

ERC Advanced Grant 2012
Research proposal (Part B section 2)

ADAPT: The ADOption of new technological Arrays in the Production of broadcast Television

Professor John Ellis, Royal Holloway University of London

a. State-of-the-art and objectives

A1. PURPOSE OF THE RESEARCH

Archival television footage is becoming available at an astonishing rate: as online assets, as repeated ‘archival’ programming and through DVD release. This availability is creating new interests in TV history and potential new uses for that material. ADAPT addresses a fresh problem that has emerged in this generally positive development. The material is the product of its times, both socially and technologically. ADAPT addresses this latter aspect by exploring the technologies and practices that created the typical forms and ‘looks’ of the television material now re-emerging from its archival seclusion. As a research project, ADAPT has two aims.

The first is historical and aims to explain the technical and human underpinnings of location shot film and video footage that is now located in many television archives. This archival footage is now becoming widely available through initiatives such as www.euscreen.eu, and it requires contextual information if it is to be properly used. Historical context is normally provided by archival metadata, but an explanation of the processes by which the footage was generated (even if such an account were to exist) cannot usually be accommodated. This lack generates misunderstandings of historical footage in its new online context. ADAPT will therefore trace the history of the adoption of new technological arrays for the recording and post-producing of moving images and sounds within the television industry between 1960 and the present. ADAPT will also present this information in ways that can be combined with online archival holdings.

The second purpose aim relates to the theorisation of technologies and their usage. From its historical research, ADAPT aims to generate an understanding of the processes by which discrete technologies are combined in everyday commercial use; how innovation is possible within such complex technical environments; the role played by the acquired skills of individuals; and the role of corporate decision-making in this process. It aims to concentrate on the phase at which many histories and theories of technological innovation tend to end: at the point where an innovation has entered into common use.

The project consists of an overall historical study complemented by a number of particular studies of key instances.

A2. THE OBJECT OF STUDY

The television industry has used a range of technologies to present images and sounds, both specifically developed for television and drawn from other activities. Television began with live studio and location broadcasts using specifically developed electronic cameras for pictures but adaptations of existing technologies (from cinema, radio and theatre) for lighting, lenses, tripod heads and sound capture. Electronic recording was not viable for the first thirty years and more of television’s history, during which it became a mass medium in many countries. For location work beyond predictable large events (sports, national ceremonies etc) television gravitated towards film technologies, driving forward developments in 16mm film in particular. Chanan (2007) examines the technological bases of the documentary filming which emerged in the early 1960s and concludes: “two things are missing in the common version of the story: the gestation of the technology, with the

main demand for 16mm sound shooting coming from the nascent television industry, and the institutional context, which is different in each country” (168). ADAPT will attempt to fill such lacks in the historical account; and, for the later period, to supply the first properly research account.

From the beginning, television used what can be termed ‘technological arrays’ rather than single technologies. ‘Technological arrays’ are combinations of different pieces of equipment, some specifically developed, some borrowed and adapted from other spheres of activity. In such circumstances, each item comes with its own peculiar potentials and drawbacks which have to be accommodated in everyday use. Thus, sound recording has particular demands that do not permit the camera to range freely; editing technologies place requirements on both sound and image capture which have to be anticipated by crews during shooting. In particular, the practice of television production from the 1960s to the near present was dominated by the choice between film and tape as a means of recording. Each presented particular advantages and disadvantages for shooting and subsequent post-production, both in terms of cost and of production possibilities.

The project will concentrate on the period from 1960 and on the acquisition and post-production of location shot footage. This is the area of maximum technological decision-making, where the adoption of any pathway involved clear decisions about the nature of the footage that would be generated, and also about its cultural status and potential longevity. 1960 is chosen as it marks a clear watershed in both film and video production. In 1960, broadcasters like the BBC began to acquire their first Ampex 2” videotape recorders, initially for use in sports coverage though quickly adopted for entertainment and drama. At the same time, Éclair introduced a lightweight 16mm camera with almost silent running, which could be used in conjunction with the lightweight ¼” reel-to-reel sound recorders produced in particular by Nagra. Similar innovations were taking place in film in USA. These two innovations defined television’s production potentials for almost half a century, until the process of digitisation of the entire production process began to set new parameters. This process is still not yet complete. ADAPT aims to capture information from its final phase.

From the start, both tape and film offered their own specific advantages and disadvantages. Analogue electronic editing was not possible in the initial phase of tape use, but film editing dated back to the dawn of cinema. Synchronised sound recording (a given in the video field) was not easily achieved on 16mm film until the introduction crystal synch technology in 1963. Tape could be instantly replayed. Film required laboratory processing. Film cameras were limited to 12 minute duration before the magazine needed changing; tape could run for an hour. Tape was transient and recycled for further use. Film was a medium of preservation. Individual production decisions were based on many factors: relative costs, expected usage, availability of equipment and skilled individuals, the knowledge of the decision makers, and corporate policy. To use a particular technological array always involved considerations of advantage and disadvantage compared to other available configurations.

The ‘Film v. Tape’ debate became a standard industry topic as producers and technicians weighed up their relative advantages and disadvantages. The choice between film and tape was fundamental, producing very different results, suitable for different purposes. Limited opportunities to combine the two also existed: during the 1960s and 1970s it was common to combine ‘film inserts’ with live or taped video material in many kinds of production from news to drama. This routine combination now seems odd, as each medium brings with it a distinctive look and sound. Video editing provided limited opportunities for work on sound, so audio post-production was often undertaken using film technology. Frequent problems were experienced in these cross-over attempts.

Neither technology stood still. Electronic post-production of videotape editing first became possible, then relatively flexible, and then, by the early 1980s, a realistic choice for all but the most ambitious forms of programme-making. But its disadvantages when compared to film were still considerable. As it involved equipment that cost hundreds of thousands of pounds, it was expensive. An ‘online’ edit had to be done in a few hours. The same cost would buy weeks of film editing during which a production could evolve. An online edit had to be prepared for by means of an offline edit involving different technicians. The possibilities of audio processing were severely limited in online edits. The

whole online process was limited by the available computing power; hobbled by the basic requirement to copy chosen shots from the original tape to the programme tape with the consequent loss of image quality; and compromised by the need to edit in linear order onto the programme master tape, one shot after another. Film editing thus remained the production route of choice for most of television's higher budget location programming, be it drama or documentary until the late 1990s and the dramatic arrival of digital non-linear editing.

During the period from 1960 to the mid-1990s, continuous improvements were made by a variety of actors, from equipment manufacturers to broadcasters and even individual crew members. Videotape formats became smaller and so the equipment became more manageable on location. Key moments in this long process include the development of cassette based tape formats in the mid-1980s, and the introduction of digital tape cameras in the late 1990s.

The example of the introduction of digital cameras demonstrates how the introduction of new technologies was a form of adaptation and negotiation between different parties. The first digital video cameras were available in 1996 to the 'amateur' rather than professional market: Sony's Hi-8 and other similar cameras. They were quickly taken up by 'professionals' in television documentary (as they were by the music recording business as well). They offered an image quality that would be acceptable combined with dramatically reduced camera weight and the advantages of digital menu control. A popular adaptation was to alter the sound acquisition of these cameras so that instead of recording in two-track stereo using an onboard microphone, different sound inputs were made onto two monophonic tracks using external microphones. This is an example of the complex activity of adoption and adaptation involved in television production. The equipment providers decided (for a mixture of market and technical standards reasons) to introduce digital video first to the non-professional market. Immediately, some technicians engaged in a form of *bricolage* with this advanced technology.

As the next step in the process, professional level cameras were being designed. However, most manufacturers designed them with sound monitoring on the same side as the camera operator, effectively preventing sound technicians from access to onboard sound recording. Here, equipment manufacturers were conceiving their main market as the single-person crews of news rather than the larger location crews of documentary or drama. At the same time, producers were trying to reduce costs by using video rather than film for single camera drama production because both image quality and the editing process were beginning to approach those of film. But camera design still assumed a different form of use. So a necessary focus for the ADAPT project will be the communication (or lack of it) between the various actors in the formulation and use of technological arrays.

The concept of technological array will allow ADAPT to study the potentials offered by combinations of equipment, and how technicians negotiated these potentials. Individual technicians in each 'department' of production often looked beyond the confines of film and video to seek out useful innovations elsewhere to solve the problems posed by particular shooting situations. So at various times some equipment arrays in use might have favoured zoom lenses over prime lenses; handheld camera over tripod; radio microphones over boom microphones; digital sound recording over analogue etc. All of these had definite impacts on what could be recorded and how. They also had an impact on how technicians behaved within the filming circumstances and how the filmed subjects (documentary subjects or actors in fictions) would modulate their behaviours. Many innovations made by individual crews became standard practice. ADAPT will study how this standardisation came about (through craft unions, trade magazines, master classes etc) as the project seeks to define the typical, the "normal way of doing things" as one of its key aims in providing context to the millions of hours of programming that are emerging from TV archives.

A crucial aspect of ADAPT will be the capture, by recreation for modern cameras, the actual working practices of crews with different kinds of technological arrays. We will record instances of standard documentary and drama crews working with 16mm film cameras and ¼ sound recording; of crews working with different analogue videotape formats; and of individuals working with lightweight

digital technologies. They will both recreate their conditions and activities of production, and discuss their work. The subjects will be chosen for their ability to compare between different ways of working (their hindsight will be an advantage), and for their ability to recall the specific ways that they interacted with their equipment. A particular emphasis will be placed on the physical routines and 'instinctive' habits that were created by the interaction of technicians with their preferred equipment. All grades had such skills. Even the film camera assistant needed the ability to load a film magazine in a lightproof bag working by touch alone. Cameramen (very few were women) knew light levels and film speeds; sound technicians the placement of microphones out of shot but with the best chance of capturing adequate sound. There were regular conflicts between the physical demands of camera and sound, and the nature of these negotiations will also be captured. The aim here is not only to provide context for archival moving image footage. It is also to collect data that will allow ADAPT to begin to establish the role played by the physical 'muscle memory' skills of each technician, and also the interpersonal negotiations that took place to resolve issues that arose because of the nature of specific locations and subjects. These are factors in the adoption and continued use of specific technologies and arrays. The balance between habitual ways of working and dissatisfaction with their inadequacies is a significant motive in the resistance to or adoption of new technologies.

A further consideration in shooting any footage was the conception of each technician about the subsequent use of their material. Conceptions of the editing process were built into many of the standard ways of working on location, from the careful logging of footage on 'dope sheets' or continuity notes, to the creation of recordings of background sound and acoustic atmospheres. The potential of the editing process was often a reason for choosing to shoot on film rather than on tape. The virtual abandonment of film as a medium in contemporary TV production seems largely to be the result of the development and standardisation of digital editing from the mid-1990s onwards. ADAPT will pay particular attention to this process as it changed the look of TV material just as much as it changed the lives of film editors. The process of adoption of non-linear editing at all levels of post-production was one of revolution rather than evolution. Changes in both camera and sound gave technicians the opportunity to adapt their skills to the new technologies. This was not the case with film editors. The processes involved were familiar enough to analogue videotape editors but were alien to the ways of working that had developed for film editing. Training was difficult to find and no standard user interfaces existed in the first period of introduction at the end of the 1990s. The change was chaotic and confusing for many film editors. Large numbers left the profession, taking their skills in image and sound combination with them.

Consideration of this change brings into sharp focus issues around the organisation of productive labour. ADAPT will integrate the study of the nature of and management of technological change within the large broadcast organisations: how technical standards are negotiated and how equipment is replaced; what expertise and skills are deemed relevant to these decisions; what level the decisions are taken etc. ADAPT will also study the power of organised labour in this process, and in particular the role of craft unions in regulating the labour market (maintaining technical standards on the one hand; excluding women and ethnic minorities on the other). The emergence of a substantially freelance production sector in the UK during the 1980s was a destabilising factor in the corporate arrangements that had been stable since before 1960. This development, along with the subsequent break-up of the vertically integrated broadcasting organisations, brought new kinds of players into the negotiations about technological arrays just before a fundamental shift was to take place away from the balance between film and tape which had been characteristic of the period since the early 1960s.

The late 1990s and early 2000s are a period in which the process of incremental development of technological arrays was suddenly disrupted. It inaugurated a process rapid technological change in which new computer-based technologies replaced the analogue and physically based forms that had been the backbone of television technology from 1960 and before. Small islands of digital 'special effects' had existed for many years (especially applied to high budget items like title sequences, major sports etc) but within a decade they became the new standard forms of sound and image capture and processing. They changed the potentials of television, introducing more industrial methods such as 'rig' setups for large-scale human observation projects. They also seem to have altered the editing

process from a small group to a communal process within some companies where footage can be viewed by anyone as it is held on central servers. The ADAPT project will take place just as the final phase of this adaptation is taking place, in the general adoption of 'tapeless' production processes. ADAPT will therefore be able to capture instances of corporate decision-making around this issue.

ADAPT will produce an overall historical account of the adoption of technologies into general use within television, an account which will emphasise: the various factors involved in their adoption; the ways in which they were deployed by skilled technicians; the particular affordances that they brought; the limitations that various times in any array imposed on the use of other equipment; and the characteristics of the material that they produced. It will seek to explain why footage is as it is and not otherwise.

ADAPT will further produce three case studies of key aspects.

- The first will be a major study by Royal Holloway researcher Dr James Bennett of the final phase of the adoption by broadcasters in Britain of a tapeless production process, and the implications for their suppliers both large and small. This will be a primarily organisational study, looking at the factors involved in corporate decision making and the reconceptualisation of working practices that result from working in a file-based environment.
- The second and third studies are conceived as doctoral dissertations in the British format (a thesis of up to 100,000 words produced in a period of 3 years).
- One PhD account will be longitudinal, researching the history of location-based audio technologies in the television industry. This thesis will examine the use of quarter inch tape; the problems of synchronisation in film; the transition from analogue to digital audio recording; the adoption of microphone technologies and the problems of sound on videotape. Sound is often neglected in the history of the audiovisual, which is perhaps why the date of adoption of radio microphones seems to be a mystery.
- The second doctoral dissertation will examine a particular historical event: the movement from analogue film-based editing to non-linear digital editing at the turn of the millennium. From the point of view of film editors, this took place suddenly and chaotically. Competing technologies with radically different approaches were adopted by different companies. Unforeseen problems emerged in productions that tried to shoot on film (for the "look" or for longevity) and then edit digitally. This will be a study of the differing factors in play at a particular moment, including technological innovation, labour relations, lack of technical standards and how individuals negotiated the adaptation of their craft skills to a radically new physical way of working.

Television is in the final moments of set of changes which will replace one set of normal routines and ways of doing things with another. ADAPT will thus be able to study a period which begins from with a mass, standardised form of television with its large numbers of skilled employees and stable management structures. It will trace the gradual evolution of the technological arrays being used in location work during this period, tracing the factors involved in this evolution. It will trace the influence of these technological arrays on the final programmes seen by audiences. It will trace the 'technological affordances' in their broadest sense: how particular arrays enabled (and even enforced) specific 'ways of doing things' that in turn created the typical tropes of on-screen material. It will also trace the fundamental changes that resulted in the replacement of the dominant technological arrangements with new arrays from the late 1990s onwards.

A3. THE PURPOSE OF THE STUDY: EXPLAINING THE ARCHIVE

All audiovisual material bears the imprint of its method of creation. Until recently, the knowledge of how particular kinds of footage were created was a specialist matter for archivists, film researchers, film and television historians. The past ten years, however, have witnessed an opening of the audiovisual archives through many initiatives that provide online access to material. Significant

collections of material have been made available to the general public, from EUscreen (www.euscreen.eu) to France's Institut national de l'audiovisuel (<http://www.ina.fr/>); the Netherlands' Beeld en Geluid (<http://www.beeldengeluid.nl/>); and British Pathe (<http://www.britishpathe.com/>). In Britain, broadcasters, particularly Channel 4, have made yet more material available to users within the UK. The BBC plans to make all its archival footage available by its centenary in 2022. Europe's public service broadcasters have provided estimates to EUscreen which show that they already provide 2 million items to internet users. This archival opening brings new users to old footage; and they are busy devising new uses for it. Their backgrounds are diverse and certainly do not provide them with the understandings of film and media historians who understand why footage looks and sounds as it does. Even experienced academic researchers from other disciplines are liable to misapprehend archival footage. In short, the audiovisual record of the twentieth century turns out not to be as transparent as was thought in earlier years. Nor is any specific piece of footage as meaningful in practice as we might assume in the abstract. Beyond the 'strangeness effect' of the surface appearances of things past lies a further set of puzzles.

For new users, archival footage can be disconcerting. Why is there so much news footage with no sound? Why are interviews so formal and so short? Why do people often seem rehearsed or ill at ease? Why do others volunteer such intimate information and break into tears so readily? Where are the probing conversational exchanges that we are used to today? Why was so much fiction shot in studios? Why does so much fiction seem so slow? Why do the settings seem so cramped and theatrical?

The explanation lies in the fact that the available technological arrays dictated particular ways of shooting. The combination of filmed report and live studio required news stories with silent lead-ins; the scarcity of synch sound equipment with various broadcasters in the early and mid 1960s often dictated the shooting of silent 'views'. 16mm film magazines were limited to an effective duration of 12 minutes shooting so long interviews were punctuated by breaks. TV had invested in studios with video technology which was cheaper to use than working with film, but video editing had a slow gestation and remained expensive for a long time. This much is known to TV and film historians, but to appreciate how technological arrays impacted on particular filming situations requires more explanation, and an appreciation of the size of film crews and the physical amount of space taken up by their equipment. There are also things TV historians seem not to know: when did the boom microphone give way to the radio microphone clipped to the lapel? This allowed filmmakers to give their subjects more freedom of movement, and spelled the end of the 'interviewee in the chair' as the exclusive interview format. Radio microphones seem to have been used in live performances well before they were adopted into general use in television. The reasons for this apparent time lag in their take-up by TV crews requires historical explanation as well narration.

The new ease of availability of large quantities of historical television material has created a need for a history of the material audiovisual text similar to the recently developed histories of the book. Written and printed texts from the long history of the book now require explanation in terms of their materiality. Scholars like Timothy Barrett (University of Iowa) have painstakingly reconstructed the ways in which paper was manufactured in order to understand the constraints it placed on the manufacture and dissemination of printed materials. ADAPT will bring similar understandings to the history of television production, with the important difference that the skilled technicians are still available to demonstrate their skills, and the equipment that they used still exists in both public and private collections or in specialised usage. The opportunity therefore exists to create new materials that can be placed alongside archival collections to demonstrate the prevailing standard practices that brought types of footage into being. These online demonstrations will show the constraints placed on all the participants (including the filmed subjects) by the arrangements of technologies that were characteristic of different periods.

A further ambition of the project will be to seek to differentiate between behaviours that are specific to particular technological arrays on the one hand, and those behaviours that might be specific to the activity of filming itself, no matter what array is used. By comparing filming practices using different

arrays, it may be possible to produce a general description of the interpersonal relationships and the framing practices of ‘filming’ in general. Filming is now a cultural commonplace, which it certainly was not in the earlier years of television. It has become a pervasive activity now that moving image cameras are widely found as part of other digital devices (phones, laptops etc). ADAPT’s concentration on the normal practices of different periods in the light of their typical technologies may well provide the ideal perspective from which to produce a general account of the nature of ‘filming’ as a human activity.

B. Methodology

B1. THE THEORETICAL PERSPECTIVES OF THE STUDY

ADAPT is a study of a complex set of processes around combinations of technologies. Its methodology will seek to bring together several approaches. The overall aim is to try to synthesise a number of approaches to the understanding of the adoption and use of technologies. The television industry may be a specific case, but the questions that arise in understanding its technical phases have wider relevance. This is all the more true because location filming has always posed specific problems to be solved ‘on the day’ according to the concrete demands of each location and of each filmed subject. Equally, each production will tend to pose new problems during the post-production phase. So television has never been able to take its technological arrays for granted. The ‘end users’ were often also specialists and *bricoleurs*, active participants in the constant reformulation of technological arrays.

The methodological approaches that will be employed include:

1. Ideological

Television production is underpinned by a series of operational beliefs: a habitus in Bourdieu’s terms. Many involve beliefs about technology: the idea that technology must be invisible in fiction; the belief that reality cameras should get as close to the action as possible; the ‘instinct’ that leads to a standard rate of shot change in editing. These beliefs have a profound impact on the technological arrays in use: the combination of devices used, and the direction in which items of equipment are developed in future models. A second set of beliefs concern innovation: ideas about improved production values, a ‘high quality look’; ideas about the programme format that ‘has the edge’ on more conventional offerings, that can ‘show the world from a new perspective’; ideas about increasing efficiency, reducing waste and saving money. These beliefs drive forward technological developments in a different way, and are sometimes in tension with the first set of beliefs. A third set of beliefs concerns the eventual user or audience for the programmes that are being produced. They involve beliefs about the social importance of television, for instance. They also have their technological aspects, particularly in assumptions that are made about the technology in the home and how it is used; “how it will sound in the home”, “safe area of the image” (i.e. that which everyone is guaranteed to be able to see no matter how their set is tuned). These beliefs often act as a constraint on innovation. Accounts of professional ideologies exist from different periods of the television industry from at least Bakewell and Garnham (1970) and Elliott (1973) onwards. These accounts will be re-examined in the light of the theoretical insights of Bourdieu, particularly his emphasis on embodiment as the lived experience of the ideological.

Latour’s development of actor network theory (or, better, ‘approach’) (Latour 2005) will also provide a valuable guide to the understanding of the various groups (technicians, craftspeople, managers, directors, producers, equipment suppliers, hardware and software engineers etc) who variously inhabit these ideologies and work them through in using technological arrays to produce programmes. Earlier versions of the approach had already emphasised the technological arrays involved in producing complex results. Law (1986) demonstrates that the extensive Portuguese trade networks of the 16th century were underpinned by combinations of technologies and actions. Latour’s development of the approach allows us to understand the performative nature of these processes: they do not simply

repeat social categories (like ‘the market’) but perform them in particular ways. Further, the groupings outlined above are themselves shifting and dynamic: individuals move from one to another, taking some assumptions with them (e.g. some programme makers become managers); the role of an entire group can shift from marginality to centrality (e.g. ‘software engineers’ in the transition to non-linear digital editing). Along with this come two valuable perspectives: the deliberate non-differentiation between machines and humans (they should all be considered as ‘actors’), and the insistence that any account will not be neutral: ‘a good text is never an unmediated portrait of what it describes’ (Latour 2005, 136).

2. History of technology

As Douglas (2010) has pointed out, the work of Pinch and Bijker on the history of the bicycle has “emphasized the role of struggle, negotiation, rejection, and subsequent new directions as inventors, companies, and everyday users interacted and competed over what final form the bicycle would take” (295). This social constructivist approach will be central to the methods used in ADAPT. “The ... model highlights the contingency of technical development (by demonstrating the interpretive flexibility of artefacts), while describing how freedom of choice is narrowed by contextual constraints and alliances” (Bijker of bikes p.269). Bijker’s discussions of the introduction of Bakelite and the development of the fluorescent lamp provide accounts of the adaptation of new technologies to existing sociotechnical conditions which can guide much of ADAPT’s work.

The case of television’s technological arrays offers one important aspect that is relatively absent from the cases studied by the pioneers of the social constructivist approach. The act of turning on a light or an individual bike journey is scarcely important once the technology has been developed. This is not the case when arrays of technology are deployed in a specific location with a specific purpose. The same items of equipment will be used differently by different operators. Two camerapeople would light the same space in very different ways; no two editors would produce a sequence in exactly the same way. Embodied skills of use are therefore a significant factor.

In addition (and this is the point of the study), the individual activities of filmmakers working with particular technological arrays impact on the resulting footage. And the resulting edited footage (or, sometimes, even rushes) is what endures and is culturally important, unlike the bike journey or the lit space. This footage is itself subject to new uses. So the technologies of production never slip into an unexamined daily use: the nature of their daily use requires understanding just as much as it requires continuous improvisation on the part of its operators.

Also, there is no one ‘technology’ in use: hence the importance of notion of ‘array’: a set of interdependent machines: cameras, lights, microphones, sound recording and mixing equipment, editing equipment, film and tape stock, digital image manipulation processes etc. These have diverse origins and discrete development processes, many of which are driven by factors ‘elsewhere’, outside the TV or film industry (e.g. music, live performance etc). The result is an uneasy interdependence of technologies within an array, rather than a designed set of kit. Hence much of the work of location crews is a continuous trade-off between the conflicting demands of particular machines (producing an almost systemic conflict between the demands of sound and image throughout the production process). So an extra factor has to be added to those already examined by the social constructivist approach.

As Douglas emphasises:

“We should not give up on social constructivism’s main point about the centrality of struggle, competition, and negotiation to the invention and diffusion process. We need to remember, borrowing from Raymond Williams, that there are always dominant, emergent, and residual technologies, and different forms of the same technology, in any society. While they come to be controlled by powerful, corporate forces—given capitalism’s amazing absorptive power—there are often insurgent, subaltern groups seeking to take technologies in new directions”.(Douglas 2010 ,303)

3. Media Archaeology

Huhtamo and Parikka (2011) are proposing a ‘media archaeology’ which owes a considerable debt to Kittler. This approach concentrates on the specificities of a technology-in-use. In a radical return to fundamentals, they propose that each technology has its own aura which cannot be duplicated by any means other than that specific technology. It is in part a necessary critique of the digitalisation of analogue assets as a panacea. In addition, this approach also prioritises attention to neglected technologies and the developmental ‘dead ends’ that provided specific sensory experiences for their users. In a careful afterword to this collection, Vivian Sobchack emphasises that the “metalevel grounding of media archaeology in all its diversity is located in a desire for, and belief in, the possibility of historical presence” (Huhtamo & Parikka 2011, 327) evoked as a kind of aura (in Benjamin’s sense) by a process of meticulous description. This developing approach is likely to provide ADAPT with a consistent methodological companion and critique. It offers a crucial focus on what is lost in any technological transition (be it a change in the technologies used, or a change in the means by which audiovisual material is remediated by subsequently introduced means). As media archaeology works at the level of the written account, a useful dialogue can be undertaken about ADAPT’s process of collecting data by the reconstruction of shooting scenarios using particular arrays, and the re-encounter of skilled technicians with the equipment that they once ‘inhabited’. However, ADAPT is likely to remain in tension with some of the more radical aspects of the approach as ADAPT is predicated on a different view of its purpose. It accepts the value of a cautious attitude to the digital that emphasises the difference of the analogue. ADAPT seeks to explain the origins of analogue material as a substitute for the loss of the marking of its origins within the new uses of old footage. But it does so not to restore the aura so much as to inform the subsequent use in new arenas. ADAPT believes that users can find delight in new use or reuse of audiovisual material, just as much as they can delight in the original when that can be re-experienced as such.

4. Experiential: ideas of embodiment.

Parr (2010) presents a series of accounts of the embodied understandings of the inhabitants of several Canadian places which underwent profound changes due to big construction projects. She argues for the body itself as a way of understanding: a ‘making sense by sensing directly’. She shows how these understandings were disrupted by the environmental changes that engulfed their spaces. She argues that “if embodied histories are key to understanding how humans have kept themselves safe, how they have honed skilful practices in order to interact with the world through technologies, how they have recognized the environments they entered and subsequently reorganized (in the process remaking themselves as sensing beings), bodies are also places and repositories of histories of practice in place.” (Parr 2010, 21).

Such an approach is necessary to understand how each technological array needed ingrained habits of use on the part of its users. A quick response to fast moving news or documentary situations required an ‘instinctive feel’ on the part of an operator. Even the humble clapper/loader or assistant on a film crew had to be able to load a reel of unexposed film into a camera magazine in a light-proof bag. Operating by touch alone, the loader had to ensure that no foreign matter (a hair or piece of grit) accidentally became entangled with the film. The result would be ruined footage. Equally, a set of ingrained habits involved anticipations about the next stage in the process: record keeping to aid the passage of film through the laboratory and into the cutting room; continuity recording to aid the transition between shots. For each specialised role, a set of learned physical habits existed, dictated by the precise configurations of each item of equipment. These determined how filming took place. But they equally determined the attitude of each operative to questions of technological change and innovation. These could have constituted a powerfully conservative force, but in the case of image and sound acquisition there were sufficient countervailing forces in a nagging dissatisfaction with the results. Image and sound acquisition technology was always as good as you can get just now, but there was always something better about to come. Change was constant, driven by a general demand to ‘get closer to the action’. The balance between embodied knowledge (‘skills’ to use a much abused term) and the pressures for change is exactly the realm of Parr’s approach.

Television presents examples of evolutionary change and adaptation and of sudden and abrupt changes (especially in post-production) where adaptation proved impossible for many. Parr's approach will help to understand these experiences, which were the results – exactly as with Parr's Canadian subjects – of changes decided upon in other remote places for abstract economic reasons.

5. Economics of innovation

The ADAPT project will need to explain the causation of these major changes in two ways. They are a result of economic considerations; and they are the product of particular management decisions which sought to translate these economic considerations into the particular field of television. Rosenberg (1982) has explored the ways that technological change is significantly inflected by economic considerations. He explores the nature of 'creative destruction' in the technological field; the relative costs of incremental change in existing technologies against those of new and disruptive technologies; the costs of adaptation; the timing of adoption. This approach can discover some of the drivers of corporate decision making: when has it been a search for efficiencies within the system, and when a desire for new programme making opportunities? What are the drivers towards early, middle or late adoption? What is the role of technical standards? How does the desire to squeeze the last out of an investment in existing technology weigh in the decision? Are there areas of broadcasting which have a pronounced culture of technological innovation, why, and what effect (e.g. the role of sport broadcasting as a driver of re-equipment)? What presumptions about future activities and markets lay behind particular decisions about equipment? The first part of the period studied is dominated by a series of decisions made during the early years of TV about investment in TV studios, which affected the nature of much TV drama into the 1980s. Why did this persist even as filmed productions became more possible and desirable?

In addition, the economics of equipment manufacture will be considered. Video technologies were increasingly the product of global companies based in Japan or USA with the consequent problems of effective feedback from Europe. Consideration will also be given to questions about the size of the market for ranges of equipment in broadcasting in relation to the other possible markets for those machines (e.g. music industry and live performance for sound equipment). ADAPT will need to discover the degree to which innovation in areas of television's technological arrays were largely determined by considerations that had to do with other industries. This is particularly the case in relation to digital technologies with wide application in other activities.

6. Management of Institutional change.

Even in the period of vertically integrated producer/broadcaster organisations with their own production staff, management was a complex business. During this time, television thought of itself as a special kind of industry with limited parallels elsewhere, and management tended to behave accordingly. Accounts of institutional management in the BBC exist from Burns (1977) - which relates events to a decade earlier than publication - to Born (2005). Institutional histories of BBC and ITV also exist and there is a growing literature around Channel 4. Equally, the UK broadcasting industry has been the subject of various government report in the period studied, beginning with Pilkington in 1962. This evidence will be reviewed for its descriptions and analyses of management structures and the management of change. Particular attention will be given to the role of craft unions and their regulation of the available pool of skilled individuals as well as their role in improving the skills of their members.

The management of change will be the particular focus of the study of the transition to tapeless production in its final phase. This has not been without major problems, as shown by the late roll-out of the BBC Fabric project. The study will examine four UK institutions to see how tapeless production affects workflow, business models, production cultures and the programmes produced:

1. The BBC – main public service broadcaster
2. ITV – main commercial public service rival (and/or Sky – the commercial operator which is commissioning increasing amounts of UK production)
3. A large independent production company, e.g. Endemol or Zodiak
4. A smaller independent

Decisions taken by the broadcast commissioners affect the production companies. However, these companies produce for many different customers. The trade magazine Broadcast surveyed major independent companies early in 2012, and 22 of them stated that the UK market accounted for less than 50% of their turnover (Broadcast 23 March 2012). So there is a complex negotiation between the preferred systems of any one party and the demands of others. Many competing formats exist and file conversion is not a simple matter at the level of programmes made for broadcasting now and in the future. The management of change in the move towards tapeless production is the ‘live’ research aspect of this project. It is therefore being undertaken by Dr James Bennett of Royal Holloway who is currently completing a two year study ‘Multiplatforming Public Service Broadcasting’ for the Arts and Humanities Research Council in the UK.

B2. PROJECT PLAN

ADAPT will consist of several activities:

1. Researching and writing an account of the principal changes in the technologies in use in broadcast TV since 1960 to the near present. This will be written by Prof Ellis.
2. A major case study in the adoption of digital workflow management in production for broadcasting: the so-called ‘tapeless environment’ which is, in 2012, acknowledged as the next step for production and is currently being implemented in major organisations. This study will be a discrete project undertaken by Dr James Bennett of the Media Arts Department, Royal Holloway University of London, and will be ‘nested’ within the larger project.
3. A longitudinal study of the evolution of tape-based sound recording and the conflict between the demands of sound and camera, particularly on location. This will be the subject of a PhD thesis from year 2 of the project. Principal supervisor: Prof John Ellis
4. A conjunctural study of the rapid change from 16mm film cutting to digital editing, a process that in many countries took less than five years and imposed heavy demands on post-production workers. This will be the subject of a PhD thesis from year 2 of the project. Principal supervisor: Prof John Ellis
5. The filming of a series of reconstructions of the process of working with particular technological arrays. Industry veterans will be reunited with the technologies they used at particular points in their careers and will be filmed whilst they work with them, discussing the strengths and weaknesses of the machines and the prevailing ways of working with them. These reconstructions will be edited to provide convenient contextual material for the many websites and agencies that are now offering archival TV material to various categories of users. The filming will be overseen by Prof Ellis and will be carried out by several experienced filmmakers who are full-time members of the Media Arts Department, Royal Holloway University:
 - a. Kishore Verma (fiction direction)
 - b. Victoria Mapplebeck (documentary direction)
 - c. Martyn Wilson (multi-platform broadcasting)
 - d. Rhys Davies (sound)

They will use the university’s facilities for filming and editing these reconstructions. The historic equipment will be hired or borrowed from private and national collections in the UK. The reconstructions will be released under a Creative Commons licence.

6. An invited colloquium of experts from a diversity of fields relevant to the project in its third year. The event will present and debate preliminary findings and explore methodological implications as well as attempt to extend the scope of the study to contiguous media areas (TV studio practices; radio etc). The international invitees will include John Caldwell (U.California), Susan Douglas (U.Michigan), Andreas Fickers (U.Maastricht), Tessa Morris-Suzuki (Australian National U.) etc.
7. This colloquium will produce at least one edited collection and possibly a monograph on the methodological issues raised by the project.
8. A final public conference will present the work to a wider set of publics (media historians, archivists, historians of technology and business, media practitioners etc)

B3. METHODOLOGY

ADAPT will use a series of written and other sources: existing histories of broadcast technology; company histories; trade publications; equipment handbooks; company archives; museums of technology; publicity and other production photographs and ‘making of’ accounts; records of training courses delivered within institutions or advertised to freelancers; the taped and sometimes transcribed interviews from the ‘BECTU History project’ of interviews with film and television technicians etc. It will draw on the work of current UK and other research projects, including the AHRC funded ‘The Spaces of Television’ (Glamorgan & Reading Universities), ‘A History of Television for Women in Britain’ (De Montfort & Warwick Universities), ‘Screen Plays (U. Westminster) etc.

Prof Ellis is a member of the Royal Television Society’s (RTS) archive committee which is concerned with the technical heritage of television. He is also on the steering committee of two research projects: on TV drama based at Westminster University and on amateur film and video based at the universities of Maastricht and Groningen and has links with many of Europe’s broadcast TV archives through the EUscreen project.

ADAPT will use the RTS membership of current and retired professionals as a means of contacting relevant technicians. From this core, a wider group of interested current and retired professionals can be engaged. A web discussion forum within the project can be set up to facilitate exchanges between these individuals to gather their recollections and to stimulate discussion of the project’s aim. It will work with existing such sites like www.pebblemill.org. Selected individuals will be chosen to be interviewed about their experiences of technologies, what they normally used, how they kept in touch with developments, memories of first encountering a new piece of equipment etc.

From this basis, some individuals will be recruited to develop simulations of the various typical technological arrays that were being used at various periods. The equipment for these simulations will be sourced from museums (Bradford, London Film Museum etc), private collectors already known to the project group (e.g. Joe Dunton), and some commercial sources. They will include demonstrations of editing processes of film and video as well as their shooting, and will, for instance, follow the shot 16mm film through its laboratory stages. The reconstructions will be recorded using Royal Holloway equipment operated by members of the academic staff of the Media Arts department at Royal Holloway who themselves have had considerable professional careers. These simulations will have several functions:

1. To be developed into material suitable for web distribution and incorporation into online archival collections as demonstrations of “how television was made”
2. To provide evidence of the ‘muscle memory’ of individuals as they reacquaint themselves with equipment they no longer use
3. To provide semi-structured interviews with these technicians about their habitual ways of working and their specific modifications of equipment
4. To explore the experience of being filmed using particular arrays of technology. Ellis 2011 examines the encounter of people and machines in the shooting and editing of documentaries using an approach derived from Goffman. ADAPT will test these ideas in practice through its reconstructions.

Archival television material available through www.euscreen.eu and other sources, as well as from the holdings of the National Film and Television Archive will be used in two ways. www.euscreen.eu has already found material that showcases TV production methods, and further material remains to be found as television (especially when new) was a highly self-reflexive medium and its methods were of public interest. Beyond this, archival television material will be sought which exemplifies the strengths and limitations of the particular approaches to shooting and editing encouraged by various technological arrays.

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B5. PROJECT TIMETABLE

Year 1

- Start-up; initial draft history of major phases established; research on variants across Europe and USA (via TV history scholarly networks); establish links with trade bodies, museums, archives
- Work with Royal Television Society to build website and recruit industry professionals
- Establish methodology
- Identification of professionals to interview
- Film and edit a pilot reconstruction
- Recruitment of 2 x PhD students
- Establishment of tapeless workflow project

Year 2

- Year 1 of PhD projects (sound technologies; transition to digital editing)
- Year 1 of Tapeless Workflow project
- Interviews
- Filming and editing of reconstructions
- Detailed research for technological history
- Initial identification of theoretical issues

Year 3

- PhD projects and Tapeless workflow project Year 2
- Interviews

Filming and editing of reconstructions
Launch of reconstructions website and tools, release of first materials under Creative Commons licence
Detailed research for technological history
Debate of theoretical issues at ADAPT's invited international colloquium
Online presentation of colloquium
Progress report to European Commission

Year 4

Completion of PhD project research,
Delivery of Tapeless workflow project
Interviews
Filming and editing of reconstructions
Development of supporting materials for reconstruction website
Completion of detailed research for technological history
Editing of collection on theoretical issues

Year 5

Writing-up, submission and examination of 2 x PhDs
Publication of Tapeless workflow project
Final writing and publication preparation of technological history
Publication of edited collection from year 3 colloquium
Presentation of findings at project conference and other conferences
Promotion of reconstruction footage to professional archive sector
Final report to funders