difference. The Case of Decision Support Systems in Crop Production', *Behaviour & Information Technology*, Vol. 20, No. 6, pp. 449-460.

Pickering, Andrew (1995), *The Mangle of Practice: Time, Agency and Science*, Chicago, IL and London: The University of Chicago Press.

Pickering, A. (ed) (1992), *Science as Practice and Culture*, Chicago, IL: University of Chicago Press.

Pinch, T. J. (1993), '"Testing – One, Two, Three... Testing!": Toward a Sociology of Testing', *Science, Technology and Human Values*, Vol. 18, No. 1, pp. 25-41.

Pinch, T. J. and W. E. Bijker (1984), 'The social construction of facts and artefacts: or how the sociology of science and the sociology of technology can benefit each other', *Social Studies of Science,* Vol. 14, pp. 399-441.

Polanyi, M. (1967), *The Tacit Dimension*, New York: Doubleday.

Pool, I. De Sola and I. Schulman (1959), 'Newsmen's Fantasies, Audiences, and Newswriting', *Public Opinion Quarterly*, Vol. 23, Issue 2 (Summer), pp. 145-158.

Poster, M. (1999), 'Underdetermination', *New Media & Society*, Vol. 1, No. 1, pp. 12-17.

Richardson, G. (1991), *Feedback Thought in Social Science and Systems Theory*, Philadelphia: University of Pennsylvania Press, 1991.

Rogers, E. M. (1995), *Diffusion of Innovations* (Fourth Edition), New York: The Free Press.

Roscoe, T. (1999), 'The Construction of the World Wide Web audience', *Media, Culture & Society*, Vol. 21, pp. 673-684.

Sassen, S. (2002), 'Towards a Sociology of Information Technology', *Current Sociology*, Vol. 50, No. 3, pp. 365-388.

Sawyer, S. and K. Eschenfelder (2002), 'Social Informatics: Perspectives, Examples and Trends', in *Annual Review of Information Science and Technology*, 36, Cronin, B. (ed), Medford, NJ: Information Today, Inc./ASIST, pp. 427-465.

Sawyer, S. and H. Rosenbaum (2000), 'Social Informatics in the Information Science: Current Activities and Emerging Directions', *Informing Science*, Vol. 3, pp. 89-96.

Schatzki, T. R., K. Knorr-Cetina and E.Von Savigny, (eds) (2001), *The Practice Turn in Contemporary Theory*, London and New York: Routledge.

Schlesinger, P. (1978), *Putting 'reality' together: BBC news*, London: Constable.

Schön, D. (1983), *The Reflective Practitioner: How Professionals Think in Action*, Aldershot: Ashgate.

Schot, J. and A. A. de la Bruheze (2003). 'The Mediated Design of Products, Consumption, and Consumers in the Twentieth Century', in *How Users Matter*, Oudshoorn, N. and T. Pinch (eds), Cambridge, MA and London: the MIT Press, pp. 229-245.

Schot, J. (1998), 'Constructive Technology Assessment Comes of Age: The birth of a new politics of technology', in *Technology Policy Meets the Public (PESTO papers II)*, Jamison, A. (ed.), Aalborg: Aalborg University: pp. 207-232.

Schramm, W. and W. Danielson (1958), 'Anticipated Audiences as Determinants of Recall', *Journal of Abnormal and Social Psychology*, Vol. 56, pp. 282-283.

Schumpeter, J. A. (1934), *The Theory of Economic Development*, Cambridge, MA: Harvard University Press.

Searle, J. R. (1995), *The Construction of social Reality*, London: Penguin Books.

Senker, J. (1998), "The Contribution of Tacit Knowledge to Innovation", in *Exploring Expertise. Issues and Perspectives*, Williams, R., W. Faulkner and J. Fleck (eds), London: MacMillan, pp. 223-244.

Silverstone, R. (2005), 'The Sociology of Mediation and Communication', in *The Sage Handbook of Sociology*, Calhoun, C., C. Rojek and B. Turner (eds.), London: Sage, pp. 188-207.

Silverstone, R. (1999a), *Why Study the Media?*, London, Thousand Oaks, CA and New Delhi: Sage.

Silverstone, R. (1999b), 'What's New About New Media?', *New Media & Society*, Vol. 1, No. 1, pp. 10-12.

Silverstone, R., E. Hirsch and D. Morley (1992), 'Information and communication technologies and the Moral Economy of the Household', in *Consuming Technologies: Media and Information in Domestic Spaces*, Silverstone, R. and E. Hirsch (eds.) London, Routledge, 15-31.

Silverstone, R. (1985), *Framing Science: The Making of a BBC Documentary*, London: British Film Institute.

Slack, J. D. and J. M. Wise (2002), 'Cultural Studies and Technology', in *Handbook of New Media: Social Shaping and Consequences of ICTs*, L. A. Lievrouw and S. Livingstone (eds), London, Thousand Oaks, CA and New Delhi: Sage, pp. 485-501.

Slack, J. D. (1989), 'Contextualizing Technology', in *Rethinking Communication, vol. 2: Paradigm Exemplars*, B. Dervin, L. Grossberg, B. J. O'Keefe and E. Wartella (eds), Newbury Park, CA: Sage, pp. 329-345.

Star, S. L. and G. Bowker (2002), 'How to Infrastructure', in *Handbook of New Media: Social Shaping and Consequences of ICTs*, L. A. Lievrouw and S. Livingstone (eds), London, Thousand Oaks and New Delhi: Sage Publications, pp. 151-162.

Star, S. L. and J. Griesemer (1989), 'Institutional Ecology, Translations and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology (1907-1939)', *Social Studies of Science*, vol. 19, London: Sage, pp. 387-420.

Stehr, N. (1994), *Knowledge Societies*, London, Thousand Oaks, CA and New Delhi: Sage.

Steinmueller, W. E. (2000), "Will New Information and Communication Technologies Improve the "Codification" of Knowledge?", *Industrial and Corporate Change*, Vol. 9, No. 2, pp. 361-376.

Suchman, L., R. Trigg and J. Blomberg (2002), 'Working artefacts: ethnomethods of the prototype', *British Journal of Sociology, Special Issue: Workplace Studies,* Heath, C. and G. Button (eds), Vol. 53, No. 2, pp. 163-179.

Suchman, L. (1987), *Plans and situated Actions: The Problem of Human-Machine Communication*, Cambridge: Cambridge University Press.

Thompson, J. B. (1995), *The Media and Modernity: A Social Theory of the Media*, Cambridge: Polity Press.

Turner, S. (2001), 'What is the Problem with Experts?', *Social Studies of Science*, Vol. 31, No. 1 (February), pp. 123-149.

Valente, T. W. and R. L. Davis (1999), 'Accelerating the Diffusion of Innovations Using Opinion Leaders', *The Annals of the American Academy*, AAPSS, Vol. 566 (November), pp. 55-67.

Valente, T. W. (1995), *Network Models of the Diffusion of Innovations*, Cresskill, NJ: Hampton Press Inc.

Valente, T. W., and E. M. Rogers (1995), 'The origins and development of the diffusion of innovations paradigm as an example of scientific growth', *Science Communication, Vol. 16,* pp. 242-273.

Van de Ven, A. H. and M. S. Poole (1995), 'Explaining Development and Change in Organizations', *Academy of Management Review*, Vol. 20, No. 3, pp. 510-540.

von Hippel, E. and M. Tyre (1995). 'How learning by doing is done: Problem identification in novel process equipment', *Research Policy*, Vol. 24, pp. 1-12.

von Hippel, E. (1986), 'Lead Users: A Source of Novel Product Concepts', *Management Science*, Vol. 32, No. 7 (July), pp. 791-805.

Wajcman, J. (2002), 'Addressing Technological Change: The Challenge to Social Theory', *Current Sociology*, Vol. 50, No. 3, pp. 347-363.

Warner, M. (2002), 'Publics and Counterpublics', *Public Culture*, 14 (1), pp. 49-90.

Weick, K. E. and R. E. Quinn (1999), 'Organizational Change and Development', *Annual Review of Psychology*, Vol. 50, pp. 361-386.

Weick, K. E. (1993), 'Organizational Redesign as Improvisation', in *Organizational Change and Redesign*, Huber, G. P. and W. H. Glick (eds), New York: Oxford University Press, pp. 346-379.

Williams, R. (1981), *The Sociology of Culture*, London: Fontana.

Williams, R. (1974), *Television, Technology and Cultural Form*, London: Routledge.

Williams, R., J. Stewart and R. Slack (2005), *Social Learning in Technological Innovation: Experimenting with Information and Communication Technologies*, Cheltenham: Edward Elgar.

Williams, R. and D. Edge (1996), 'What is the Social Shaping of Technology?', *Research Policy*, Vol. 25, pp. 856-899.

Winner, L. (1995), 'Political Ergonomics', in *Discovering Design: Explorations in Design Studies,* Buchanan, R. and V. Margolin (Eds.), Chicago, IL: University of Chicago Press, pp. 146-170.

Woolgar, S. (1991), 'Configuring the user', in *A Sociology of monsters: essays on power, technology and domination*, Law, J. (ed), London: Routledge, pp. 57-102.

Woolgar, S. (1988), 'Reflexivity is the Ethnographer of the Text', in *Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge,* Woolgar, S. (Ed.), London: Sage, pp.14-34.

Woolgar, S. and M. Ashmore (1988), 'The Next Step: an Introduction to the Reflexive Project, in *Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge,* Woolgar, S. (Ed.), London: Sage, pp.1-11.

Wynne, B. (1989), 'Sheep Farming after Chernobyl: A Case Study in Communicating Scientific Information', in *Environment*, Vol. 31, No. 2, pp. 10-39.

Yapp, C. (2003), 'Transforming Education for the e-Connected World', in *The e-Connected World: Risks and Opportunities*, Coleman, S. (ed), Montreal-Kingston, London and Ithaca: McGill-Queen's University Press, pp. 69-78.

Ziman, J. (1984), *An Introduction to Science Studies: The Philosophical and Social Aspects of Science and Technology*, Cambridge: Cambridge University Press.

Ziman, J. (1978), *Reliable Knowledge: An Exploration of the Grounds for Belief in Science*, Cambridge: Cambridge University Press.

Zimmerman, C. and R. A. Bauer (1956), 'The Effect of an Audience Upon What is Remembered', *Public Opinion Quarterly*, Vol. 20, Issue 1 (Spring), pp. 238-248.

APPENDICES

APPENDIX A: Futurelab Project and Event Descriptions

1. Size Matters
2. Savannah
3. Tableaux
4. Digital Childhoods Conference Brochure

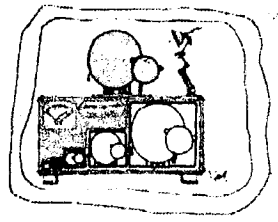
1. Size Matters

NESTA Futurelab

transforming the learning landscape

Size Matters

Team
Andrew Lovelock
Alan Snow, illustrator
NESTA Futurelab: Martin Owen, Mary Ulicsak, Jo Morrison



Technology
Director

Outline

The Size Matters prototype was designed to act as an interactive exhibit in science centres to be used alongside a range of hands-on activities, for children aged 11-14. The prototype was developed to explore whether an engaging series of simulations, that showed hamsters being enlarged to the size of a moon, and elephants ranging from pocket sized to 'ginormous', would trigger children to ask questions about how size affects structure.

Rather than 'telling' children about how gravity and centrifugal force play a role in these processes, the prototype provides a series of simulations and 'thought experiments' intended to trigger discussion amongst users, encouraging further play with the software and further experimentation with other resources along the same themes.

Learning Research Objectives

The focus for the development and research was on whether a visually engaging set of simulations, informed by key principles of physics, would be able, within a science centre or school setting, to:

1. Engage children with questions of size and scale.

2. Generate discussion, hypothesis formulation and reflection.

3. Enable children to apply ideas learnt through using the prototype in other areas.

Research and Development Process

The Size Matters software was developed in-house, with Andrew Lovelock, a partner who had initiated the idea for the software at NESTA Futurelab's Science Simulation Creative Incubation Lab, leading the prototype development. The software was trialled during June and July 2003 in a number of locations, including evaluations with families and school groups at Bristol's Explore Science Centre; with teachers and year 6, 7 and 8 children at Luckwell Primary School and Bedminster Down School, Bristol; with a group of physics undergraduates; and with teachers and researchers with specific interest in children with special educational needs.

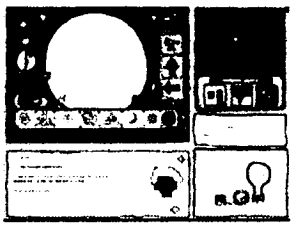
NESTA Futurelab

Findings

The research produced a series of key findings relating both to the specific software, and to the design and development of such resources in future.

1. Thought experiments are useful in triggering debate, although to maximise benefit of the prototype, this sort of simulation and stimulation activity needs to be used in conjunction with other activities, such as expert mediation from teachers or others, or through hands-on activities using a range of other resources.

2. Verbal instructions and sound effects are demonstrably significant in triggering student attention and engagement. These may also play an important role in enabling students with special educational needs to engage with these types of resources.



Screenshot of planet-sized hamster

3. Early involvement of target audiences and educational experts in the concept and early design stages is likely to play a significant role in improving the quality of educational resources.

4. Developers producing similar materials need to ensure that there is a clear 'fit' between the 'look and feel' of resources and the age groups for which they are designed in terms of educational content.

Children at Luckwell Primary School, Bristol, using Size Matters

Next Steps

Having completed the prototype design and evaluation phases, Andrew Lovelock is currently consulting with a number of partners to explore how the prototype might be taken further within a science centre setting.

Contacts

Andrew Lovelock
NESTA Futurelab Jo Morrison

2. Savannah

NESTA Futurelab

Savannah

Team

NESTA Futurelab: Jo Morrison, Keri Facer
Mobile Bristol: Richard Hull,
Ben Clayton, Stuart Martin
BBC: Mark Jacobs, Tim Scoones
MRL: Steve Benford, Martin Flintham,
Duncan Rowland

Technology

Global positioning system
Wireless network
Games server
Handheld devices
Software applications

Outline

Imagine 'being' a lion, imagine the sights and sounds you would come across, imagine the challenges you would face to stay alive, to protect your cubs, to ensure your pride's survival in the face of manmade and natural obstacles. Then imagine what it would be like to enable children to experience this first hand as part of their education

The Savannah project is an ambitious combination of games technology with mobile computing and innovative approaches to teaching and learning. It aims to support Year 7 children to become collaborative, creative and imaginative learners in the field of ecology and ethology. The prototype consists of two related areas of activity. In the first, children play at 'being lions' in a playing field, interacting with a virtual Savannah and exploring the opportunities and risks to lions in that space. Children are given GPS-linked PDAs through which they 'see', 'hear' and 'smell' the world of the Savannah as they navigate the real space outdoors. The second domain, the 'den', is an indoors space where children can reflect on how they have succeeded in the game, can access other resources to support their understanding, and can further develop strategies for surviving as lions in the virtual Savannah.

The project brings together the motivation of games play, with the near magical quality of wireless computing to create an engaging world where children learn through a cycle of experience and reflection, of 'being' animals and reflecting on animal behaviour in their environment.

Learning Research Objectives

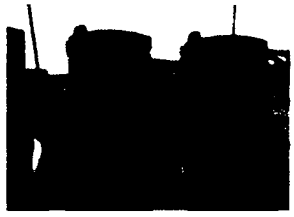
In this project NESTA Futurelab is addressing three related top-level research questions

1 Is it possible to create an iterative learning process that combines experiential learning with reflective development of understanding?

2 How can we exploit the new opportunities offered by wireless technologies to create collaborative and active learning experiences outside the classroom?

3 How can games technology be used to create a compelling and engaging learning experience?

NESTA Futurelab



Mobile hand-held devices

Children in the den

Research and Development Process

The Savannah project originated in a three-way discussion between NESTA Futurelab, the BBC's Natural History Unit and colleagues at Hewlett-Packard working within the Mobile Bristol Initiative. The interests of these three groups married through a shared interest in creating engaging experiences, and in the potential offered by both the new wireless GPS technologies and the BBC's archive of natural history footage.

Preliminary concepts for a 'lion game' were trialed in 2002 with Year 7 children at Cotham School in Bristol through a design a game workshop led by NESTA Futurelab, and with science teachers in Bristol. Following this, the concept was refined through iterative discussions between all the partners before the Mixed Reality Lab at Nottingham University were commissioned in May 2003 to implement the Savannah games server using their experience in mixed virtual/reality gaming.

A three day workshop at Hewlett Packard in September 2003 brought all parties together, along with interface designers, a science teacher, an experienced documentary maker and researchers. Savannah was trialled over five days at the The-i City Learning Centre in Bristol in November. Following further development of the prototype and pedagogy full trials will be conducted in March 2004, with results from the project available in May 2004.

Partners:

NESTA Futurelab coordinates the project and provides the educational research and trials needed to explore its effectiveness as a learning experience. The project brings together the expertise of Mobile Bristol's wireless computing initiative, with the BBC's longstanding experience in Natural History and the Mixed Reality Lab's track record in creating virtual/physical games experiences.

NESTA Futurelab- Project Management, Content Design and Educational Research
BBC Content Design
Hewlett-Packard/Mobile Bristol
Wireless Technology and experience research

Contacts

NESTA Futurelab: Jo Morrison

3. Tableaux

NESTA Futurelab

transforming the learning landscape

Tableaux

Team
Donna Burton-Wilcock Director of Education, Immersive Education
NESTA Futurelab: Martin Owen, Keri Facer
Cotham School, Bristol

Outline

Tableaux starts from the premise that we can use technology that is normally used to create typical, 3D viewpoint 'shoot-'em-up games for education. The aim is to put the power of the software into the hands of learners to create their own interactive visions. It is a world simulator. The built-in real physics of objects, movement through 3D space, and the ability to animate virtual actors provide a narrative story telling tool that is unique.

As a first step towards unleashing this potential, Immersive Education, in collaboration with NESTA Futurelab, has developed a prototype that creates a virtual TV studio. This virtual studio has a range of scenes, props and a cast of actors who can move and speak. The actors can adopt general behaviours like affectionate or aggressive and carry through these behaviours in body language when moving or speaking. Students can put their own voice or pre-recorded voices into the mouths of actors.

Learning Research Objectives

Tableaux is potentially a powerful tool for young people and teachers to create narratives, documentaries, sketches and reflections on ideas. As such, it is not intended (at least in its current form) to 'teach' specific skills or content areas. Rather, our collaboration in this area was around identifying how a powerful new tool for communication and creativity might be used in schools.

The focus for the research on the Tableaux project, therefore, was to identify:

1. How Tableaux might support children's communication and creative processes.

2. How Tableaux might be used across the curriculum, and within English as a specific subject area.

3. How the design of Tableaux might be improved to further support children's working processes.

Research and Development Process

While Immersive has been developing Tableaux for some time, NESTA Futurelab became involved earlier this year in order to bring the experiences of teachers and learners to bear on the development process. As a first stage, NESTA Futurelab ran a teacher workshop, with nine teachers from English, history, citizenship, drama and media studies subject areas, and the designers and educational advisors from Immersive Education.

NESTA Futurelab

transforming the learning landscape

Screenshot of the Tableaux interface

R and D Process Ctd.

The second phase comprised a six week design research study at Cotham School in Bristol, where the learning research team from NESTA Futurelab and the education and design team from Immersive worked with an English teacher and 15 year 8 students on a sustained curriculum activity. The students worked in groups of three to develop virtual inserts for regional television news. This provided the students with lots of scope for expression and demonstrated their understanding of genre and the ways in which particular media forms can be used to represent their ideas.

Findings

Several key areas were worthy of attention:

1. In the design of tools to support creative production it seems clear now that we need to exploit the potential of working in a non-linear fashion offered by digital technologies. Combining editing, scripting and performance processes, rather than separating these out into different stages, is clearly supported by the technology and actively exploited by today's school children.

2. Teachers, particularly in the English and media studies departments, saw clear uses for a tool such as this for all ages. Teachers in citizenship saw potential applications for international collaboration, and teachers in history saw its potential for recreating and reflecting on different historical interpretations.

What the Tableaux research forces us to ask is, when we have these tools available in schools - how best can we support children to become creative producers of digital resources, and how can we enable teachers to collaborate on these activities across the curriculum?

Contacts

Immersive Education: Donna Burton
Wilcock
NESTA Futurelab: Martin Owen

Partners

The development of Tableaux is based on Immersive's use of technical and design platforms pioneered by the computer games industry and uses conventional PC technology.

Tableaux was developed by Immersive Education, with financial and research support from NESTA Futurelab. Immersive Education is a global education publishing business based in Oxford and London. It develops innovative software solutions for use by teachers, pupils and parents, designed for schools and homes. Immersive Education also publishes curriculum-based offline support materials for teaching in the form of lesson plans, activity suggestions and units of work that function alongside its software platforms.

Next Steps

NESTA Futurelab and Immersive Education are currently in discussion around the possible next stages for further collaboration.

4. Digital Childhoods Conference Brochure

David Puttnam, Chairman of Enigma Productions, is best known for his movie credits. He is equally committed to the field of education, serving as an adviser to a number of UK Government departments as Chancellor of the University of Sunderland, and a governor and lecturer at the London School of Economics. As Chairman of the National Endowment for Science, Technology and the Arts (NESTA) he has a particular interest in the learning and teaching of young children.

Professor Mike Cole, [illegible], University of California, San Diego and **Charles Crook**, Reader in Psychology, University of Loughborough

Mike Cole is the originator of the Fifth Dimension after-school programmes that involve cooperation between local community organisations such as YMCAs, and colleges and universities. He and Charles Crook outline the major schools of thought in terms of children's development, social identities and cognitive functioning.

Dr Lydia Plowman, Senior Lecturer, University of Stirling Institute of Education

Formerly a teacher in secondary schools for nine years, Lydia Plowman currently manages a project studying interaction with digital toys in after-school clubs and children's homes. Addressing issues such as the significance of play in learning, how children learn through play and what 'play' is, this presentation draws on research evidence and identifies the main schools of thought in this field.

Jocelyn Stevenson, Senior Vice President, Global Creative Production, HIT Entertainment

Jocelyn Stevenson has written, produced and created several television series for young children, including Sesame Street and The Hoobs and is currently responsible for all the creative output of HIT Entertainment. Using specific programmes she explores how television has enabled young people to learn through play, the key features of programming that support this and the future role of television in playful learning.

Cathy Barrick, Producer, CBBC

Input CBBC is a research pilot project to encourage more user-generated content from children, for a long-term vision where showing a child's film on CBBC is as common place as showing a child's painting is now. It also aims to examine the potential for a peer-to-peer broadband magazine for kids. This is a collaboration between CBBC's Future TV Unit and Ultralab.

Kimiko Ryokai, Researcher, MIT Medialab

Kimiko Ryokai examines the notion that for younger children, it is often more appropriate to design tools for learning that are not screen-based, and instead to allow interaction with artefacts. The talk explores the form of such artefacts, their key features and the implications for the role of children's imaginations while using them.

Dr Lieselotte van Leeuwen, Research Fellow, University of Sunderland

This session gives practical examples of how to develop co-design sessions with children of different ages. Lieselotte is a perception-action psychologist specialising in designing for and with children. In the last five years she has concentrated on developing concepts and prototypes for toys and learning tools.

Dai Griffiths and Professor Josep Blat, Universitat Pompeu Fabra, Barcelona

The 4Tel, a prototype robotic toy for supporting children's reflection on perception and cognition, was designed in partnership with three schools across Europe. This case study discusses the central role of the children throughout the project, and the impact of this experience on the participants. Dai and Josep examine the practicalities of incorporating the co-design process into classroom activities, together with the organisational, pedagogical and ethical issues this raises.

Stephanie Gould, Online Editor for Children, BBC

Stephanie demonstrates games and material devised for some of the BBC's latest productions such as the animated Tikkabilla Zoo and celebratory material from the Fimbles created for the CBeebies first birthday. Stephanie has a wealth of knowledge about what compels pre-school children to use online materials, drawn from her experience in the field.

Paul Nuttall, Head of [illegible], Granada Learning

Paul Nuttall focuses on the new range of software from Granada Learning's At the... series. Paul looks at the educational rationale for the series, which complements role play in early years practice, the development of the software interface and studies examples of its use.

An opportunity to view a collection of the most innovative examples currently available or in development in this field. Try out the devices, see behind the scenes in the production process, and talk to the designers.

educational

In addition to fine food and drink, this evening goes beyond conventional networking to give delegates an opportunity to get involved in their own play and learning experience with a collection of entertaining and challenging games.

Simon Fuller, Deputy Managing Director, 4Learning

4Learning, the education division of Channel 4, has a remit that includes the provision of innovative and distinctive television and online resources for children at home and in school. This presentation focuses on the relationship between television and online with particular emphasis on The Hoobs, for pre-school; The Number Crew, for 5-7 year olds, and GridClub, for 7-11 year olds.

Anna Home, Chief Executive, The Children's Film & Television Foundation

Anna Home is former Head of Children's Programmes at the BBC and has a wealth of experience in communicating with children through this medium. She takes a long view of the benefits and drawbacks of TV for children and looks at whether its output should be controlled, and if so how.

Peter Maggs, New Media Education Specialist, Australian Children's Television Foundation (ACTF)

Peter Maggs outlines how children as young as 5 can take on the role of creative content developers. Whether a concept needs to be displayed, a story told, a process demonstrated or a dialogue initiated, the child can be empowered to do so at home or in the classroom. The ACTF has created a diverse, creative online community of young storytellers, designers, inventors, poets and artists, where participation is facilitated by a unique set of multimedia construction tools called Kahootz that allow students and teachers to create, exchange, inform and collaborate.

These workshops are designed to allow smaller groups of delegates to focus on particular ideas. You'll be unable to take a back seat in these sessions where participation and molding ideas is the norm. Facilitated by recognised experts, these sessions give the added value of interaction with peers from different sectors to make a sparky, creative mix. You will have the opportunity to attend two of the following six workshops:

- **Susan Brumpton** of The Making Place looks at play and learning
- **Leon Cych** of All Souls School, Westminster on children as co-designers
- **Peter Maggs** of the Australian Children's Television Foundation on linking home & school
- **Yasmin Valli** of Leeds Metropolitan University looks at early years learning
- **Colin Hughes** of Learn.co.uk addresses the potential impact of games technologies and design in education
- **Lego** explore the tangible interfaces for early-years learners

Keri Facer, Head of Learning Research, NESTA Futurelab

The extent to which there is a new 'digital generation' of young people growing up in homes rich with digital technologies, and how this might impact on their play, learning and social identities, is the main theme of this keynote. Keri explores what schools can learn from this interaction with technologies at home.

Doug Brown, Divisional Manager in ICT in Schools Division, DfES

Doug Brown outlines what the government sees as the future of learning for under-10s. Technology is just starting to have an impact on teaching and learning methods and will continue to change practice in our schools. Doug identifies the key concerns that we should be aware of, with particular reference to the special needs of the under-10s group. The presentation projects up to ten years into the future to look at what primary schools may look like then, how they will have changed, and what we need to do now to guide those changes.

NESTA Futurelab
1 Canons Road
Harbourside
Bristol BS1 5UH

Tel: +44 (0) 117 915 8200

Email: info@nestafuturelab.org

Website: www.nestafuturelab.org

APPENDIX B: Interview Guides

Case study of *NESTA Futurelab*
February 2003

Interview guide (background interview)

Individual background

- Can you tell me about the first time you heard about NESTA Futurelab and the events that led you here – right up to the moment you took up the post?
- What is your job description? What made you the right person for it?
- What other expertise and experience do you feel are key to the work you do at FL, professional or otherwise (e.g. parenting)?
    - Do you have a specific example of when this came in handy?
- Is there anything else about your background we have not discussed and which you feel may help me understand your contribution to FL?

Futurelab and its purpose

- Where does FL fit in 'the grand scheme of things'? Can you describe FL's activities, in general terms? What are its key features?
- What makes it an original or important endeavour in your eyes?
- Who do you feel are the main stakeholders in FL – not just financially, but socially, culturally, etc.? In other words, who stands to benefit from the work you do, and how? Who stands to lose?

Workplace interactions

- Can you describe a typical workday and working week? Can you describe the kinds of meetings you have?
- You are creating technology - are you all 'technologists'? Can you comment on the balance between people with more socio-cultural expertise on the one hand, and 'technologists' on the other? What do these labels mean in practice?
- Looking at FL's organizational structure, could you say a few words on the activities/responsibilities of each department and your colleagues, as you see them?
- Were you involved in the recruitment of any other colleague? If so, could you give a general assessment of why they were recruited?

- How are you reminded, if at all, of 'what is important' as you carry out your work on a daily basis?

- Do you think your own appreciation of FL's purpose is shared by all your colleagues, that it is a constant, driving force?

- What would you say are the main sources of friction or disagreement?
  - Do you have a specific example?

- When there are problems, what are the processes whereby a way forward is sought?

- Conversely, what works well in terms of group dynamics? Have there been instances when you've felt you were all pushing in the same direction and that 'things were happening'?
  - Do you have a specific example?

Outcomes

- In broad terms, what would Futurelab have to achieve in order to be considered a success, for you personally?
  - In your colleagues' view?
  - In your partners' view?
  - In the educational community's view?
  - In NESTA's view?

- What concrete steps have been made in this direction in the lab's first year?

- (Prompt about the Science Simulation Lab if necessary)

- In the short term, what specific projects/activities do you think are particularly promising, and why?

- What kinds of activities would you like to see Futurelab involved with, which perhaps it isn't at the moment?

- Regardless of time and financial constraints... If you could set out, chronologically, the steps to be taken to successfully carry out a project, what would that plan look like?

Other

- Is there anything we haven't covered which you feel would be important to my appreciation of Futurelab, its purpose, its structure, its activities and its individual members?

Case study of *NESTA Futurelab*
14 February 2003

Interview guide (update interview)

10.30 [Chief Executive Officer]

Please complete, or comment on, the following statements:

- *Education as we know it (in Britain) isn't working – it is failing...*
- *FL is in the process of establishing a new paradigm in the science of education, much like scientists explore and push the boundaries of hard science, replacing old paradigms with new ones.*
  - What is the difference between hard science and FL's activities?
  - What needs to be done for the new paradigm to be widely accepted?
  - Who should have a say in validating this new paradigm?

Call for Ideas:

- What is the purpose of the CFI? Whose ideas are you looking for and how are they evaluated? Why not just collaborate with commercial partners who have experience in R&D?
- What were successes and shortcomings of the initial CFI in your eyes? How would you like the process to be carried out this year? What areas need to be prioritised? Do you have a timetable?

Current and upcoming projects/events:

- Can you tell me about some of the work currently underway which you feel is promising in terms of fulfilling some of FL's key objectives?
  - Size Matters.
- Virtual Puppeteers: tell me about the school visit earlier this week? Is that kind of fieldwork a sure-fire way of finding out what will work?
- What is the difference between 'giving users what they want or like' and 'giving them what is good for them'?

Other:

- Are there any other developments you feel I should be aware of?

Case study of *NESTA Futurelab*
30 June 2003

Interview guide (first-year review)

[Deputy Chief Executive]

Futurelab and its purpose

- If FL isn't just 'about technology', what is it about? What is being produced here? (knowledge, content, etc.)

- In what respect is FL a lab? How does it compare to other labs you have been in?

- Thinking of everything that is produced here for FL's audiences and stakeholders, can you go through the list of outputs and say a few words about the purpose they serve and whom they are for?

    - Learning research
    - Events
    - Literature reviews
    - Prototypes
    - CFI
    - Website

- Has the picture you have just drawn changed over the course of FL's first year?

First year review

- In the latest business plan, it says that 'the learner will be at the heart of all FL activities'. What does this mean? How is this different from the way things were done in the 1st year?

- Has FL managed to establish itself as a key player in the field of education and digital technologies, in the eyes of the following communities? What do you think these communities see as your key assets and conversely, what do you feel they see as FL weaknesses?

    - Educational community
    - Creative community
    - Technology community
    - Policymakers
    - General public
    - Potential innovators

- In terms of the organizational structure there has been a shift in the last few months, with Technology and Production shrinking, whilst the Learning Team has grown. Is there a strategic reason for this? New position of Production Manager?

- In terms of [the CEO]'s succession, has that been sorted?
- What kinds of activities would you like to see FL involved with, which perhaps it isn't at the moment?
- Can you give me a general assessment of FL's first year? Key successes and areas for improvement?

APPENDIX C: Coding and Analysis Procedures and Documents

1. Coding and analysis procedures

The process recounted here was deemed the best way to navigate around the difficulty of conducting a case study that takes account of individual perceptions but which does not fit with the epistemology of interview-based research designs that draw a representative sample from a theoretical population and thus have the requirement to contrast each individual response against those of the group in order to argue the significance of the findings for the wider population. Unlike such research designs which are based on a representative sampling strategy, this study used a theoretical sampling strategy consistent with the grounded theory approach (cf. section 2.2). Accordingly, the coding and analysis procedures were inductive rather than deductive.

The process of analytic induction aimed to develop explanations to my 'intellectual puzzle', which of course implied to set these against contrasting evidence (Mason, 1996: 155). In this study, the individual responses were compared and contrasted with those of others where relevant. But as importantly, in a case study such as this, one may refer to the organization's ostensible features and development (Futurelab's structural changes, outputs and activities, meetings, etc.) in support (or otherwise) of user perceptions and thus construct a coherent narrative such as those in Chapters 5 and 6. The identification of 'controversies' was key to this process of analytic induction.

First, the interview transcripts were merged in a single word document in chronological order. An initial coding of this 'master document' was done with labels and annotations made in the margins of the document, using the guiding propositions derived from the conceptual discussion as a rough guide for anticipated topics (e.g. 'FL purpose', 'outcomes and outputs', 'audiences', etc.) The topic labels found in column 3 of Table 4.1 thus became the main 'codes' used to label and organize the data. An additional set of questions served as a coding manual (see Appendix C, section 2). Recurring emergent themes were also indexed – examples included the topics 'branding and publicity' and 'learning-by-doing'. The coded excerpts were compiled

in an evolving index as concise phrases under topic and sub-topic headings, identified by the relevant page number as it appears in the main transcript document. For instance, a paragraph in which the Projects Manager explains that various ways the producers directly engage with learners enable them to keep in touch with them, appears as 'that's how we keep in touch (47)' under Code 7 – Producer-user interaction, and sub-heading 'F2f interaction'. (A sample of the original coding using the (rough) original frame is in Appendix C, section 3.).

This initial coding yielded a considerable amount of overlap as a result of the lack of exclusivity between topics (e.g. between topic 3 – Perceived audiences – and topic 5 – End-users/stakeholders relationship), itself due to the complexity and interrelatedness of the research questions. A related problem was the difficulty of segmenting the respondents' discourse into short, mutually exclusive bits.

Rather than attempt to devise a set of more exclusive codes, a parallel coding procedure deemed consistent with a 'sociology of controversy' enabled me to overcome the redundant coding and make better sense of the data. Throughout the initial coding and indexing process, excerpts thought to be compelling and explicit illustrations of issues or problems (i.e. 'controversies') relevant to each of this study's guiding propositions were highlighted (by the use of an asterisk) – these were referred to as 'star quotes', of which more is said below.

For example, although originally coded under both 'audiences' and 'outputs and outcomes', 'branding and publicity' was made a key issue around which the latter topic (Code 4 – Outputs and outcomes) would be discussed. It emphasized a problem – the difficulty of deciding what outputs to favour – whose cause could be traced to the need to cater to Futurelab's potential partners and projected users from the outset of the endeavour. The issue was expressed forcefully by the HLR's assertion that 'we could be in danger here of publicising what we're doing very well and very effectively (...) because we need to be seen to be doing things, and not actually doing some of the substantive, rigorous thinking that needs to go on underneath'; and by the Head of Production's view of the condition for Futurelab's success: 'it's got to deliver on what everybody thinks it's already doing'.

Another example may be given in relation to the modes of interaction between producers and users (Code 7). Here a key problem was eloquently illustrated by the CEO's 'unkind analogy' in which he plays down the importance of direct user involvement in favour of the producer's own expertise: 'If you were running a mission to Mars and people said 'oh you'll get good ideas on this from kids', do you run a school competition for kids? No you don't, do you? Because the question is, if we think we are right at the front of knowledge...' This was deemed a valid issue or problem in that it drew an explicit opposition between two different modes of interaction on the basis of their usefulness to Futurelab. Similarly, on the matter of Futurelab's definition and purpose (Code 1), responses to the 'Hollywood of education' allegory elicited mixed reactions in terms of approval or disapproval, but most drew a clear opposition between the interests of partners and users. Hence, these responses were treated in the 'star quotes'.

The 'star quotes' excerpts were not selected primarily on the basis of their 'representativeness' or exceptional status with respect to a larger body of similar responses (although such instances can be found in the empirical chapters), but rather for their coherence, eloquence and ability to federate views of key tensions at Futurelab that could speak to my hypotheses. For instance, the predominance of the Head of Learning Research's responses in section 5.2.1, which provides an overview of Futurelab's development, is explained by a number of factors: her key position at Futurelab; the clout she exercised within the organization, which was revealed in the recorded meetings, but also in less formally-monitored settings (conference, workshops, etc.); her effusive personality, coherence and eloquence, which made her comments eminently quotable; the fact she expressed concisely a view of the key issues at Futurelab which fit with the impressions I myself was forming of them, through talks with her of course, but also other instances.

The second step was an analysis procedure: the treatment of the 'star quotes' document. Under each main topic label, the key quotations such as those cited above were pasted in sequence, with brief analytical paragraphs (or 'notes') drafted in order to fill the gaps between them. The purpose of this step was to flesh out the components of a proto-narrative which would serve as the basis of this study's empirical chapters

and foreshadow the subsequent analysis chapter. (See Appendix C, section 4 for sample)

A third step comprised additional coding of both the interview and observation transcripts whereby relevant data was indexed in order to solidify, contrast and complete the emerging proto-narrative ('star quotes' document). As this narrative was structured to reflect the 13 main topics of Table 4.1, these were used as a coding frame (see Appendix C, point 2) for this second phase of coding. But crucially, the earlier issue of a lack of exclusivity in the codes was largely avoided as the indexed 'star quotes' enabled a more focussed and selective application of the codes.

Lastly, the fourth step consisted of the drafting of the empirical chapters proper, using both the 'star quotes' document and the additional coding index. It must be reiterated that the empirical component of this study (Chapter 5 and 6) does not consist of a sequential report of the responses gathered in relation to each specific topic (or operational question), as one would expect from a study based on a representative sampling strategy. Rather, after having been coded under the main topics, relevant data was drawn upon and structured in order to 'tell a coherent story' while addressing either hypothesis (e.g. problematization and experience-based expertise). This approach is consistent with the analytic induction based on case studies which typically aim to illustrate key events as they have unfolded over the course of the investigation and which the analyst believes most clearly illustrate the issues at hand.

2. Coding frame and manual

CODES	CODING MANUAL
Code 1 - Definition and purpose: Why has the production facility been set-up?	How is the production activity in general described by producers (collectively and individually)? What are its declared aims (main + secondary purposes)? How does it bring together, in broad terms, the social and the technical?
Code 2 - Seamless web: How do technological and social considerations fit within the endeavour's general purpose and aims?	Is the production of technology seen as an end in itself or as a means to achieve other ends? What issues arise from such an arrangement?
Code 3 - Perceptions of audiences: For whose benefit do producers feel they carry out their work, and/or of whose scrutiny are they aware?	What social groups do producers evoke, directly or not, as having a stake in their current endeavour (potential partners or end-users)? What social groups do producers evoke, directly or not, as having

	expectations (stated or presumed) with regard to their current endeavour, and/or having the power to determine its success or failure (potential partners or end-users)?
Code 4 - Outcomes/outputs: What are the different outputs produced, what purpose do they serve and what audiences are they for?	What documents, instruments, artefacts and/or events do producers create and what specific purpose and/or audience are they for?
Code 5 - End-users/stakeholders relationship: How does the three-way relationship between producers, end-users and (potential) partners take shape?	How do producers define end-users, as a means of creating relationships with (potential) partners?
Code 6 - Participation of others: On what grounds are other (outside) people acknowledged or dismissed as potential contributors or otherwise to the decision-making process?	What are the reasons (given or implied) for wanting to associate or otherwise with partners, grant or deny resources to a specific project, or solicit ideas?
Code 7 - Producer-user interaction: What are the modes of interaction between producers and users?	What do producers feel can be gained from involving users in the process? Conversely, what are the limits of direct involvement? When are users solicited and why?
Code 8 - Process: How do producers attempt to make decision-making more effective and efficient, in line with stated purpose and aims?	What processes are proposed and carried out in order to establish consensus internally and move the endeavour forward?
Code 9 - Relevant experience: What relevant experience or knowledge do producers draw upon in order to better define the end-users?	What elements of their background do producers perceive to be relevant to the production endeavour? What were their reasons for joining the organization? What do they see as their own key contribution?
	What is the social context on which user-related knowledge claims are based? Is it purposely organized for the current endeavour, or did it occur independently of it?
Code 10 - Producer-user overlap/reflexivity: What are the manifestations of the 'reflexive user' and 'producer-user'?	In what instances do producers conflate their own identity with that of the users? When do they make claims by drawing on their previous f2f interaction with, indeed as a member of, relevant social groups?
Code 11 - Social and technical knowledge: Do producers claim/display expertise with regards to both social and technical knowledge?	How is expertise in regards to either dimension put forward? Are they contributory or relational forms of expertise?
Code 12 - Defining relevance/importance: How do producers argue a logical link between the endeavour's purpose and/or aims and their own knowledge and/or experience?	In situations of discussion/debate, what personal factors (prior employment, other situations) do producers evoke to make a point and/or win an argument/suggest a way forward? Or simply to assert their competence?
Code 13 - Access and contribution: Are the criteria of access and effective contribution of producers related in a necessary way?	What do the producers think about the division of labour and the authority of their colleagues? In what circumstances do producers 'speak out of turn'?

3. Sample coding index

Code 7: Producer-user interaction

- F2f interaction
  - Purposive F2f with teachers and children confirms that FL is right (15)
  - School workshop to paper-prototype Virtual Puppeteers (47)
  - that's how we keep in touch (48)
  - hope to see kids more in the lab (42)
  - use kids as test beds (48)
  - involve teachers in what we do (53)
  - need to incorporate teachers and children as soon as a project is a glimmer in the eye (54)

- Trump card: teachers and parents invoke their interactions with children to quash arguments about kids; this is powerful because of view of childhood as separate inaccessible world; once you've left it you can't talk about it until you get your own/become teacher (97-98)*
- SS as representative for theatre for young people (61)
- direct contact with children is channelled through Keri and Martin while rest of team don't see the process (54)
- Keri and Martin f2f interaction with children: respect and trust (56)
- Learning Team: test users and potential users (64)
- Getting actual children in FL is an ideal but not always possible: crucial to *see* them otherwise you forget they are the target (69)*
- Is start of process, not end: children validate mere idea of a project, not end product or even prototype; whether their contribution can be measured in middle is dubious (92)
- We use children as testers and evaluators whereas they should be involved sooner (127)
- 'School visits': everyone at FL spent a day in school
  - to remind us what it is actually like to be a kid in school (48)
  - to see how kids use computers now (48)
  - inspiring and motivating, wonderful reminder of FL's purpose (54)
  - *seeing* the challenge from a teacher's perspective: short modules to keep level of interest (54)*
  - real interest: *seeing* the shortness of attention span; *seeing* the huge variety of abilities; seeing some disabilities; *struck* by how to link learning in and outside school (54)*
  - made clear in practice some things discussed in theory: realization of how arrogant producers are in their assumptions that technology can make everything better (55)*
  - We think we're quite young, but we're not! Haven't been in school for a long time, so need to be around kids to be reminded what it's like (70)*
  - MF's witnessing of teacher's methods confirms his belief in role-playing (85)
- Value of K gained from users in purposive activities
  - Can't always give them what they want because they don't know until they've seen it (34)
  - Not about discovery: no one single experiment in a school will make you say 'Eureka! We did not know this before' (80)*
  - Distinction between content and medium (66)
    - F2f good for finding out what is engaging (medium): kids can tell us *how* they learn best, not what (66)
  - Competition for kids' ideas: not sure about quality (mission to Mars analogy) (82)

- Representation/user images
  - need to have kids in mind all the time (48)
  - representation in political economy terms: producers should reflect the diversity in wider population (50)
  - if kids aren't interested it won't work (69)
  - not enough to imagine 'a kid playing in bedroom'; must ask real research questions (77)
  - Need to conceive of users as both potential scientists and just citizens in teaching of science: no blanket answer as to how to do that (84)
  - User = knowledge worker in 21st Century (89)
  - Training online vs. in expert community: depends on profession (89)
- Other means
  - Aside from KF and MO, other team members only have access to children through written reports and feedback – not good enough (54)

Code 10 – Producer-user overlap and reflexivity

- Producer-user (reflexive user)
  - KF as 'proxy' for children in negotiations with partners (16)*

- direct contact with children is channelled through KF and MO while rest of team don't see the process (54)
- KF and MO say yes but what about kids, will it work in the classroom? (69)
- KF and MO f2f interaction with children: respect and trust – if they say children/teachers won't find it useful, it is taken as given (56)
- Learning Team test users and potential users (64)
- Seeing the challenge from a teacher's perspective (54)
- SS as hinge between production and unrelated context involving a theatre for young people (61)
- Whole of society can't be involved yet (63)
- Soft knowledge: everybody has opinion on those kinds of things (i.e. children) – caution as to how it is validated (65)
- Producers' experience of education/as a learner
  - Need to afford learners with equal opportunities (28)
  - Age isn't important: levels of understanding. E.g. JM's knowledge of science would be 12-15 (32)
  - Learning as fun vs. hard work and rewarding (65)*
- FL as 1st audience of what is produced:
  - lit reviews meant to get everyone on same page in terms of knowledge (76)
  - different people within FL as representatives of different audiences (John, Martin, Jo etc.) (76)
- MO as user advocate at SSL: what is it like for users? (77)
- Always asking 'how is this relevant to 10 or 5 yr old?': need to offer experiences that are authentic to them, not to us (99)
- what would it be like being a kid playing cowboys and Indians using wearable technologies? (92)
- take cool idea and transplant to my world, that of a teacher, in order to establish potential (93)
- As adults, we get bored if we feel we aren't progressing – same for kids (100)

- Projections in time
  - Childhood is something everyone goes through
    - Parents and teachers: they know what's going on; they have 'huge expertise', but are not only ones – we all go through childhood (18)*
    - Claims made to own childhood from memory: it's OK because it is helpful as long as taken as one experience, not universal (98)
    - Levels of understanding, not age groups: adults and kids can have the same level of understanding (32)
    - But it has been years since we have been [children]... (48)
    - We think we're quite young, we're not! Haven't been in school for a long time, so need to be around kids to be reminded what it's like (70)*
    - Exploring the potential of a technology: what would it be like playing cowboys and Indians using wearable technologies? (92)
    - Hard fun vs. stealth learning: as adults, we get bored if we feel we aren't progressing – same for kids (100)
    - Entitlement to rubbish: as an adult, I require trash on regular basis so I don't see why children should always be virtuous (104)
  - User = knowledge worker in 21st Century (89)

4. 'Star quotes' – proto-narrative structure (sample)

Code 4: Outcomes and outputs

KF: My view very strongly is that we have an opportunity here to be developing our knowledge and understanding in a whole variety of different areas and that that is actually a key and important part of it. **What tends to happen is we have conversations around this, where I say something like that, and then [the Chief Executive] will say 'yes but we still have to publicise what we're doing', and I'll say 'yes of course we have to publicise what we're doing, those two are not mutually exclusive, it's just a question of which**

> **we prioritise first'**. And we could be in danger, here, of publicising what we're doing very well and very effectively, and making lots of things that look great, and tell nice stories because we need to be seen to be doing things, and not actually doing some of the substantive, rigorous thinking that needs to go on undemeath. That's the concem I have at the moment, which is what makes me particularly arsy in meetings. We'll just have to work that through. (KF 14)

Note: Key issue of branding and publicity. FL must conduct valid research and publicise what it is doing in order to establish itself in the field. However both cannot be done simultaneously – must prioritize one over the other, which involves a trade-off in terms of stakeholders/audiences.

> JR: And it's also that you're having to be, you're having to put on this successful front – well, it's not that you have to put it on, but when you work in the corporate sector like I did, we always used to work this method where they always dangle a carrot in front of you, so even if we did this press release that bends the rules a bit over what you've achieved, then we've got to make sure we live up to it, yeah? And we never go out too far, but you know, it's the donkey chasing the carrot trick... But of course for us, they come in thinking it's all here and it's all 'gee wiz'. (...)
> PR: Moving on to outcomes, and this relates to some of the things you just said... What would FL have to achieve in the short, medium and long terms to be considered successful, in your view?
> JR: **It's got to deliver on what everybody thinks it's already doing.** (JR 27)

Note: This simple quote illustrates the real problem of publicity in this field: expectations are created which must then be lived up to. This is particularly difficult when there is no guidebook on how process should be set up. The need to do valid research whilst being seen to be doing valid research poses a real problem in terms of how FL organize their outputs.

> PR: Now, moving on to outcomes – can I ask you, what would FL have to achieve – in the short, medium and long term – to be considered successful, in your eyes?
> RN: In the short term, I think **we need to get a couple of prototypes done**. Which will benefit Steve and Annika, because it's something to show, it's good for funders, because it just shows 'after a year, yeah this is what we've done'. So it puts people's doubts at bay. **Because it's easy to say we've done this, bla bla bla, but we need to show**. So in the short term we need to be doing that. (RN 50)

> AN: Where I don't think we've made our mark yet and I hope we will, is in drawing in the creativity of the games development community and of the media community, and inspiring them to get involved in the educational market. And I think that's natural that there's an element of their having a lot to do and them saying **'well, show us what you've done and then we might believe you'**. (AN 52)

> PR (going through list of FL outputs; the question is 'what audience are they for?): Next I had prototypes.
> BW: Should be for the kids. I think that through the learning research, that is the main focus. Like I was just saying about Tableaux – what does this give kids that they wouldn't otherwise have. But at the same time, it's partly for us and our partners, to demonstrate to the people who have pots of money, what kind of stuff is worthwhile, that it can be done, possibly without huge expense. **In some respects the projects are a bit of a PR thing, as much as anything else.**
> PR: That's what I wanted to get at. From your perspective, you don't necessarily have to achieve a working prototype in order for the whole process to be worth something to someone?
> BW: No. No. I mean some of the prototypes probably will be nothing more than a few sheets of paper. It depends how they work with kids. Some of them possibly will fall apart almost as soon as they've started (laughs). But primarily I think they are for the betterment of kids' learning, if possible. And their secondary purpose – well, not purpose, but certainly secondary usage – is as a kind of PR thing, just to let the big industry bods know that, you know, if we can do this with just 10 grand and a few pieces of string, then imagine the possibilities if you chuck 100K at it. And I mean, that is how FL will actually have to make its living in a couple of years, when the DfES stop funding us, because they are only here to start us up, really. **So in part it's like, 'we have to develop these projects because we have to prove a point', but it is also, it might be that we end up disproving a point – proving that educational technology is just more clutter and that it gets in the way of children's learning. That might be the outcome in two years. I think there would be a lot of resistance to accepting that and I don't think it is the case. But we are coming to realize that there is brilliant creative use of creative technology, and there is an awful lot of rubbish, of pointless use of technology.** (BW 124)

Note: These quotes clearly highlight the perceived need to demonstrate, to actually show outputs to potential partners. Regardless of their real worth in terms of research (or useful functioning), prototypes are useful in and of themselves, in a first instance as a form of currency – their mere existence is proof that FL gets things done. And that is

enticing and important to eventual funders and partners. BW's response links to the idea of deferred market as well, or two-step flow: the prototypes are for kids ultimately but in the meantime they are a **PR exercise** to persuade partners. Later AN adds: 'So I think it was inevitable that the education community would see much sooner what we were trying to do and the creative and technology communities need something much more tangible to buy into us, as it were.' (AN 102)

> AN: I would hope that that would develop considerably so that we can really, in a sense develop our brand, so **that we can become something of an 'Intel inside'. That our badge of credibility, 'Futurelab inside'** every product that we have been involved in and that we will have endorsed, that that really becomes, that it stands for something important. (AN 52)

> PR: I have been told that as the link between FL and the outside world, you would be particularly keen to have something to show potential partners or whatever, something concrete to show, 'you see this is what we can achieve at FL, come along with us and help us build more of these'... Can you say something about that?
> AN: I would. I think the danger... **I wouldn't want us to have just one prototype and to become too boxed and too blinkered. Partners could see us as the ones that build that particular kind of mobile prototype, whatever it might be...**
> PR: You could be typecast?
> AN: If we can create **some sort of presentation that includes some footage of our work in schools, showing** our interactions with children, **showing** that whole process. A flavour of some of the prototypes that are in development to **show** how we link academic research with creativity... **somehow showing** the process. **Because once we get the buy in of commercial partners, that FL is a good thing, in terms of how it approaches problems and how it finds solutions, that is more important that actually making something tangible.** Like you say, it could typecast us. (AN 55)

> MO: There are times when we're going to have to put forward strong, well-thought, well-argued cases forward to policy-makers, because that's what they're asking of us. Or to people in industry because they want specific guidance. And perhaps there are going to be times when we need to come down our fences and actually say 'well, we think this is better than that'. If I'm starting up in a position which is authoritative – if you're a **keynote** speaker you're speaking from your personal authority – therefore you are more selective about the things you want to say. If you're in a **seminar** situation, you may well want to bounce ideas out specifically to get feedback to see whether the idea has any validity, and making tacit ideas more public and have no fear of exposing tacit ideas, but you accept that in the environment that you're in, those are the rules of the game, that you come up with a redundancy of ideas. And in cycles of development, I think that there are times when you want to be free to put forward half-formed ideas and have them accepted as such, and not being criticized as such. Whereas if you are actually at a later stage in the cycle of development, saying 'we have definitely found this', you're making more emphatic statements, then I think at that particular point you are exposing yourself to stronger criticism if your idea doesn't hold water. **It has something to with the ideas development cycle in that sense.** Yes, obviously you want criticism in the first stage, but that's implicit in the way you are talking about it in a sense. You know: strong ideas but weakly held. Whereas you might have strong ideas which you are more willing to be defensible about, later on down the line. I think that's just part of an ideas development cycle. There are things that you don't necessarily feel strongly about but you just want to make them available to people. And you don't feel at that stage that there are issues of brand 'integrity' – you know, have you done damage to the integrity of the brand by suggesting them? (MO 75)

> PR: You said you couldn't get away with spending one afternoon doing trials or whatever, what exactly do you meant by that? Do you mean that nothing of scientific worth can come out of that kind of exercise and therefore the educational community will look at it and say 'rubbish'?
> BW: It's partly the methodology aspect of it, yeah. But I think more importantly for us, it's we're working with quite complex tools. As an example with Tableaux, it takes hours getting used to working with it. Therefore spending two hours with kids is not going to give you a fair indication of what they can do with it. They need to practice and develop different skills before they can actually get down to the nitty-gritty of producing the short films. So partly it's the academic methodology, proving that we are doing things correctly, but also we're not about coming up with ideas making it and sticking out in the market, and I think that's good. **I think it's good that most of the stuff we do isn't in-house, because we might be a little more biased if it was.** I think it's about demonstrating or disproving the worth of some of these things, and being completely candid about it. Without a red face, being able to say, it looks cool, it sings and it dances but no, it doesn't work with kids. Or kids love it, but they love it because it's play, but really they are learning nothing from it – in 2-3 hours they are just fiddling and getting nothing from it, and that's why they love it. I think we should be open and admit those sorts of things. (BW 126)

Note: All three quotes speak to the tension between the need to produce tangible outputs and learning from the process regardless of materialization in prototype form. I like AN's insistence on the need to show partners what hey produce and how they interact with children – it fits well with the concept of mediated quasi-interaction. A

key danger highlighted by AN is that of **being typecast**, i.e. of being associated in the mind of partners as the producers of Technology X and nothing else, where what really counts is linking up research and creativity. Whereas most commercial enterprises would conceivably be happy to be typecast – to become synonymous with one successful product – this is seen as a danger here, further illustrating that it's not about the technology, but about improving learning. AN also mentions video footage that will be used to entice partners: what KF later refers to as 'Hallmark moments'. Similarly, MO's comment on the seminar/keynote analogy conveys the same concern with regards to research output: about the weight given to certain ideas over others and the lack of variety in opinions expressed, when one of FL's objectives is precisely to be eclectic and so on. **Thus branding and honest research (ideas development) are seen as in some measure incompatible. More specifically, branding is perceived as a hindrance to the ideas development cycle**, at least one that is genuinely open and socially-grounded. If branding is defined as the establishment of a link in the minds of audiences between a brand name and a set of products and/or values, then it plays out on several dimensions here (audiences X products/values). MO is concerned that by turning what was originally a research document written in 'seminar mode' and meant for a limited audience (internal FL, then stakeholders) into something for general consumption, the idea expressed therein might be taken as authoritative and thus give the false impression that FL has come to conclusions with regard to learning technologies.

APPENDIX D: Additional Empirical Materials

As described in section 5.1, this section outline Futurelab's official discourse on issues of methodology and outputs in order to provide a useful backdrop to the developments recounted in Chapter 5.

In interviews, several members of staff were keen to point out that although Futurelab had been launched in December 2001, it really only 'opened for business' once it had settled into its current building in May 2002, for it is at this point that the core team of executives, communications, production and education specialists was assembled and began work in earnest. In fact, the recruitment process for the original core team extended beyond its official launch in December 2001. What is more, the structural makeup of the organization that opened at Bristol's Harbourside was significantly different from what had been originally planned: two key posts were created as a result of the cases put forward by individual candidates during recruitment. Whilst not unusual for a start-up company, for Futurelab such personnel additions were to have a lasting effect on its development.

Two early structural changes may be noted. First, the creation of the post of Head of Learning Research effectively doubled the number of learning specialists at Futurelab, which was originally meant to have a Learning Director only (Interview, 6 December 2002). Second, the creation of the post of Deputy Chief Executive to complement the Chief Executive's creative, intellectual (and 'hands-on') approach to educational technologies, with a more solid grounding in 'raw business development' (Interview, 26 February 2003). (Issues of structure are discussed below.) In spite of these early changes, it is necessary to begin with an overview of the Futurelab project as formulated in its promotional literature as well as its founding documents, i.e. proposals submitted to NESTA and the DfES.

Futurelab's strategic and operational framework is set out in its two founding documents. The first, an analysis of the educational software industry in the UK titled *The Learning Game*, was commissioned by NESTA and carried out by an external consultant (Henning, 2000). The second document, *The NESTA Future Learning Lab* (the name was changed to NESTA Futurelab in the months leading to the official

launch) is the original business plan (Freeth and Henning, 2000) prepared by the NESTA Executive in charge of Education Programmes – who would become Futurelab's Chief Executive – in collaboration with the author of *The Learning Game*. It was prepared in November 2000 for the Department for Education and Employment (DfEE) – as of 2001 the Department for Education and Skills (DfES) – in order to secure core funding for the initiative.

By and large, the description of the organization's purpose and objectives is consistent with those contained in the promotional documents reviewed in Chapter 2. In social constructionist terms, they too are embedded in a fabric of socio-technical ins and outs and thus resist attempts to establish which, of social or technological considerations, is the essential driving force behind Futurelab. The organization's discourse reveals a concern for the improvement of education and learning. However, both social and technical motivations are bound in a business initiative: perceived social needs are the basis for exploiting a commercial opportunity, but it is the potential of technology that puts these social needs into sharp relief.

The seamless web may be untangled somewhat in moving from the 'what' of Futurelab's purpose and activities, to the 'how'. The aforementioned operational documents outline some prescriptions as to outputs, process and structure.

Futurelab is primarily involved in developing and assessing the viability of projects generated either in-house or by external parties. The organization's original business plan makes the production of learning software and prototypes the key output to which all other activities – namely, learning research and the dissemination of knowledge to the broader community – are subordinated. Indeed, the 'tangible outputs' meant to be engendered by the Futurelab endeavour are listed as follows:

- a series of learning software prototypes taking the form of DVDs, websites, interactive television, broadband internet, game console interactivity and/or mobile services
- a report from the educational psychologist or learning consultant on the power of these prototypes to motivate and enhance learning
- project diaries, each of which records project team observations and illuminates the lessons learned from the development process
- individual project reports, one from each project leader
- Phase 1 report from Lab Director

- paper prepared by Lab Director and the Advisory Group with recommendations for the sustainability of the Programme beyond Phase 1.
(Freeth and Henning, 2000: 35)

One remark to be made here is that the existence of a specific kind of artefact (e.g. 'DVDs, websites, interactive television, broadband internet, game console interactivity and/or mobile services') is deemed necessary in order for Futurelab to conduct valid learning research and communicate its findings to the outside world. In this sense, upon its inauguration Futurelab appears to be primarily a production laboratory with an added internal learning research component.

Such a prioritizing of Futurelab's prototype development activity has ostensible consequences in terms of structure. Upon the creation of the organization it was anticipated that Futurelab's core team would consist of the following members: 'the Lab Director, interactive and graphic designers, ICT expertise, *an educational psychologist* and administrative support.' (Freeth and Henning, 2000: 9, emphasis added). The projected structure of the team was designed to sustain a production process oriented to the output of prototypes – it is skewed towards production and technology, with only one learning expert and perhaps external consultants.

Within the organization, Futurelab is widely acknowledged as the brainchild of one individual: the lab's first Chief Executive, whose commitment to education, awareness of technology and keen business sense made the endeavour possible (Interviews with Chief Executive, Head of Production, Futurelab Manager and other key staff, December 2002 – July 2003). The genesis of the project may well be attributed to this one resourceful individual, conceived as a heterogeneous engineer (cf. Law, 1987). However, if one accepts that it is the core staff's role to make real – to instantiate, or carry out – the theoretical objectives stated in Futurelab's discourse, then one cannot presume homogeneous and unproblematic interpretation across all individuals.