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Historicising Knowledge-Intensive Organizations: The Case of Bletchley Park 1939-1945

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Historicising Knowledge-Intensive Organizations: The Case of Bletchley Park 1939-1945

Abstract

This paper contributes to the emerging 'historic turn' in organizational analysis identified by Booth & Rowlinson (2006) by developing an historicised account of Knowledge-Intensive Organizations (KIOs). In a way parallel to McGrath's (2005) study of early medieval Irish monastic communities as KIOs, we provide a study of Bletchley Park (BP), the WW2 codebreaking centre. In particular, we argue that not only are there parallels between contemporary KIOs and earlier organisational activities, but there is a densely connected history of knowledge intensive techniques. Furthermore, we contend that KIOs should not be seen simply as hybrids between bureaucratic and post-bureaucratic organisations, but that bureaucratic organisation is itself knowledge intensive and that the drawing of such boundaries is saturated with power, not least in categorising certain types of work and workers as privileged.

KEYWORDS: History. Organizational Analysis. Knowledge-Intensive Organizations. Bletchley Park. Signals Intelligence.

Introduction

Shortly before the outbreak of the Second World War a manor house in the English midlands was purchased for use by the Government Communication and Cypher School (GC & CS). Its name was Bletchley Park (BP) and its purpose was to process Signals Intelligence ('sigint'). What happened there over the next few years was to have a decisive impact if not on the outcome then at least upon the duration of the war (Hinsley, 1993) and, it is hardly an exaggeration to say, upon the course of human history. At BP, new cryptanalytic techniques were developed which enabled the reading of, most famously, the Enigma[1] codes used by Nazi Germany and, in fact, a range of other Axis codes. This meant that for most of the war the Allies were in possession of much of German operational and strategic communications. In the process, the world's first computer was invented.

This paper is not concerned with the technical and military aspects of BP, but rather with its nature as an organization. More specifically, as we will argue, it can be considered as a Knowledge-Intensive Organization (KIO)[2]. Although often remembered for a small number of geniuses, such as Alan Turing, BP was in fact a large and highly complex organization growing from less than 200 employees in 1939 to around 10,000 by the end of 1944. Moreover, the work was done in conditions of immense secrecy, a secrecy which was maintained in effect until 1974 (Winterbotham, 1974) and, in some aspects, for several years thereafter.

This paper represents the first public presentation of the findings of a two year study of the organization of BP. In the course of this study, an extensive investigation of

[1] Enigma machines were extremely complex cipher machines used by the German forces, who considered them unbreakable. The odds of breaking the code, actually a series of subcodes or keys which were changed daily, randomly was approximately 1 in 10^{48}

[2] For ease of exposition, throughout this paper we will use the term KIO even when discussing literature which prefers the term Knowledge-intensive Firm or KIF

archive material held at the Bletchley Park Trust (BPT) and the Public Record Office (PRO)[3] was undertaken, for the first time we believe, with,a specifically organizational focus. There is also a voluminous secondary literature on BP which we have studied. This ranges from highly illuminating recollections (e.g. Calvorcoressi, 19??; Hill, 2004; Hinsley & Stripp, 1993; Welchman 1981) through to academic and detailed journalistic studies (e.g. Smith, 1998; Smith & Erskine, 2001) to the official history of British wartime intelligence operations (Hinsley at al, 1979-1984; 1993). There is even a novel, *Enigma* (Harris, 1995), subsequently made into a film, which whilst of course fictional is closely researched and discloses much of interest. With the partial exception of Budiansky (2000) and Davies (2001), there is little in this literature with a directly organizational focus although there is a wealth of incidental material of relevance. However, there is in addition a small more precise and scholarly literature (Black & Brunt, 1999, 2000; Brunt 2004) concerned with indexing and information management at BP which, whilst different in focus to our study, is of considerable relevance to it.

Apart from archive and secondary sources, we have had intensive discussions with those having expert historical knowledge of BP. These include Rodney Brunt, whose work on information management we have just referred to, as well as experts at BPT and the Government Communication Headquarters, GCHQ (the successor organization to GC & CS). It is worth recognizing that whilst information about BP is now almost entirely declassified and in the public domain, the fact that it was secret for so long presents a particular challenge of reconstruction which is different in kind to, for example, conducting a company history.

Additionally, we have drawn upon the transcripts of some 200 interviews with veterans of BP lodged in the BPT archive. These were conducted by various people at various times and for various purposes and so do not constitute a systematic resource but nevertheless one of interest. Finally, we ourselves collected a small amount of testimony from BP veterans in the form of a) interviews with five such veterans chosen for their knowledge of administrative issues at BP b) with one of these interviewees, who worked directly for the Deputy Director of BP, we conducted follow up telephone interviews and also a site visit of offices at BP c) correspondence with five other veterans who were not well enough to be interviewed d) conversations with some 10 veterans at a BPT official re-union as part of a session arranged by the organisers. In all of this testimony we pursued specifically organizational material. It will be appreciated that this kind of evidence is of a particular sort, since it is both retrospective and, moreover, very distantly so, with the informants being very elderly (the youngest in her late 70s, the eldest in her early nineties). It needs to be treated very circumspectly. Space precludes discussion of this interesting methodological issue, but see Summerfield (2005) for such a discussion and Summerfield & Peniston-Bird (2006) for an exemplification of how such material can be used in an analogous case[4].

[3] Specifically, the HW sequence of the Public Records Office. HW/3 and HW/14 are of particular relevance.

[4] We should perhaps note the particular ethical issues posed. The informants we worked with are all members of the BPT network and were contacted by letter via the BPT or else contacted us in response to an appeal by BPT. All those interviewed gave written consent. Interviews were tape-recorded and lasted for around 2 hours.

The volume of material collected through these various methods is of a daunting quantity and complexity, and we can only present a tiny part of it within the context of a short paper. In any case, in addition to doing so, we wish to pursue a particular theme, namely that of historicising our understanding of knowledge-intensive organizations. Therefore, before saying anything more about BP, we will make some brief comments about the project of historicising organizational analysis, mainly in order to indicate our own stance towards this project. We will then introduce some themes and debates from the existing literature on KIOs before presenting some detail on the BP case. In the next section we will draw together the themes of history, KIOs and BP before moving to a concluding discussion.

Historicising Organizational Analysis

For at least a decade there have been calls for more historically sensitive approaches to organizational analysis (Kieser,1994; Zald, 1993) and there are distinct signs that these calls are being heeded to the point where there may be emerging an 'historic turn' within the discipline (Booth & Rowlinson, 2006; Clark & Rowlinson, 2004). Without wishing to repeat the detailed reviews and arguments contained within these latter works, it is worth briefly outlining some of the issues in order to position the approach we take in the main body of this paper.

Kieser notes that Weber, perhaps the single most significant progenitor of organizational analysis, was as much historian as sociologist, believing contemporary institutions could only be understood by knowing how they developed in history. However, over time interest in history dissipated, "and nowadays, excursions of organization researchers into history have become extremely rare" (Kieser, 1994: 609). One reason is the professionalisation of sociology, as sociologists developed a preference for scientific methods in order to create a distinct identity for the discipline. Sociologists favoured grand theories, which are largely distrusted by historians. They look to generalise, while historians typically stress the uniqueness of organizations. Kieser contends that organization theory has followed this trend away from history (cf Zald, 1993), with the partial exception of labour process theory which was isolated from, and largely ignored by the mainstream and therefore did little to restore the status of historical analysis more generally.

Rowlinson & Hassard (1993) also regard the tension between history and sociology as critical for understanding organization studies' hostility to historical work. They identify two issues - one methodological and the other epistemological - which they explore by reference to the literature on organizational culture. The first issue refers to a heightened sensitivity towards meaning and understanding as explanation of behaviour, which privileges in-depth, qualitative interviewing and makes history relatively inaccessible, especially if potential respondents are dead. Culture is researched at the inter-personal level, with documents and other archival material not assumed to be as central to the organization's history.

The second reason for the failure of organization studies to incorporate history is epistemological. Rowlinson & Hassard believe that much culture writing has succumbed to post-modernism, which is sceptical about the epistemological status of historical events. If taken to its logical conclusion this means that all history is subjective - history is what the historian makes it. In culture writing, they see this

view as exemplified by Martin (1985), for whom both cultures and organization histories are socially constructed. While accepting this, Rowlinson & Hassard argue that "the reality of a past need not be abandoned because it has undergone a process of social construction, to do so would result in abandoning historical research. Instead, the production of history, itself the process of social construction, can be incorporated into the historian's account" (Rowlinson & Hassard 1993: 302).

One particular way in which history is produced within the management and organization field is, paradoxically, through the adoption of resolutely ahistorical assumptions. That is, as Clark & Rowlinson (2004) make clear, the issue is not just the absence of history, but the way in which history is used within organization studies. Classic popular management books place great importance on historical sources, but conduct, according to Clark & Rowlinson, hagiography rather than historiography (cf Case, 1999). This is the presentation of "historical narratives in a common-sense, quasi-pluralist form, where the lack of reflexivity regarding rhetoric leaves ideological assumptions unexplored" (Clark & Rowlinson, 2004: 335). These works are replete with voluntaristic surface narratives that provide simplistic overviews of the past and give no consideration to the ways in which structures constrain and shape agency.

To seek to provide a corrective to this is consistent with Kieser's (1994) argument that one reason why an historical approach to organizational analysis may be valuable is the recognition that identification of organizational problems and their solutions are ideology-laden. Therefore, by confronting popular thinking in contemporary organization theory with similar developments in the past, it is possible to identify and overcome prejudices in their current presentation. It is also consistent with the third of the strategies for an historical approach to organizational analysis proposed by Üsdiken & Kieser (2004), that which they call 'reorientationist'. This approach is described (and endorsed) by Booth & Rowlinson as involving "a thoroughgoing critique of existing theories of organization for their ahistoric orientation" (2006: 8).

Taken together, the arguments we have briefly reviewed here are indicative of our own perspective. We agree with the need to provide a more historically sensitive form of organizational analysis and one in which, whilst the facts do not speak for themselves in the way apparently envisaged by, for example, Golden (1992; 1997), nor are they infinitely plastic constructs with no existence independent of accounts given of them. Certainly the facts which are recorded, recalled and selected by the organizational analyst are to be understood within a context of ideology and epistemology; but this is so for any form of organizational analysis including, perhaps especially, including that which ignores history all together, or treats it only cursorily. This brings us to the other many issues we have highlighted, namely the need to use historical analysis to reorient dominant approaches to the study of organizations.

More specifically, we are concerned to reorient what has been the dominant account of KIOs, which are almost universally considered as either very recent or still emergent phenomena. The main exception to this is a study we will now consider in some detail for in its approach, although not of course its focus, it has several similarities to our own. McGrath (2005) examines organization and management practices within early medieval Irish monastic communities and their parallels with contemporary KIOs. By suggesting that they might also have been organizations of

the past, this study adds a level of historical complexity to contemporary discourses about KIOs. The study aims to:

> "… open up debate, to encourage new ways of seeing, to explore possible mutual interpenetration of past and present and thereby problematize the bland ahistoricism underpinning current discussion of knowledge workers and KIOs and organization theory generally." (McGrath, 2005: 551).

McGrath identifies three themes of early medieval Irish monastic communities which are pertinent to understanding contemporary KIOs: structure; strategy and control; and community and he believes the parallels are impressive, despite the 1000 year separation. Both forms favour a flexible, geographically dispersed network form of structure. Teamwork is central to both, allowing a level of specialisation and, through collaboration, extensive knowledge sharing and the development of a communal orientation. Both have a clear and unifying mission but little sense of elaborate strategic planning. Both emphasise a relatively discrete body of knowledge by focusing on interpretation and applied skills in terms of exploiting core knowledge. Both see knowledge sharing (both internally and externally) as a core philosophy. Lastly, both have a strong emphasis on normative control with a view to fostering high commitment, responsibility and autonomy as a means of enabling dispersed activity.

After identifying these parallels, McGrath lists three contributions of this 'monastic metaphor' for the study of contemporary KIOs. First, it provides insights into the nature of community, an emerging but under-represented topic in KIOs. This "cautions against simplistic instrumental and narrowly focused models aimed at designing appropriate value-driven communities within organizations" (2005: 559). The second contribution concerns the high level of heterogeneity across Irish monastic settlements in terms of their structure and management, which encourages a view of KIOs as a plural form. Third, McGrath speculates that the success and endurance of monks can be partly attributed to the way they exploited a gap in the existing social structure. Contemporary KIOs have assumed a similar social significance, by positioning themselves as "the mediators or guardians of this new uncertain order" he argues (2005: 561).

The paper concludes with a discussion of methodological issues raised by the study. Here, McGrath notes that the parallels between contemporary KIOs and early Irish monastic communities might be coincidental and that even if these parallels are evident, the contexts are so different that drawing generalisations from the pre-modern context is impossible. His intention was not to present a counter-history to the emergence of KIOs or argue for a philosophy of universal evolution, but to suggest the possibility of continuity or cyclicality and therefore to encourage new perspectives for understanding KIOs.

Our contention about Bletchley Park is a similar one. Clearly it is much closer in time than early medieval monastries and, amongst other things, this means that our case can be explored using rather different methods. But we too, are, at least in part, concerned with providing the parallels and resemblances which provide much greater historical texture than is normal in understandings of KIOs, and which undercut the notion that they are a new and unprecedented organizational form, characteristic of

late modernity. Additionally, we have the same reservations as McGrath about the idea that this reorientation constitutes a counter-history. That is, we are not saying that Bletchley Park is somehow the point of origin of KIOs. Nor are we saying, in anachronistic fashion, that it was 'the same as' contemporary KIOs. However, we depart from McGrath's stance in not only highlighting parallels and the possibility of cyclicality, but pointing towards an interconnected history of knowledge intensive techniques. Such techniques form part of the focus of what has become a large and influential literature on contemporary KIOs to which we now turn.

Theorising Knowledge-Intensive Organizations

Attempts to define and conceptualise 'knowledge-intensive organization' tend to begin from acknowledging the problematic nature of this concept. Starbuck (1992) points out that KIO has diverse meaning partly because people use different definitions for 'knowledge' - itself a highly ambiguous term which has many meanings. Since all organisations and work involve knowledge, it follows that what qualifies as a KIO or as 'knowledge work' (KW) is rarely self evident. The concept of 'knowledge intensiveness' is vague, and tends to encourage interpretations of knowledge that erase the distinction between knowledge and other forms of human capacity. It is therefore difficult to substantiate knowledge-intensive organisation (KIO) and knowledge work as distinct and uniform categories. Nevertheless, there are differences between professional service and high-tech companies on the one hand, and more routinised service and industry companies on the other. This is reflected, for example, in terms of broadly shared ideas about the significance of a long theoretical education and of intellectual capabilities for the work. Karreman et al (2002) therefore suggest that "it makes sense to refer to KIO as a *vague but meaningful* category, with sufficient heuristic value to be useful. The category does not lend itself to precise definition or delineation because it includes organisations that are neither unitary nor unique" (2002:71).

Several 'broad-brush' definitions for KIO are suggested in the literature, for example, in Blackler (1995) KIOs are described as "organisations staffed by a high proportion of highly qualified staff who trade in knowledge itself". Similarly, in Karreman et al (2002) KW and KIO are distinguished from other kinds of work and organizations on the assumption that KW, and KIO as an environment, contains unique qualities. The most crucial difference lies in the assertion that KW is primarily intellectual as it draws on mental abilities rather than physical strength or manual craft. Starbuck (1992) too, notes that the term *knowledge-intensive* imitates economists' labelling of organizations as capital intensive and labour intensive, indicating the relative importance of either capital or labour as production inputs. By analogy, labelling an organization as knowledge intensive implies that knowledge has more importance than other inputs. According to Karreman et al (2002), the literature suggests that the concept of KIO applies to organisational settings that share the following common denominators:

- Personnel are highly qualified and have professional backgrounds (i.e. academic and other comparable pre-employment training and education).
- Products and services are complex and/or non-standard.
- Product, market and personnel development are significant activities within the organisation.

A more comprehensive discussion is provided by Starbuck (1992; see also Alvesson, 2004) who proposed the following considerations and criteria for labelling organizations as knowledge-intensive:

- ***KIO vs. information-intensive organization***. Knowledge is a stock of expertise, not a flow of information. Indeed, some activities draw on extensive knowledge without processing large amount of current information (e.g. management consulting). Conversely, an organization can process much information without using much knowledge. Nevertheless, it may be difficult to draw the line between a KIO and an information-intensive organization since expertise and large scale may well reinforce each other.

- ***Esoteric expertise vs. widely shared knowledge.*** If one defines knowledge broadly to encompass what everybody knows, every organization can appear knowledge-intensive and the value of focusing on a special category of organizations is lost. Similarly, every organization has some unusual expertise. To make KIO a useful category, exceptional expertise must make an important contribution. One should not label an organization as knowledge-intensive unless exceptional and valuable expertise dominates commonplace knowledge.

- ***The scope of expertise in KIOs.*** One can define expertise broadly, recognise many people as experts, and see the expertise embedded in many machines and routines. This strategy makes KIOs less special, but it removes some blinkers caused by stereotypes about expertise and increases the generality of findings about KIOs. Alternatively, one can acknowledge only legitimated expertise of people with extensive formal education, and can emphasise high tech machine and unusual routines. The second strategy makes KIOs more special but accepts stereotypes about expertise which bear the influence of social class and social legitimacy.

An expert may not be a professional and a KIO may not be a professional organization. Professionals have specialised expertise that they gain through training or experience, and KIOs may employ people who have specialised expertise. Thus, KIOs may or may not be professional organizations. A profession has at least four properties besides expertise, namely an ethical code, cohesion, collegial enforcement of standards and autonomy. Management consulting and software engineers for example, do not qualify as recognised professions although those who do these jobs have rare expertise. KIO therefore forms a broader category than professional organization, even though there may be similarities in terms of labour markets, interpersonal networks, experts' individuality, self-interest and social standing.

- ***KIOs' knowledge may not be in individual people.*** Besides the knowledge held by individual people, one can find knowledge in: capital such as plant, equipment or financial instruments (when knowledge is convened to physical forms); organization's routines, strategies and cultures; and, professional cultures which similarly carry valuable knowledge. This is another reason why KIOs may not be professional organizations and organisations such as McDonald's hamburgers provides an illustrative example of an organization in

which knowledge is embedded in technology and routines that substitute for in-person management.

Moving beyond Starbuck's discussion of the characteristics of KIOs, it is possible to find other, albeit related, conceptions of how we should theorise such organizations. The first of them tries to capture what is distinctive about the *knowledge* part of a KIO. The second, which we will consider in more detail, is the *organization* part of a KIO.

On the first issue, Alvesson (1993; 2004) argued that *ambiguity* represents a central aspect of KIO, understood as persistent uncertainty, confusion and contradiction. Ambiguity is present in several ways for KIOs. The concept of knowledge for example is highly ambiguous, thereby making both the product of the KIO (knowledge) and its production processes (knowledge development and maintenance) ambiguous in character. The very idea of sophisticated knowledge means that complexity and uncertainty prevail. Furthermore, KIOs are typically engaged in complex and difficult tasks that cannot be perfectly converted into standardised work procedures and regulation. Hence, KIOs are forced to attract and retain qualified people who can adapt their repertoire to meet the demands of the task. Managing these workers in a strict manner through a focus on behaviour is difficult due to the nature of the work, so a considerable amount of *self-organisation* is necessary (Robertson and Swan, 2003). This means that the most important organisational knowledge is dislocated from standardised work procedures towards the individual's skills, experiences and capabilities. In contrast to the bureaucratic (and Taylorised) form, mission critical organisational knowledge is not stored or manifested in procedures and processes in KIOs, but rather in qualified individuals - the professionals or experts (Karreman et al., 2002).

This latter point is highly significant for the second aspect of the theorisation of KIOs which we will discuss. It relates not simply to the question of what charactersises KIOs but to the pertinent question (for this paper) of their historiography. A general characteristic typically claimed for KIOs is that of *debureaucratisation*. Karreman et al (2002) argue that the literature tends to picture knowledge-intensive organizations as a departure from the bureaucratic form. They propose that the difficulties of employing valid and reliable rules and performance measures in KIOs has led many authors to emphasise cultural-ideological or internal control instead of bureaucratic or market-like forms of external control. KIOs are seen to depart from the bureaucratic/systematic model by decentralising activities, encouraging entrepreneurship and creativity, and not involving everyone in decision making. KIOs downplay formal structures, and they achieve coordination through norms and reward systems instead of hierarchy. Starbuck (1992: 730) cites four reasons for this: a) experts' sense of importance as individuals and their desire for autonomy: close control would induce exit, b) common values and norms that result from many years of formal education – KIOs appear to derive some of their properties from universities, c) experts have to work independently because projects involve just a few people, and d) the instability of projects and services means that in order to absorb variations in demands for their services, KIOs need fluidity and ambiguity. Matrix and 'project' structures are prevalent and organisation charts are often sketchy. Supervisors counsel non-directively and experts form liaisons across formal boundaries, including those of the organisation.

According to Karreman et al (2002), the claim that KIOs break with, or substitute for, the bureaucratic form is sometimes linked to general societal and organisational trends and developments. These are described as increasing the knowledge, flexibility, networking and innovation - all features making bureaucracy and its characteristics (hierarchy, stability, standardisation and rules) less relevant as key organisational mechanisms. Within the current discourse, *knowledge* is highlighted as a key dimension. It is frequently claimed that the locus of organisational exemplar has shifted from *capital-intensive* industries such as steel and automobile to *information-intensive* industries such as financial services and logistics, and more recently, towards *innovation-driven* industries such as computer software and pharmaceutical companies. In the latter, knowledge and the ability to apply it, that is – competence - are seen as vital. Knowledge and its adjunct *learning are* strongly emphasised in contemporary writings on management, especially in relation to their implications for manager's role (cf Contu et al., 2003). Senge's (1996) statement that the manager is no longer 'a boss' but rather a teacher primarily concerned with knowledge development and learning is cited in this context, together with related ideas, most notably organisational learning and knowledge management. The notions of 'community of practice' and partnership and the associated vocabulary in use (e.g. 'sharing', 'nurturing', 'relating') is seen to break radically with conventional ideas of bureaucracy.

The dichotomous view of bureaucracy vs. KIO has been summarised in the following manner:

Key aspects	**Bureaucratic ideal-type**	**KIO**
Mode of production	Standardisation	Ad-hoc problem solving
Dominant control logic	Enforcement of rules	Negotiated order
Environmental contingencies providing relative advantage	Stable, anticipated change	Turbulent, disruptive change
Nature of product and/or services	Homogenous	Ambiguous

Source: Karreman et al (2002:73)

Thus, KIOs are typically described (e.g. Drucker, 1993; Wikstrom et al., 1993) as organisations that deal with tasks that invalidate or break with bureaucratic modes of operating: hierarchy, division of labour, formalisation and standardisation. The literature on contemporary organisations in general, and KIOs in particular, suggests that bureaucratic modes of operation are substituted for more organic and flexible forms of organising, sometimes referred to as 'adhocracy'. This seems to be a general trend: markets are more turbulent, customer preferences are more differentiated, and production systems are more knowledge intensive – all factors that make bureaucratic modes of operation a less viable option (Karreman et al., 2002:75). It will be noted, then, that the ways in which KIOs are defined are very much historiographic in character. That is, they entail claims about a 'new age' of information (Castells, 1996), technology (Zuboff, 1998) and post-bureaucracy (Heckscher, 1994) having superseded bureaucracy. This historiography of 'epochalism' (du Gay, 19??) and rupture has been enormously powerful, not just within organizational analysis, but more widely within corporate and governmental understandings of our times – times which, necessarily, can be defined only by reference to their difference from 'the past' (cf Grey, 2003)

The distinctive contribution of Karreman et al (2002) is to problematise this dichotomisation of bureaucracies and KIOs. Drawing on empirical findings from two organizations which meet most extant definitions of KIOs, they show that these also embody very many recognizably bureaucratic features. They therefore conclude that the conventional dichotomy is inadequate, and suggest that complex *hybrid* forms of organization are more persuasive. In a development of this work, Karreman & Alvesson (2004) also show how KIOs utilise hybrid forms of organizational control. However, their analysis carries some dangers of being self-defeating in the sense that the emphasis they give to identity regulation and normative control might seem to reproduce the dichotomy of KIOs and bureaucracies in a different language (i.e. that the mode of control represents the epochal break)[5].

Karreman and Alvesson (2004) also argue, however, that technocratic and socio-ideological forms of control have a more complex relationship, particularly in the case of KIO/professional service. In this sense, the argument has similarities with

[5] This danger seems especially real in Alvesson & Robertson's (2006) study of identity work in KIOs.

Courpasson's (2000) concept of 'soft bureaucracy' whereby certain seemingly post-bureaucratic organisational practices, such as decentralisation, are better understood as conforming to the bureaucratic logic, rather than breaking away with it. Unlike Courpasson, however, Karreman and Alvesson (2004) further argue that the bureaucratic logic is affected in the *interplay* between the control forms. Rather than viewing the imaginary, such as organisational and social identities and organisational cultures, as additional, or as a separate extension to the substantive/structural/material dimension, socio-ideological and technocratic forms of control build upon and *feed each other* in these kinds of companies.

Although in this section we have scarcely been able to do justice to the huge literature of KIOs, we have sought to introduce at least its contours in a way which will be useful to our subsequent analysis. These contours should suggest that the definition of KIOs is a contested and contestable one. It requires the drawing of some fuzzy boundaries between KIOs and other organizations. Yet, once drawn, these boundaries have in many studies and commentaries become ossified into a dichotomous historiography of old and new organizations, a dichotomy which the empirical work of what might be called 'the Swedish School' has called into question. Yet, as we will attempt to demonstrate, even this work, important and insightful as it is, may not go far enough.

The Case of Bletchley Park

In this section, we offer a highly simplified and limited description of the organization of BP. It is strictly speaking a misnomer to regard it as a singular organization. It comprised up to 10,000 people working for army, navy, air force (and both male and female branches of these), the Foreign Office, the Post Office, various branches of security services and, from 1942, a small number of US service personnel. It might better be understood as a place in which these various organizations coalesced – as a node in a complex network. BP, as a physical site[6] came to have the role it did because it was bought in 1938 by the Government Code and Cypher School (GC & CS) which was a part of an ill-defined overall Intelligence organization which included MI6 with which GC & CS had a loose affiliation. The main thing holding this overall structure together was the person of "C"[7], the head of British Intelligence, to whom both the heads of GC & CS and MI6 reported, and who was ultimately located within the Foreign Office, and the Joint Intelligence Committee (JIC) of the heads of staff of the military. In other respects, it was either indeterminate, or is difficult to reconstruct, quite what the chain of command at BP was. For, apart from the fluidity of the intelligence services, different parts of BP were at different times located in various structures some of which ultimately terminated in different political entities such as the War Office and the Air Ministry.

Operations and Scale

[6] And here again there is a complexity because BP can be thought of as a number of sites including listening posts and also spillover sites which undertook various decrypting, translating and intelligence assessment tasks

[7] During the relevant period C was, first, Admiral Hugh Sinclair and, later, Colonel Sir Stewart Menzies

The basic purpose of the operation was to retrieve, sort and decode intercepted enemy transmissions and to assess and use the intelligence thus derived. But this bald statement reveals little of the complexity of the operation. Successful interception was itself an onerous task requiring many hundreds of highly skilled operators working in gruelling conditions. At the height of the war, 5000 messages were being successfully intercepted every day. A large transport operation was required to bring the intercepts to the BP site. The process of decoding, about which much has been written, posed formidable mathematical challenges and came to require the extensive use of mechanical and electromechanical devices. Once decrypted, it was necessary to translate the messages (which typically had a highly technical character) into English. But individual messages in themselves rarely had an intelligence value. Rather, potentially thousands of messages together needed to be considered and this necessitated the development of a variety of indexing and cataloguing techniques. This could then yield intelligence which might be useable in the field or for planning purposes. In addition to these core operations, a substantial infrastructure was required to maintain them.

The most famous code, Enigma (not, in fact a single code but rather a series of sub codes or keys, each of which required separate decryption), was, in the main, not broken until 1941 but from then onwards, with some notable exceptions, was read throughout the war. In the process, techniques used successfully against one 'key' were transferred in order to attack another key (e.g. 'Banburismus[8]' and the 'Herivel Tip[9]'). This, combined with rapid growth in signalling associated with Germany's expansionist military activities, explains why BP grew so rapidly in size, and character, from around that time. Not entirely coincidently, there was also, in March 1942, a change in the management of BP, with its original Head, Alistair Denniston, being replaced by Edward Travis and, at the same time, a more elaborate structure of Directors was created. This can also (or, perhaps it would be better to say, relatedly) be thought of in terms of a shifting organizational culture in which BP moved from a period dominated by creativity and a 'craft' approach to work to a production line for processing and indexing the large amounts of data[10] (by the end of the war, the number of individual pieces of information indexed at BP ran into several millions). To put it another way, in the words of Ralph Bennett who left BP for North Africa in 1942 and returned in 1943:

"I had left as one of a group of enthusiastic amateurs; I returned to a professional organization …." (in Hinsley & Stripp 1993, p38)

This is an assessment echoed by Davies (2001) in his essay on BP organization and it does a give a rough sense of the changes that occurred in 1942. What is certainly true is that BP experienced a very rapid growth in both personnel and buildings throughout the war but especially from 1942. The changes which this was caused by and the administrative effort which it in turn caused were very considerable. So far as the physical fabric is concerned, this is painstakingly documented by Evans (2003). So far

[8] "A method of attacking daily naval Enigma keys, minimizing the use of bombes, using perforated sheets made in Banbury" (Hinsley & Stripp, 1993: glossary)

[9] A way of identifying non-random settings of Enigma machines by exploiting laziness or non-compliance by Enigma operators. Named after John Herivel, who first identified this possibility.

[10] We obviously do not mean to imply that creative work ceased at BP after 1942, just that the bulk of the organization was now perforce engaged in a production line that had not hitherto existed.

as personnel is concerned, numbers rose from around 200 in September 1939 to 1576 in March 1942[11] but then rose to a height of 8743 at the end of 1944 before dropping back to 5781 at the end of the war[12]. One can say that the period to March 1942 was marked by the larger percentage change, and that was significant in terms of management but the period from March 1942 shows a much larger absolute change and one which almost inevitably implies an appreciable change in organizational character. As one interviewee in our study, working in administration remarked "[In January 1941] it was all the embryo of the organization and it just got too big, we couldn't be coping …".

The scale of the purely administrative task at BP can be glimpsed from Nigel de Grey's[13] post war review of BP in his 1949 report (HW14/145), where we find that in July 1944 there were about 4000 billets (of various sorts) in force, with another 4000 accommodated through the services. There were over 30,000 meals served each week, on a near 24 hour basis. There were almost 34,000 miles of passenger journeys organised using 115 drivers. Associated with the billeting was an organization of buses (with many personnel using their own transport e.g. bicycles) so that, according to one of our interviewees, in 1944 there were around 40 buses per shift, each with a seating capacity of around 40 (so, 1600 in total) transporting the staff in and out[14]. Another interviewee, working in administration, recalls that "it was a *huge* logistical exercise, and it had to take place every day round the clock … that was a colossal administration in itself, the transport". Travis's annual report for 1942 refers to the efficiency with which the growing headcount was serviced so that "although the workers have increased by 100%, by excellent organization of the transport and billeting the weekly mileage of transport has only risen by 37.5%" (HW14/67)

The Experience of BP

If we have given at least an insight into the nature and scale of BP, what of its character? This has been massively documented, and here we give just the briefest flavour of what is known. As we will stress later, experiences of those who worked at BP were very varied, but there are two aspects that seem to have been common for everyone who worked at BP. The first was secrecy. Everyone who has spoken of their work is quite clear about this. To take one of hundreds of examples, in this case from one of our own interviewees:

"It was the absolute cardinal principle. You never, ever spoke about your work. Full stop. And I never did until the whole thing came out in 1977 [actually, 1974]"

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[11] This figure was actually lower than it had been in 1941 because as part of the reorganization diplomatic and a little later commercial sections went with Denniston back to London. Headcount may have been 2500 prior to this.

[12] These figures are drawn from personnel returns for BP (HW14/154) but it is the case that other estimates vary considerably so that a figure of 10,000+ is often given. What such discrepancies reflect is the organizational complexity of BP: what counts as 'inside' or 'outside' the organization? But the main point for our purposes is the change in the *order of magnitude* over the period. Nigel de Grey makes exactly these points in providing the rough figure of 10,000 (HW14/145, p.14)

[13] Second in command at BP

[14] This recollection seems accurate given that there were three shifts per day over most BP operations and given that not all staff would use the bus service (as against walking, cycling and in a few cases driving)

There are many stories of people who worked at BP who never told even spouses what they had done in the war, even after declassification. In the case of one of our interviewees, both her mother and sister worked at BP and shared the same home, but never talked about their work at the time or after the war. And even though everyone had signed the Official Secrets Act, the vast majority of those who worked at BP did not actually know what it was that they were keeping secret[15]:

"We knew nothing about Enigma at all until long after the war …We were very much in watertight compartments because of the security so one really only knew one's own sections" (Julie Lydekkar, clerk, in Smith, 1998: 36)

This quotation points not just to the secrecy aspect, but also to the second common experience, that of compartmentalization:

"It was a very curious organisation. We were very, very departmentalised. You never discussed your work with anyone except your little group you worked with. I hadn't a clue what was going on in the rest of the Park and nobody else had a clue what we were doing …" (Susan Wenham, codebreaker[16], in Smith, 1998: 37)

But despite these common experiences, the main point to make is that, because of the huge variety of tasks within BP, and because of the compartmentalization, experiences of working at BP were highly varied. Of the 10,000 or so people employed, perhaps only 1000 were involved in high-level work such as cryptanalysis, translation, research and intelligence assessment (Hinsley, 1993: 117). It is worth particularly noting the substantial gender division at BP. About three quarters of staff were female, but nothing like this fraction of the high-level employees were women, although there were certainly some women doing extremely responsible jobs. We do not have figures for the gender divide amongst the high level staff, but perhaps an indication may come from the fact that, of the 32 contributors to Hinsley & Stripp (1993), which is by an large concerned with the high-level work at BP, just three are women. By contrast, Hill's (2004) account of daily life at BP is far more focussed on women's experiences, and they appear to have been much more variegated.

Just the fact that people were billeted miles into the surrounding area into accommodation that varied hugely in standard and welcome impacted on people's experience[17], let alone the variety of work. It is therefore not surprising that recollections of veterans are greatly divergent. For example:

[15] There is some complexity here. It is the case that (at least) some staff were given information as to overall purpose of their work e.g. those who operated the 'bombes' (mechanical parts of decrypting) were given encouragement in their rather dull tasks by being told something about their importance (Welchman, 1981: 146). In our interviews a respondent, employed by the Post Office to service Fish (rather than Enigma) machines saw decrypted signals on the teleprinter so guessed what was going on even though he was not formally 'indoctrinated'. Interestingly he thought that the (small) Fish operation was being hidden in a wider cover operation at BP, not realizing that that wider operation was actually the Enigma decoding effort.

[16] A rare example of a female cryptanalyst

[17] Nigel de Grey's report is again instructive. He makes several points about the scattered and variable standard of lodgings and notes that a "large proportion of GC & CS staff [were] accustomed to [a] higher standard of housing and feeding" (HW14/145, p.33). No doubt this was true, given the social standing of many staff, although no doubt, also, many accepted the exigencies of war time.

"It was a terrific human experience and I've never matched it since" (Bill Bundy, in Smith, 1998: 177)

But:

"Nissan huts, beastly concrete paths, ablutions … a drafty concrete hut … I loathed Bletchley" (Anonymous, in Hill, 2004: 136 [epilogue])

It is fair to say that all of the people we ourselves interviewed for this study had happy memories of BP, but equally fair to say that these are inevitably refracted through time and also come from a highly selective and selected group, notably those involved with the BPT. But just as it would be absurd to deny that many enjoyed BP so too would it be sentimental to ignore the fact that others did not.

Recruitment

We have seen that BP grew very rapidly over a short period of time and of course this means that the recruitment effort was considerable. The initial drive to recruit 'men of the professor type' (REF) provides the background to the recollections of many BP luminaries. A typical example, of very many that could be given, recounts that:

"In April 1940, about the end of the phoney war, Hugh Last, Professor of Ancient History, asked me to come to his rooms in Brasenose College, Oxford. He explained in a roundabout way that there was important but highly secret war work to be done, and that my studies in ancient languages and Egyptology might make me suitable for it. He advised me to go to a house called Bletchley Park and offer myself. And so on 6 May 1940 I took a train to Bletchley and entered BP …" (Alec Dakin, in Hinsley & Stripp, 1993: 50)

The process was not quite as casual as this account implies and it offered some distinct advantages. As de Grey's (1949) report explains, it arose from contingency planning prior to the war which "through contacts at the universities earmarked about 60 suitable men ... [some of whom] … attended a course in peace time … [a]ll joined at the outbreak or before." (HW 14/145, p4). This process continued after the outbreak of war, with Dakin's case being just one example. That it was possible, rested in part on the fact that the university system was much smaller than is nowadays the case and so it was possible to identify suitably talented individuals – mathematicians and linguists in the main – relatively easily. The advantages of recruitment through university contacts were both knowledge of these talents but also of the trustworthiness of the people concerned (who would of course have been subject to security vetting as well). And this surely cut both ways, since presumably those recruited would be unlikely to act upon such oblique approaches unless they came from someone known to be trustworthy.

Nevertheless de Grey concludes with customary pungency that "[t]he whole process [of billeting] is unpleasant and unpopular even to the patriot" (*loc. cit.*)

Nevertheless this approach was an idiosyncratic one, with some potential disadvantages in terms of the systematic identification of suitable recruits. As Hut 6[18] member Derek Taunt notes of his arrival at BP in 1941:

"… had I been at either Marlborough or Sidney Sussex [College, Cambridge], instead of the City of London School and Jesus College [Cambridge], I might just have arrived at BP in its great pioneering days rather than 'at the end of the beginning'" (Taunt, in Hinsley & Stripp, 1993: 101)

Recruitment became considerably more systematic later but in any case the key point to make is that these kinds of ways of staffing BP applied to only a tiny minority of those employed there. There is a received image of BP as recreating the ethos of Oxford and (to a greater extent) Cambridge colleges, and this is not wholly false. Yet this only applied to a small, albeit crucial, segment[19]. The story of BP, as we suggested earlier, is one at variance with the image of a small coterie of intellectual codebreakers. There were many other influences, and the increasingly 'mass production' system from 1941 or 1942 means that the 'high table' culture was also increasingly uncharacteristic of most of BP.

Moreover, what we have talked about so far is the recruitment of civilians. As the war progressed, more and more potential members of staff were in the armed forces, and in these cases employment to BP was largely a matter of military deployment. "GC & CS policy veered between initially preferring civilians lest the Services demand too great a say in the conduct of GC & CS and later urging the Services to provide more people …." (HW 14/ 145, p5). The vast majority of these came from the women's branches of the three Services, although very few women served as cryptanalysts.

The introduction of conscription posed particular difficulties for BP because of the call-up of its civilians. The most high-profile case of this was when Gordon Welchman[20] was suddenly, though temporarily, removed from BP by the call up. There had been numerous similar cases but Welchman's led to a concession by the authorities to Travis that if he stated that a fit man was essential to BP then he would be exempt from conscription subject to Travis promising not to abuse this power (HW 14/ 145, p.10).

Aside from the informal recruitment of civilians and the military deployment of personnel to BP, there was a large variety of other mechanisms of recruitment, some more idiosyncratic than others. One woman interviewed for this study told of how she had been planning to volunteer for the WRENs but just before doing so received an anonymous note in her pigeonhole at Girton College Cambridge invited her to attend an interview in London resulting in her going to BP as a member of the ATS. Another

[18] It is worth explaining the meaning of hut designations. The expansion of BP meant that its operations quickly moved out of the original manor house into a series of prefabricated huts. Functions performed in these huts continued to be known by hut number even when they physically moved. Thus, for example, Hut 3, which dealt with *Luftwaffe* and *Wehrmacht* signals continued to be so called even when it moved to Block D under the massive building programme from 1941-42. See Evans (2003).

[19] And Oxbridge was not the only source of university educated personnel. A number of universities were targeted and particular mention should be made of the School of Oriental and African Studies (SOAS) at London University which became significant for BP as the only University where Japanese was taught.

[20] Head of Hut 6 and later Assistant Director in charge of mechanical devices

curiosity was the now famous Daily Telegraph crossword competitions which netted a few recruits in 1942 (Hill, 2004: 14).

However, the general picture is more mundane. Nigel de Grey's (1949) report explains this picture in great detail, and interested readers should consult it for we can provide only a brief summary here. Many low grade employees came as directed labour via the Ministry of Labour (here poor morale, poor work performance and military call-up were constant and insoluble problems); higher grade labour was supplied via the Foreign Office (here the results were "exceptionally good"). The Civil Service Commission also provided specialists of various sorts, although here de Grey records that "it was difficult to persuade them [CSC] that people were not necessarily suitable [for BP] just because they were queer and difficult to place elsewhere"! (p.6). The General Post Office (GPO) maintained many of the intercept stations and provided technicians to BP. The quality of these staff was high, although de Grey records difficulties caused by restrictive practices amongst this unionised workforce (p.8). In general the supply of cryptanalysts and other high grade personnel was adequate to the task. It seems to have been personnel such as maintenance mechanics for devices such as the bombes[21], skilled W/T and R/T operators, and clerical supervisors which posed the biggest difficulty.

Organization and Management of Work

The great variety of occupations at BP again means that generalizations are difficult. The working environment was often poor in terms of heating, for example in the prefabricated huts, lighting[22] and even the availability of furniture. Conditions could be physically hard both for the desk-bound and those operating machinery such as bombes or Typex[23] machines. Shift work imposed strains, as did a working week which varied from 48 to 51 hours, depending on shift pattern. Clearly all this, too, might be accepted given the wartime situation and the knowledge that friends, relatives and compatriots were facing not just discomfort but danger. Even so there were certainly cases of mental breakdown at BP because of pressure of work (we do not know how many, but enough for de Grey to be able to make a comparison of the rates of such breakdowns as between the young and the middle aged) and there was a sickness rate of 4% by the end of the war.

Needless to say the working experiences at BP were as varied as the working conditions. As we have emphasised several times, BP was in many respects not a unitary organization. For the cryptanalysts there was much intrinsic interest in the work itself, and this must have compensated for whatever privations there were. Moreover not just for cryptanalysts but for other staff at the 'centre' of BP there was an approach to management which, in an internal post-war review of Hut 3, was described thus:

[21] Electromechanical devices developed at BP to test possible settings of Enigma machines. This substantially speeded up (or even allowed) breaking the daily code. The operation of bombes was physically arduous and was performed by WRENs.

[22] At the Chatham listening station, candles in bottles were used in the early days of the war (HW 14/145, p16)

[23] British cipher machines, sometimes used in modified form as facsimiles of the Enigma machine, sometimes to send enciphered messages [CHECK]

"Ours … was an exceptional freedom. Those who did their work well were left, within the inevitable limits, to do it their own way. (By their nature, that freedom was particularly felt in the Research Sections). It was the exact reverse of the HITLER principle of the greatest possible meddling with the greatest possible number. That trust was repaid. And if mistakes were made (as of course they were) by ignorance or negligence, the remedy was found not nearly so much in reprimands, or witch-hunts for the delinquent, as in the mortification decent persons felt at having let things down" (HW3/119, p.5)

Elsewhere, quite a different approach was adopted in which work was much more closely monitored and management was of a very traditional sort. The Typex Office is a good example. Here:

"Labour was 'directed[24]' and the interest nil. It became necessary to intervene and institute factory methods. This was done chiefly by keeping careful records of output per watch, per machine and per girl. This showed up weaknesses, peak hours etc., and enabled the manager to adjust numbers and skill per watch …" (HW14/145, p.29)

We can see here the outlines of, so to speak, 'Theory X' and 'Theory Y' management in different parts of BP. Above and beyond these differences, BP was extremely fractured in a structural sense. We have alluded to the range of different organizations which coalesced in BP, and we have very substantial evidence that these arrangements were not just tangled but fractious. A core issue was the relationship between civil organization and the services, and also that between the services.

Thus the organization was described as "freakish" and "intolerably complicated" (Birch n.d.: 474) and the post-war review concluded that:

"The history of relations of GC & CS to the Services consists almost entirely of the quarrels that resulted from this bad organization, having parallelism in no way as between the 3 Services or logic within GC & CS, and the efforts to straighten them out." (HW 14/145, p.22)

We must recall that these damning remarks come from someone who had been one of the most senior directors at BP and were written as an official review of its operations for what was by then GCHQ in order to prepare for any future war. Moreover, contemporary historians agree:

"Relations between the military and civilian sides was strangest of all at Bletchley Park, where the chain of command was so loose that it bordered on anarchy" (Budiansky, 2000, p.229)

Yet, despite this[25], the experience 'on the ground' was quite different:

"[The] whole structure was one where you might readily find a Major working under a Lieutenant or under a civilian, somewhat younger. Whoever was in charge was the person who had been judged to be more effective at doing it. It ws meritocracy in

[24] That is, they were civilian conscripts under Ministry of Labour directives.
[25] Or rather, we believe, *because* of this – but it would take a different paper to substantiate this claim.

spades and without regard to where you came from or whether you were a man or a woman, although I think we had a very large majority of men in the senior positions." (Bill Bundy, in Smith, 1998: 136).

This was said of Hut 6, but we find a similar picture in Hut 3:

"Here [Hut 3] over five hundred and fifty individuals of widely differing ages, gifts, and characters, men and women, Service and civilian, British and American, yet formed with all their variety one welded whole; working – often overworking – together, year by year, with unpretentious skill and pertinacity, gaiety and irony, and with less time wasted in intrigue than one could easily have thought possible in this too human world. Not everyone doubtless, overworked. Not everyone was always angelic. This is not a fairy-tale. Not everyone was always content. There were grumbles … [b]ut we were 'a happy ship'" (HW 3/119 p4)

However, yet again, it is necessary to recognise the great variety at BP. Huts 3 and 6 were amongst the main centres for cryptanalytic, research and intelligence work. There was a division between the 'minnows' and the 'boffins' at BP (Hill, 2004: 62). The Y-stations (intercept stations) offer perhaps a good illustration of the 'minnows' experience' at BP (of course they were not on the BP site), and it is worth considering these at some length. We should recall that, as noted above, this was an area where recruitment was difficult and where there were severe inter-service rivalries over control of the intercept operation. We should also note that the Y-stations were intensively managed for performance. Thus weekly records of intercept success were kept and, in turn, annual records. The report for 1944 (HW 14/154) provides detailed breakdowns on the interception of international W/T giving percentages for different services[26]. These are then broken down by Y-station. One station, Sandridge, was in January 1944 recording a 35% success rate (compared with Whitchurch 49%, Hawklaw 64%, Brora 59% and Denmark Hill 53%).

It is fascinating to place this information next to that provided in extracts from the Journal of the Sandridge Radio Section of the Wireless Branch of the UPW[27] (HW 14/19). Frustratingly, this document is undated but incidental evidence leads us to believe that it dates from late 1943 and so is nearly contemporary with the January 1944 interception data. The extracts take the form of three letters to the journal form W/T intercept staff. Extracting from the extracts:

"[Letter 1] My personal opinion is that we are not kept sufficiently informed about the character of our work. It is obviously boring to sit on a quiet frequency for hours, but if we could be told in confidence a little more about the chaps we are intercepting and the class of work we are dealing with it would go a long way. [Letter signed 'Doc']

"[Letter 2 – reply to 'Doc'] He has … only touched upon the problem … [a]s well as being kept in the dark about the work … there is no incentive for that very necessary accessory – initiative. [Signature illegible]

[26] To give a flavour of detail and variety, there was a 7% success rate against Irkutsk-Tokyo W/T communications in January 1944, rising to 39% in December and a 100% success rate on Kabul-Berlin communications in January, falling slightly to 97% in December. Overall on the 35 routes listed the intercept rate rose from 63% to 73% over the year and, for 'priority services' from 66% to 81%.
[27] Union of Postal Workers. It will be recalled that GPO staff were unionised.

"[Letter 3 – reply to 'Doc'] … I … agree … what about allowing us to see what a few message look like after they have been decoded? … how about the staff being allowed to nominate 3 or 4 of their number to visit the holy of holies, "BP". What a thrill we would get out of hearing about, and perhaps even seeing, those mysterious figures, Mr Welchman, Mr de Grey, Mr Shiner, etc., and dear old 'Hut 5' … if we could obtain … just a little information about what goes on above our heads, I feel sure it would do much to stimulate that interest which is now so sadly lacking. [Letter signed 'Veteran Temp']"

Just from this brief and highly selective account of BP it is hopefully possible to see how complex and how heterogeneous an organization it was. We now examine BP further, through a consideration of how the case and our account of it can inform contemporary debates on KIOs and the 'historic turn' in organisational studies.

Bletchley Park, History and Knowledge-Intensive Organizations

The most obvious question that can now be asked is whether BP can meaningfully be regarded as a KIO. The answer to this appears to be positive. What we might regard as the core segment of BP – cryptanalysis – certainly conforms with Blackler's (1995) definition. Considering Starbuck's (1992) criteria, it is clear that 'esoteric expertise' was dominant, to an extreme degree, and the expertise was to a large extent founded upon formal academic qualifications (in mathematics and languages, in particular). The expertise in question was perhaps not formally 'professional', but certainly highly specialised. And one can say that the expertise was partially encoded in organizational routines and machines.

There are also comparisons to be made with McGrath's (2005) analysis of the parallels between medieval monasticism and KIOs. BP had a geographically dispersed, flexible (sometimes even 'anarchic') and networked structure; teamwork, collaboration and knowledge-sharing (within teams) were strongly present. There was a clear and unifying mission (of the general war situation for many; of the codebreaking effort for some) and little evidence of elaborate strategic planning. Additionally, particularly in recruitment, there is strong evidence of BP of the importance of networks and trust. Moreover, BP exhibited many of the features identified by Heckscher (1994) as post-bureaucratic, and especially in the way that responsibility and decisions (e.g. in Hut 3 and Hut 6) lay with the most competent, rather than the most senior.

In these various senses, then, we can follow McGrath (2005) in making a fundamental and important point: knowledge-intensivity is not some novel organizational formation that only emerged in the late 20th century. Moreover, BP whilst in many respects unusual and in certain respects unique, developed its knowledge-intensive character from a profusion of pre-existing organizational techniques, including those derived from libraries and commercial organizations, as Black & Brunt (1999) show. Speaking of, specifically, information management, they conclude: "far from being a recent development linked to the appearance of what some see as a post-industrial, information society, [it] commands a long tradition rooted in the pre-computer,

industrial age" (1999: 371).Thus, this more historicised claim about KIOs cannot be countered by regarding BP as either an anomaly or as a prototype, for it was neither.

However, with all that said, it is clear that the BP case also throws into sharp relief the indeterminacy of the KIO concept. At least in numerical terms, BP's was largely not knowledge-intensive. Firstly, as we have seen, a great deal of activity was of a type directly analogous to, and understood at the time to be, that of an industrial production line, and much of it was physically demanding, labour-intensive work. Here, the modes of control were at least in large part those of coercive and bureaucratic rather than normative control. With variations, this could be said to be true of the listening stations, the bombes, the Typex room and many other things. Much organizational activity was, to use Starbuck's distinction, clearly information intensive rather than knowledge-intensive (indexing, for example) and gave rise to standardised clerical forms of labour. In addition, all of the support functions associated with transport, catering etc were by no means knowledge-intensive. Throughout the account we gave earlier of BP we repeatedly stressed the *variety* of organizational experiences and practices.

Now, the counter to this might be to say that, nevertheless, cryptanalysis, translation, research and intelligence work were, to use the term we ourselves used at the start of this section, the 'core' of BP, and that this dominated the organization. Yet the more we learn of BP the less clear this seems to be. Whilst it is certainly true that none of the labour- and information-intensive activities would have been possible without the cryptanalytic successes, it is no less true that these successes would have been impossible without, certainly, the labour-intensive work of both the listening stations and the bombes. Moreover, cryptanalysis would be no more than a clever 'game' were it not for the delivery of an intelligence yield, and was only a necessary, but not a sufficient condition for this yield. The capacity to transform decrypts into meaningful and useable intelligence was first and foremost an achievement of information-intensivity. This is not at all to downgrade the cryptanalytic achievements at BP but rather to contextualise them.

Manifestly all of this links to the question raised earlier, namely that of the distinction between bureaucracy and KIOs. Here, we can concur with Karreman et al (2002) that these are over-polarised. In the case of BP we find both present simultaneously and, more important, in a mutually reliant way. Even in the highly esoteric area of cryptanalysis there is a mixture of 'ad hoc' problem solving and standardization – whether in the form of the establishment of particular ways of attacking codes ('the Herival Tip', 'Banbarismus') or in the semi-mechanization, through the bombes, of discriminating between different possible keys. Insight, even genius, were not in themselves enough. More generally, of course, much of BP was highly rule-bound in terms of organizational procedures (not to mention military discipline) – indexing protocols being an obvious example.

However, we can make an additional point to that made by Karreman et al (2002). Their insight was that much that happens in KIOs is bureaucratic, but it might equally well be said that much bureaucratic organization is itself knowledge-intensive. The key to the power of bureaucracy was, for Weber, that of 'domination through the files'. Nowhere was this clearer than at BP where files, in the form of indexes, but also elaborate systems of security vetting and recording of organizational events were

central to both the existence and the success of the organization. From this point of view – and linking back to the epistemological debates about historical evidence we briefly alluded to in the first section of this paper - the very extensive archive material we have studied takes on a particular significance. It is not just a source of information, but in its very existence and profusion evidence of how file-based knowledge was a mode of organizational power.

Having raised this point, we will conclude this discussion by making two further comments about what the history of BP can tell us about the wider project of historicising organization studies and the study of KIOs in particular. The first is that historical distance assists de-familiarization. In the case of BP this has a particular twist in that it comes at the cusp of (indeed to some large extent it initiates the transition between) pre- and post-computer ages. This means that the non-knowledge aspects of knowledge work are extremely visible in the form of people doing work that is now done by computers. Indeed, over the course of the war, BP witnessed precisely a shift in this boundary. Contemporary depictions of KIOs put heavy emphasis on the centrality of information technology and, precisely because they are contemporary, may, to us, be misleading. For example, a current day knowledge-worker receiving an email, storing it, and replying to it can be recast as a clerk opening the post, filing it and writing a memorandum. Thus cast, some of the 'mystique' of knowledge work is eroded. In the case of BP, no such exercise is necessary since the evidence of routine and lowly work as an adjunct to knowledge-based activities is immediately obvious.

Secondly, the difficulty and indeterminacy of separating KIOs from other organizations is not an accident. There is not an essential quality to KIOs but, rather, attempts to construct such a delineation are intimately linked with power and interests because they are attempts to define status and worth of organizations and, in particular, employees. With the BP case, it being historical, it is perhaps easier to see how particular narratives about the organization have this constructed character. This relates directly to Hassard & Rowlinson's (1993) point about incorporating the production of history into historian's accounts. The dominant received picture of BP puts an emphasis upon the knowledge workers – the codebreakers. This picture foregrounds those who were largely male and from a social elite (it also typically downplays the non-British contributions to codebreaking) and who undertook what may now be seen as 'glamorous' rather than mundane work.

This is not to posit a conspiracy, but rather to point to the way that historical accounts are conditioned by systematic and ideological characteristics rather than being either accidental or neutral in character. If we decide that BP was a KIO then we can only do so by giving privilege to one particular aspect of its work. But the same must be true when we call a present day organization knowledge-intensive. Therefore the most important result of historicising KIOs is not simply to point out that they existed in the past. It is to use an understanding of how historical accounts are constructed to reflect more upon how accounts of the present are being constructed and with what power effects.

Conclusion

It will be clear that this is a very cursory and preliminary analysis. We have simplified at every step: the discussions of history and organizational analysis, of methodology, of BP, and of KIOs would not satisfy a specialist in any of these areas. This partly reflects the limitations of a single paper – and no doubt the limitations of its authors – but it also reflects the very great difficulty of reporting research on the history of organizations. Historians do not normally need to begin by explaining and justifying historical analysis; those presenting case studies, in any field, are often forgiven for doing no more than reporting the 'facts'; organizational analysts often are able to rely on a set of shared assumptions that make incremental contributions easier. Perhaps, as the field of management and organizational history grows, this will become true for it as well.

In the meantime, a certain compression is called for. Nevertheless, within these constraints, we hope that we have been able to do a number of things. A minor, but perhaps not altogether negligible, one is to signal, just by having written this paper, that there is a considerable overlap between the 'historic turn' in organization studies and critical management studies (CMS) (Clark & Rowlinson, 2004: 334). As authors with some commitment to CMS, we find an affinity between the two developments, and we certainly believe that CMS should not be equated with the extreme relativism criticised by Rowlinson & Carter (2002). In particular, we see a strong parallel between the CMS commitment to 'de-naturalization' (Fournier & Grey, 2000) and the reorientationist agenda for organizational history of Clarke & Rowlinson (2004) and Booth & Rowlinson (2006).

Beyond signalling a general commitment of this sort, we hope that the methodological and analytical strategies we have adopted make clear that there is a 'critical' approach to organizational history which is non-relativistic without being epistemologically naïve. We have tried to present facts about BP whilst recognizing the limitations and partiality of appeals to facticity and also some of the ways in which ideological patternings structure historical accounts. Certainly we are not amongst those (if indeed they exist) who regard history as no more than an artefact of accounts given of history.

More specifically, we have sought to advance an historicised perspective on KIOs by using the BP case to illustrate:

- That, following McGrath (2005), it is factually and analytically inadequate to regard KIOs as a recent or emerging phenomenon; but we have gone further than McGrath by suggesting that it is not just a matter of 'parallels' between previous and extant KIOs. Instead we have drawn on Black & Brunt (1999) as well as the BP case to suggest that there is a densely interconnected history of knowledge-intensive techniques
- That, following Karreman et al (2002), it is factually an analytically incorrect to regard KIOs as dichotomous with bureaucracy; but we have gone further than Karreman et al. by suggesting that not only are KIOs bureaucratic, but also that bureaucracies are knowledge-intensive
- That historical analysis can enable a move beyond that of seeing the KIO/non-KIO distinction as problematic and difficult towards recognizing that attempts to make such a distinction are saturated with power. The way that the BP case is both obviously one of knowledge-intensivity, but also only ambiguously so,

reveals the contestable nature of historical accounts of organizations and, in the process, the contestability of contemporary accounts of KIOs

These arguments, preliminary and partial as they are, suggest that the Bletchley Park case offers considerable opportunities for the analysis of knowledge-intensive organizations and, more generally, that historical analysis can substantially deepen our understanding of these organizations.

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