Academic Attitudes to New Media in UK Higher Education: an Interdisciplinary Study

By Kathleen Laura Menzies

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Department of Languages, Information & Communication Studies

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ABSTRACT

This thesis examines the attitudes of UK academics toward new media as both cultural artefacts and tools, assessing the relationship of those attitudes to traditionally distinct disciplinary structures. An inclusive and conceptually informed framework was developed following a review of multi-disciplinary literatures addressing the organisation of disciplines, the management of Higher Education, and the multiple meanings of new media. The original contribution of the thesis is an enriched understanding of what new media mean to academics both symbolically and practically at a time of immense technological and organisational change.

Empirical data were gathered from a sample of 209 UK academics in four academic fields which were selected strategically using a frame based on the work of Whitley (2000). The primary instrument used was a self-administered online questionnaire (distributed to 953 individuals in 112 in-scope institutions, hence the response rate is 22 percent) using Likert scales and semantic differentials to capture attitudinal statements. Illustrative, descriptive and inferential statistics were computed from this, although it must be noted that the population size could only be *estimated*. An analysis of commonalities and differences in emerging and conventional disciplinary structures suggests a stronger influence of the practical rather than symbolic influences of discipline on academics' attitudes toward new media. A homogenisation of attitudes is found across not only disciplines, but genders, age groups, and experience levels.

At the same time, while these findings echo those of other research, strong conceptual and methodological differences remain evident in debates about new media in much scholarly literature, primarily that drawn along disciplinary lines, or for a specialist audience. This suggests two equally important positions from which academics assess new media; those rooted in disciplinary modes, and those common to multiple practitioners and audiences in the academic 'workspace'. This can be seen as symptomatic of the new managerial models for research, teaching and assessment currently prevalent within HE.

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THESIS STRUCTURE

Because of the numerous and sometimes overlapping theories, concepts and lines of enquiry addressed in this thesis, there were many possible ways to structure the document. Certain aspects of new media and academia relevant to the research cannot be entirely separated and are difficult to narrativise linearly. Sometimes it makes most sense to discuss each together; at other times, it is more logical to separate out strands of the discussion. While chapters and subsections are arranged thematically, their contents are not entirely distinct – for instance, changes to the management of universities are discussed in Chapter Two Part I (Discipline and Knowledge) but also in Chapter Two Part II (Information Science, New Media and Academics in Higher Education) where, rather than being described in general terms, they are discussed more closely, in relation to rhetoric around and policies in support of new media's importance on campus, identified in literature reviews.

The key influences on academic attitudes toward new media as identified and examined in this research, are shown in Figure 1. This gives a basic and high level overview of the major structures and concepts found to affect perceptions and uses of new media by academics. The relationships between them and the relative importance of each in literature on new media are described and examined as the thesis develops. Each can be positioned in a complex, multi-disciplinary information ecology, or 'ecosystem', meaning that any models or typologies of academic relationships with new media can be analysed, assessed and altered over time and according to perspective:

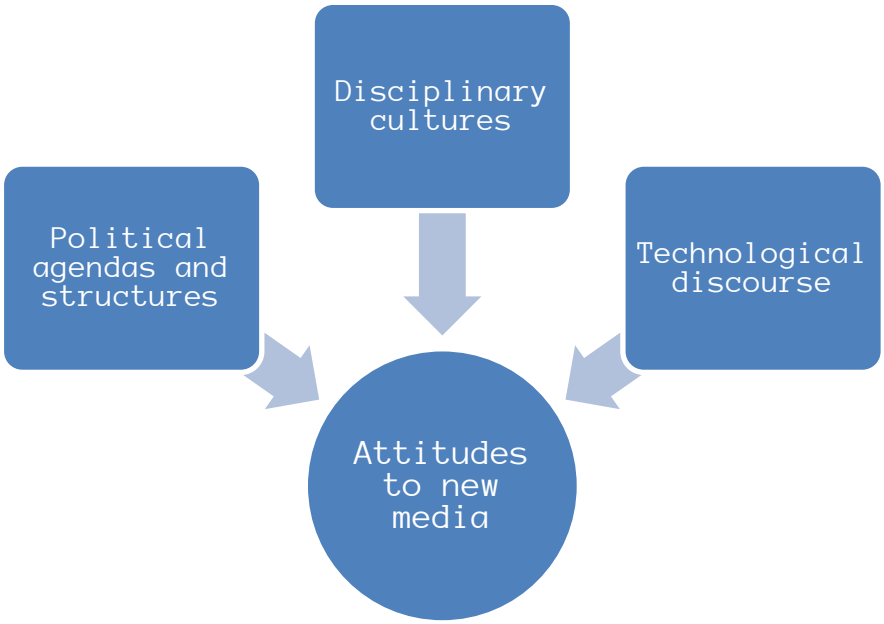

Figure 1 – Structures and discourses influencing academic attitudes to Higher Education.

Sequentially, the thesis is organised as follows:

In Chapter One, the aims and objectives of the thesis are articulated. Definitions of new media are vital to its lines of enquiry, thus these are considered here also; in particular, the multiple meanings of "new media" and the unpacking of it and related terms such as social media, digital media and Web 2.0, commonly used in discussions about new media, research and teaching agendas. “New media” is used here because it is the broadest and most inclusive term, with the others being sub-sets or specialisations of those. Conclusions are reached on the importance of contextualised definitions of new media and points made about the potentials of the disciplinary lens for attitudinal study.

Chapter Two Part I addresses the theoretical, structural and social features typically used to describe or discuss academic disciplines. Literature from previous decades – including important works by influential scholars from the 1930s, 60s, 80s and 90s – are detailed and mined for central concepts such as the lineage of disciplines and disciplinary reproduction. The ways in which features do and do not change, the cultures and processes of continuation or disruption which they accommodate, and their relationship to both

interdisciplinary research and the (often pragmatic or politicised) positions of academics and knowledge classification are examined. The role played by managerial models and practises, in particular, New Public Management, is also considered in relation to university-wide and disciplinary agendas. New media emerge here as a toolset with uses that can be linked to marketisation and to the defence or growth of particular academic territories via processes of adaption and realignment.

Chapter Two Part I comprises a literature review of work in the field of Information Science which directly addresses academics, new media and academic attitudes toward, as well as uses of, these technologies. Literature taking a UK perspective or setting is prioritised because the focus of this research is on UK academics, hence contexts and results are more straightforwardly comparable. However, work from elsewhere is considered where appropriate – i.e. when the conditions it describes are comparable to those evident here (in Great Britain). Key themes are identified, in particular, an emerging and powerful rhetoric around innovation and new media for research and teaching. The role of national and local policy instruments, which affect the attitudes and working practises of academics, are explored. The Digital Humanities as a new yet firmly rooted discipline (or set of disciplines) is used to exemplify this argument, with the complex economics of open access publishing and experimentation also briefly considered.

Several relevant studies into academic attitudes toward new ICTs and new media are identified and their findings summarised, with key points highlighted. Absences and gaps in the literature are also noted, with additional questions posed as a result – for instance, what exactly *are* academic disciplines, in the current management-centred and technology-dominated educational environment? Relationships between the structures and

processes found to be influential upon academic attitudes toward new media, as described in the literature are identified and illustrated.[1]

In Chapter Three, the research philosophy and the research approach of the thesis are explained; its theoretical and methodological bases are described and justified as parts of what is, to some extent, an interdisciplinary methodology (in that it is uses methods and styles from various fields to ask questions relevant across them), informed by both structuralist and post-structuralist concepts. In particular, attitudinal research and the centrality of this to the thesis are explored, as is the use of a disciplinary lens. The sampling frame used for selecting disciplines (and fields) representative of the spread of knowledge within universities and from which primary data were gathered is described. The relative nature of academic disciplines – as seen from both organisational and cultural perspectives – is shown to support their treatment as variables, although the fact that positions are never absolute is also acknowledged and explored. Similarly, parameters and constraints of the theoretical frame are noted.

In Chapter Four, the methods used for both qualitative and quantitative data gathering and analysis are described. Research methods include semi-structured paired interviews, online questionnaires, and the use of semantic differential charts (a technique derived from clinical psychiatry). Analytical methods include theme identification/thematic coding, illustrative descriptive

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1 Appendix XIII contains a supplementary literature review. Key concepts and discourses in academic writing on new media are identified in multiple fields, in particular, Media Studies, Cultural Studies and Philosophy. Some address new media as cultural artefacts in non-academic contexts; others directly address the university ecosystem. This was also a source of terms used in semantic differential exercises. Further, engaging with these enables a richer contextualisation of new media, academia and discipline-based genres or registers.

statistics, descriptive statistics, inferential statistics including factor analysis, and triangulation with findings from the thesis' literature review. The assumptions embedded in the quantitative analysis and its limitations are detailed, as well as its strengths. This includes an assessment of the various ways in which statistics can be used in Information Science research, and the ways in which they are used here.

Chapter Five presents the results of an initial empirical study involving eight academics from four scholarly fields, each of which was deemed representative of a traditionally distinct discipline. Key themes and terms are identified through the analysis of interview transcripts and documents resulting from 'brainstorming' activities. These are considered in relation to the preceding literature review. Answers to questions about discipline characteristics and in response to semantic differential exercises are examined, with similarities and differences between and within discipline pairs identified. The adjustments that were made to data gathering instruments as a result of the first phase of empirical data gathering are described.

In Chapter Six, the findings of the main study (an online questionnaire distributed to UK academics in the same four field explored in the first phase, and which gained 209 responses) are presented. The characteristics of the dataset and the population from which it was sampled are examined and found to be adequately representative of the wider population in UK academia. Here, the main method of analysis employed is a factor analysis of semantic differential data which encodes academic attitudes to new media as they relate to particular potentially oppositional concepts. The attitudes of respondents toward the characteristics of their fields are also assessed. Supporting the identification and measurement of similarity and difference on several measures (for instance, hierarchies, elitism and ways of working), this also creates room for a consideration of *change* and a recognition of the fluid, artificial nature of classification systems. The necessity of qualitative analysis, partly as a way to better interpret quantitative data, is identified.

Accordingly, Chapter Seven draws together the analyses of qualitative and quantitative data to discuss the main findings and conclusions of the thesis, in relation to its aims and objectives. It develops and contextualises a coherent argument concerning the characteristics of academic disciplines and the validity (and limitations) of the disciplinary lens as a way of understanding academic attitudes to new media. The utility of the methodology and methods used are reflected upon, with limitations noted. Here, the relationship of those attitudes to changes in Higher Education, systems of knowledge creation (or production), and the social and cultural frameworks and processes in which education and research are made manifest.

In Chapter Eight, further areas of research that could usefully build upon and extend the findings of the thesis are proposed.

A bibliography and appendices (including various statistical analyses and the supplementary literature review described above) are provided.

CHAPTER ONE: INTRODUCTION, AIMS AND DEFINITIONS

The substantial organisational changes occurring in Higher Education (HE) are significant ones, occasioned and supported by agendas and policies devised by governments and funding bodies and reflected in the models devised to manage and conduct academic research and teaching. Many of these encourage "network-centric" strategies (Eijkman, 2001, page 93) – such as 'e-learning', "digital pedagogy" (Gold, 2012, page 151) or "technology-enhanced learning" (Kirkwood and Price, 2014, page 7) – and interdisciplinary research based around technological innovation (Hey, 2009; Liu, 2009, page 27; Department for Business, Innovation and Skills, 2011, page 39). The view promoted here is that Information and Communications Technologies (ICTs) can enhance not just learning and research but also civic engagement, regional development (Brennan, Durazzi and Tanguy, 2013, page 20) and overall economic growth (Russell Group, 2012, page 3). Universities are reimagined as vital catalysts for "social mobility" (Department for Business, Innovation and Skills, 2011a, page 54) and as parts of a "global academic market" (Illeris, 2009, page 7) or a "knowledge economy" in "a time of rising competition and tighter public funding constraints" (Department for Business Innovation & Skills, 2009, page 3).

New technologies, which are seen to play "an important role" in serving this growth agenda (Brennan, Durazzi and Tanguy, 2013, page 20) must be positioned on campus in ways which are beneficial to it. Political and economic considerations are directly informative then of the ways in which staff and students interact with and think about new media – even if this is not immediately apparent. As parts of a research and teaching 'infrastructure', new ICTs are increasingly managed and instrumentalised. In this agenda, the "useful properties" or affordances of devices and systems are prioritised. Arguably, this decontextualises them from their relationship to human experience. When positioned in such a way, people (both as individuals and in groups) become "the subject of technical action which we call management" (Feenberg, 2005, page 50). However, "struggles over technological change

always take place in social contexts" and, as Feenberg and Hamilton (2005, page 116) emphasise, "despite the growing discretionary power of both administrative bodies and state/corporate interests, faculty and students still have some power in the institution and can intervene in institutional change". Usage may be managed and controlled, but there remains some room for experimentation and debate; attitudes toward the meaning(s) and the role(s) of new media will vary, particularly in an environment such as academia where critique is fundamental to scholarly endeavour and where new media concepts are frequently scrutinised (Valentini and Krukeberg, 2012, page 5; Olorunnisola and Martin, 2013, page 276).

Weller (2011, page 9), discussing "digital, networked and open" approaches to technology, observes that while the individual factors at play in how academics relate to these represent "simply an adjustment to existing practise", the impact of each – "when considered across the whole community" – is potentially "revolutionary", reflecting the "somewhat schizophrenic nature of digital scholarship at the current time". To some extent, forces of "compulsion" render academics' engagement with new media and new models of research and teaching "inevitable". This may contribute to objections, challenges and the formation of sceptical or negative attitudes (page 11) as well as to experimentation and enthusiasm. Although all scholars are affected by their growing importance in socio-cultural and educational contexts – "regardless of whether they use them or not" (page 114) – the implementation and use of new media is not uniform across fields.

This thesis constitutes an investigation into the attitudes toward new media of academics working in universities in the United Kingdom (UK). To date, this topic remains under-explored in the research literature, with behaviour being more frequently addressed. Drawing on organisational and socio-cultural models of academic disciplines, a methodology is proposed for typifying new media in relation to traditionally distinct and evolving disciplinary communities and the current contexts of digital technology in Higher Education. Doing so matters for many reasons. As Elias et al. (2014, page 454)

note, understanding "an employee's attitude towards technology in the workplace is important because such attitudes are crucial to the successful implementation of technological systems". Further, influence, persuasion and reputation (at individual and group levels) play an important role in how disciplines function (StateUniversity.com Education Encyclopedia, 2016).

Discipline – defined by the Collins English Dictionary Online (2016) as "a branch of learning or scholarly instruction" and "a system of rules for behaviour, methods of practice, etc." – is the core organisational principal of university teaching and research, affecting how staff and students are grouped, the methodologies, methods and equipment they use, the sources and amount of funding made available (Biglan, 1973; Kuhn, 1996; Becher and Trowler, 2001) and how the university positions or advertises itself in public. State University's Education Encyclopedia (2016) explains that:

> Training in a discipline results in a system of orderly behavior recognized as characteristic of the discipline. Such behaviors are manifested in scholars' approaches to understanding and investigating new knowledge, ways of working, and perspectives on the world around them.

Even where pressures or aims are to some extent common (e.g. general funding cuts, increased competition) these do not necessitate the disappearance of meaningful epistemic, administrative and cultural distinctions between areas of intellectual enquiry (cf. Abbott, 2001, page 148). Several "analytical frameworks" have been used to classify disciplines for the purposes of comparative study, with "codification", "paradigm development", "consensus" and the extent to which knowledge is practically applied being key variables that distinguish one from another. (State Education Encyclopedia, 2016). A disciplinary lens is therefore a useful and relevant one for enquiries into HE and new media.

Because discipline characteristics and ways of working change however, it is necessary to reassess these too in light of new agendas and ideas. Discussing research funding, Juhlin et al. (2013, page 8) write that:

> The top areas for research capital investment include the most resource-intensive ones [such as] Medicine, Dentistry and Health, Engineering and Technology, and Biological, Mathematical and Physical Sciences. HEIs [Higher Education Institutions] are more likely to invest in already strong areas than weaker, but potentially strategic, areas. Growing demands for capital investment from hitherto equipment-light disciplines (e.g. social science and humanities) will increase pressures on HEI budgets and prioritisation may become a larger issue than it is now.

Disciplines alter and adapt to accommodate and critique new techniques, tools, ways of working and understanding (Berry, 2012, page 5; Rieder and Röhle, 2012, page 68). As academics and disciplines develop, position themselves and compete, traditional boundaries are at times reinforced and at times challenged (Dutton and Loader, 2002; Rice and O'Gorman, 2008a). New technologies can be used in ways that are both generic and site-specific (Research Information Network, 2009), with the use or otherwise of new media rooted in established as well as emerging models of organisational information practise. New approaches and practises may be embedded within existing fields – for example, eScience (Hine, 2006b; Yang, Wang and Jie, 2011) – or entail the formation of novel categories such as the Digital Humanities (Spiro, 2011; Berry, 2012; Hirsch, 2012, page 40). This contributes to analytical complexity.

Sterne (2005, page 253) writes of "the need for us to understand technologies as part of heterogeneous networks that do not adhere to the analytical categories we invent for the purposes of scholarship." Developing an argument that digital media are important objects of study *across* disciplines, he argues that:

> Technologies have to be understood amid other apparently different technologies, practices, ideas, and institutions. If we follow the connections, if we look to morphology instead of common sense assertions, we may well begin to tell very different stories about technologies […]. Our challenge is to break with common sense and to ask fundamental questions of all dimensions of the digital world, including aspects of that world that may not, at first blush, seem digital at all.

Part of this challenge relates to the fact that no specific methodologies and methods have been defined or discovered as accepted best-practise tools for the study of digital media. Although some propose new/digital media studies be viewed as a whole and separate discipline, distinct epistemologically and methodologically from others, the conditions for it to be so are not yet satisfied and may not in fact be appropriate. As Sterne (2005, page 254) further observes, it is unclear whether or not digital media will mainly be studied within humanities, social sciences, or somewhere between the two; this means researchers must "commit to conceptual breadth and intellectual and historical depth" in their studies of new media. Do digital media scholars seek primarily to tell and explore "stories", or to ascertain facts, problems, and solutions? These questions relate to the very nature of what both *digital* and *scholarship* mean, conceptually and practically.

Because it would be impossible to consider them all, four fields (each representative of a discipline) have been selected for the primary data gathering activities of this thesis: art and design, computing science, politics and international relations, and health science (which includes medicine, clinical dentistry and healthcare science). These can be seen to be representative of the broad spectrum of epistemologies and discursive modes present within HE and were selected using a sampling framework based on Whitley's classification of the academic sciences, wherein they are positioned relatively according to various organisational and socio-cultural criteria

(Whitley 2000), and on the extension of his model by Fry and Talja (2007) which provides extra detail and includes the arts and humanities.

A multidisciplinary literature review including works from information science, organisational studies, business studies, media and cultural studies, politics and philosophy complements the primary data and allows closer analyses of genre and discipline-based views on the incorporation of new media. The aims of the thesis are now presented.

AIMS AND OBJECTIVES

The aims of the thesis are as follows:

1. To measure the attitudes of academics in UK HE to new media by identifying the conceptual and practical terminology that they associate with them.
2. To relate these understandings to existing and emerging models of academic knowledge creation and exchange, and the role of digital technology, within and across distinct disciplines.
3. To propose useful methodological approaches and methods for the study of academic attitudes toward new media, in light of the above.

The following objectives were set forth, in relation to each aim:

Aim 1: Objectives

1. Gather and analyse original empirical data on the attitudes of UK academics toward both their discipline communities and new media technologies and concepts across four traditionally distinct disciplines, sampled strategically.

Aim 2: Objectives

1. Position and analyse data within a discussion of the pronounced organisational, technological, cultural and policy changes taking place in academia, supported by a broad but appropriately focused multi-disciplinary literature review.

2. Identify through quantitative and qualitative analyses of the above, the key themes or factors that can be used to describe academic concerns around new technologies and concepts, showing how these relate to the current contexts of UK HE within and across disciplines.

Aim 3: Objectives

1. Assess and compare the utility of both the quantitative and qualitative methods used in the thesis in relation to its aims, its findings, and relevant discussions around new media and methods.

Primary data were gathered from 217 academics (8 in a small exploratory exercise and 209 in the main study) in 112 in-scope UK universities (see Appendix II). Respondents included those working in research, in teaching, and at all stages of their professional careers, with varying levels of knowledge about new media and varying levels of expertise in their use. Methods used include semantic differential exercises, semi-structured interviews, and literature reviews. Within an empirically-grounded framework, various modes of analysis – both qualitative and quantitative – are employed to accommodate difference and fluidity of meaning. Engaging with cultural understandings of new media and academia drawn from multiple disciplines, the ways in which disciplinary conventions, constraints, and concepts around new media intersect with academics' attitudes toward them are considered. At the same time, useful working definitions are identified.

The next section of this introductory chapter discusses the distinctions and overlaps between what are variously termed digital media, new media, social media, Web 2.0 and Web 3.0., seeking those definitions most useful for the research. Examples of new media and their sub-types are provided, with both common and less familiar definitions and interpretations noted. The impact of new media-based models on professional expertise, questions around technology and materiality, the political potentials of new media and their

influence upon group identity construction are touched upon[2]. To illustrate some of the specialist definitions that exist in discipline-based communities of theorists and/or practitioners, some of the meanings of "new media" as understood in digital art discourse are considered.

DEFINING NEW MEDIA

Because of the many different instances of new media circulating in digital (or digitally mediated) environments, and the multiple uses to which they can be put, there is no clear agreement about what new media *are*. A simple definition is problematic. They may be described primarily in terms of form, function, mode, or in relation to supposed dichotomies between them and older media (Huhtamo, 1997; Manovich, 2001, page 44; Prior, 2005, page 24). Terms used may be as much conceptual as activity-based. In a classificatory complication, aspects of new media might be manipulated and altered by both designers and users – for instance, interfaces can be customised, narratives personalised, and relations between creator and audience/consumer shift (cf. Laurel, 1993; Murray, 1997; de Lange, 2010). Such flexibility challenges fixed notions of structure, meaning and style. A basic online search is revealing. New media can be:

> A general term covering non-traditional ways of delivering advertising or promotion messages, anything from text messaging to the Internet.
>
> A new communication medium that, like the sky in relation to prior transportation media (water and ground), bridges the mutually incompatible characteristics of prior communications media.
>
> Artworks that use multimedia, computers, or communication technologies in creative expression.

[2] Again, these definitions, discourses and themes are explored more fully in Appendix XIII.

> Technologies, such as the Internet, that blur the line between media sources and create new opportunities for the dissemination of news and other information.
>
> Some combination of universal access to simple publishing tools (meaning anyone can ‘publish' content), and powerful social bookmarking and aggregation services.
>
> - Definitions gathered from a Google "define:" search, January 2012.

In some cases, specific tools and services (e.g. social bookmarking, text messaging) are mentioned; in others, particular functions or "channels" (delivering advertising messages, the dissemination of news). The relationship of new media to creative and communicative arenas is also evoked. Verbs like "blur" and "bridging" suggest the abstracts with which new media are often associated. Attitudes are revealed in some of these descriptive classifications. For instance, tensions around old and new lead one author to put the word publish in inverted commas, evidencing a somewhat reactionary stance that seems to privilege older forms of publishing. This invokes a legitimate analytical distinction – anything 'new' or considered new relies for its definition not necessarily on genuine uniqueness but on how it is perceived, as well as the activities it supports.

The idea of "clear-cut boundaries separating a technological system from its environment" is complicated by the "dynamic character of the contemporary world that is beset by contingencies of every sort, making the construction of predictable and quasi-closed technological systems always a precarious accomplishment" (Kallinikos, 2006, page 39). Discursive traditions, policies of control, and cultural "webs of signification" (Huhtamo, 1997, page 222) affect the attitudes of those seeking to understand what new media are and how to use them. Environmental factors fuse with the first-hand experiences of individuals and the collective cognitive processes of groups working with technologies (Mangen and Velay, 2014; Vasiliou, Ioannou and Zaphiris, 2014) to form increasingly intricate sets of "interactive artefacts" which support,

interfere and compete with each other in [people's] homes and workplaces" (Stolterman, Jung, Ryan and Siegel, 2008, page 219). These can be treated as "networks" which require active "maintenance", dependent on personal or group preferences and evaluations (page 221).

Iowa State University's Studio for New Media (2009) propose generic definitions that accommodate various understandings and practices while allowing typical characteristics to be identified:

> Some writers have come to define new media with simple lists of technologies. This effort would seem fruitless, as some technologies prosper and others falter over time. Many writers take a different tack, instead focusing on the sense of interactivity that new media give users. Some take pains to differentiate new media from traditional mass media […].
>
> A more interesting definition would be one that explains "new media" in a way that promises to be more lasting, yet also seems meaningful to readers. Perhaps that could be accomplished by defining new media as a family of genres that involve digital media: like "poetry" or "the novel", each new media format could be conceptualized as a collection of styles of production which have implications for the sort of content appropriate within the style. As with a poem or a novel, both the writer and reader have some knowledge before beginning the work as to what sort of work it will be, and what their role is supposed to be interacting with it (http://newmedia.engl.iastate.edu/about/what_is_new_media).

Perhaps such a typology could be adapted to refer to academic disciplines, in accordance with the new media formats their members interact with most frequently and which are used to accomplish core objectives (whether in research, teaching or other activities). Genre could also relate to particular epistemologies, and to discourses on new media that arise within orchestrated linguistic/disciplinary networks. It is worth noting here that, while not always

transparent, hierarchical relationships are encoded in the "communication exchanges that bind distant participants into an effective community", rendering them subject to the "effects of [both] power and solidarity" (Hodge and Kress, 1998, page 40). These may be particular salient notions when addressing new media in academic disciplines, predicated as they are not only on communication but on claims of *priority* in processes of discovery and knowledge creation.

SYSTEM FEATURES AND SOCIAL MEDIA

New media are predicated upon the logic, languages and outputs of computing science. Their contents are circulated between fixed and/or mobile devices generally connected to the internet and which make use of the World Wide Web or other networks through a combination of wired and wireless infrastructures. They enable transactions and collaborations to take place between service providers, system components, content creators and remote and distributed users (or audience members, or players) both synchronously and asynchronously. Through graphical user interfaces (GUIs) that are 'intuitive' and accessible to non-programmers, new media support the production and distribution of multimedia content or aesthetic effects. These interactions rely on digital data translated by computers and captured by input devices such as keyboards, touchscreens or motion sensors.

Prominent examples are WordPress, Flickr, Vimeo and SoundCloud. These are basic but powerful content-driven sites which focus on particular file types and special interests; in turn, html, digital photographs, digital video and digital audio recordings. Social networking sites such as Facebook, LinkedIn and Google+ revolve around social interactions and allow users to upload and share various types of file in a less specialist forum. All of these – generally known as "social media" – are immensely popular on a global level and take as their currency user-created content, be it artwork or a conversation.

The "dynamic representation" of personal identities (Goriunova and Bernardi, 2014, page 455) is often central to the formation and maintenance of online

communities. Designed to be flexible, participatory, interoperable and interactive, the "technical realization" of these services "prescribes certain formulae for representations and evaluations" such as character limits on Twitter or the 'like' button on Facebook (Goriunova and Bernardi, 2014, page 455). The user's "goals, expertise, and specific media characteristics influence their construction, integration and personalization of interactive [and] social media" (Stewart and Grover, 2010, page 13).

Augmented reality games and applications – popular examples include Urban Sleuth, Perplex City and Zombies, Run! – are less well-known instances of new media. These require offline as well as online interactions using various channels and modes. For example, Urban Sleuth asks players to solve puzzles that might be "planted on web sites, or engraved on historical monuments" (Urban Interactive, 2008). Interactive digital artworks are also examples, though these do not necessarily involve the internet; for instance, "virtual representations that take the form of 3D imagery integrated into photography, animated loops, and multi-channel animation installations" (Hart, 2014) or interactive documentaries displayed in a gallery space or website. These are also social and participatory but in different ways (something which is discussed further below).

Sector specific platforms more akin to the social media previously described include Moodle (a teaching and information management system for educational organisations), Yammer (a social networking and collaboration environment for corporations) and Framebench (a cloud based communication and feedback platform specially for digital creative industries), many of which offer similar features to sites like Facebook, LinkedIn or WordPress. Businesses using such systems for communication and collaboration generally restrict access to employees within their organisations. Most are designed in accordance with service oriented computing paradigms – specifically, Software as a Service (SaaS) or Service Oriented Architectures (SOA). This means that rather than being designed in-house or installed and run on local computers, services and information are hosted and stored

remotely and in the 'cloud'; i.e. on servers located off-site, owned and run by external companies.

These types of new media support a 'many-to-many' form of information sharing, defined in Wikipedia as "one of the three major Internet computing paradigms, characterized by multiple users contributing and receiving information, with the information elements often interlinked across different websites [and/or devices]" (Wikipedia, 2013). Both public and private social networks rely on the principles and features of 'Web 2.0.'

VERSIONS OF THE WEB

In most definitions, a distinction is made between a non-participatory and restrictive first 'version' of the web (Web 1.0), and the second version (Web 2.0) which supplanted it. This second version is (or was) typified by flexible, scalable software operating "above the level of a single device" to treat the network as a "platform" (O'Reilly, 2005, page 4), and by multi-directional communication channels encouraging user contributions and interaction. In this narrative, the web of approximately 2002 onwards is treated – in the language of software developers – as a new 'release'. It improves upon, and is a logical extension of a previous state. O'Reilly (2005), who popularised the term, describes it thus:

> Like many important concepts, Web 2.0 doesn't have a hard boundary, but rather, a gravitational core. You can visualize Web 2.0 as a set of principles and practices that tie together a veritable solar system of sites that demonstrate some or all of those principles, at a varying distance from that core – *What Is Web 2.0. Design Patterns and Business Models for the Next Generation of Software.*

This definition may serve well the combination of systemic, structural, and post-structural notions that underpin multidisciplinary analyses of new media. As DiNucci (1999, page 221) puts it, Web 2.0 is "the ether through which interactivity happens", with "no visible characteristics at all". At the same time,

given the multiple devices and interfaces providing access to the web, that may be considered unintentionally "ironic".

Some critics suggest that by being so nebulous and by bracketing together so much, Web 2.0 is essentially an empty buzzword, incapable of supporting meaningful theorisation long-term. For Madden and Fox (2006, page 1), Web 2.0, "provided a useful, if imperfect, conceptual umbrella under which analysts, marketers and other stakeholders in the tech field could huddle the new generation of internet applications and businesses that were emerging to form the "participatory Web" as we know it today". From another angle, Web 2.0 may be criticised for encouraging "amateurism", "error", and "narcissism" through its reliance on 'amateur' content – something which is detrimental to knowledge production as traditionally understood (Keen, 2007).

Indeed, a more recent 'version' of the Web – Web 3.0 – incorporates new data interchange models, mark-up languages and vocabularies (for example, the Resource Description Framework and the Web Ontology Language) to link data "semantically". This supports richer and more accurate or "intelligent" searching (Berners-Lee, Hendler and Lassila, 2001, page 12), the compilation of more detailed data and metadata sets, and the creation of responsive, personalised services ranging from geo-location based apps to advertising messages based on the "behavioural targeting" of users (Chen and Stallaert, 2014, page 429). Context-aware "agents" might also improve the effectiveness of policies designed to ensure privacy and security online (Chen, Finin, Joshi et al., 2004, page 69).

According to Calcanis (2007), the move toward Web 3.0 marks an ideological power shift – it returns greater control to "experts", allowing users to trust more in the accuracy of the resources and services they make use of rather than relying on the "wisdom of the crowds" – for example, Wikipedia now places greater restrictions on the editing of articles by users while deploying automated semantically aware processes to detect problems and improve content.

For Lovink (2012, page 1) – from a quite different critical perspective – the "forgettable Web 2.0 saga is long over" and "the participatory crowds suddenly find themselves in a situation full of tension and conflict." Regulation and state intervention overrule "the [libertarian] notion of the internet as an exceptional, unregulated sphere". It was not "rolled out into a vacuum" but into and as a result of socio-political and economic realities (page 2). For him, the internet has taken over many aspects of society and life in ways which are invasive, frightening, and diminishing to "Truth" (147). Web 3.0 merely extends further the reach of those in authority – i.e. governments and corporations. As a "commoditized platform" (Calcanis, 2007), its new functions and effects are essentially "technocratic" (Lovink, 2012, page 148).

Undoubtedly, the increasing ubiquity and pervasiveness of digital and new media, characterised by multiple forms of representation and exchange (Tapscott and Williams, 2007; Castells, 2012, page 51), have corresponded to a much-discussed growth in potential markets and revenue streams (Gallaughera, Auger and BarNir, 2001; Swatman, Krueger and van der Beek, 2006; Maron, 2014) within what Castells (2012, page 77) calls the new "informational, global and networked economy" wherein information itself is a product. Normative pressures are put upon individuals, groups, and companies as a result of these "dramatic organizational and institutional changes" (page 78).

Nonetheless, while new media based services and products are theoretically lucrative, devising effective and creative business models that satisfy both business and user requirements is an inexact science (Kusek and Leonhard, 2005; Conneighten, 2013) and the attitudes of industry practitioners toward the potential of digital production and commerce vary greatly (Rosenstiel, Jurkowitz and Ji, 2012, page 18; Thompson, 2013, page 377). Those located in other sectors may conceive of new media in quite different ways to those responsible for engineering them or making them profitable.

DIGITAL ART, MULTIMEDIA AND METAMEDIA

New media art offer a particularly strong example of alternative definitions for new media. While rooted in artistic tradition, they clearly cross disciplinary lines and challenge many conventions. Here, new media implies technologies and concepts requiring more investment of resources and/or expertise than those commonly referred to (predominantly, social media). Depending on the specific project new media art might employ techniques associated with theatrical performance, engineering, computing science, media production, social protest, cognitive psychology, or somewhere else entirely, as well as from art and design. The materials used may be as old as wood or as modern as sound-activated LED lighting. Artists working with new media may consider themselves some combination of "technician, photographer, designer and video artist", or as both scientist and poet, exploring the relationships between technology and nature through installations in mixed media (Levy, 2014).

For new media artists, digital technologies are parts of a larger expressive framework; computers become strategic elements in wholly or partly digital artworks and installations – for example, supporting the production of aesthetic, cognitive or kinetic effects based on light, gesture and sound – designed to engage and provoke. Continuing a historical bond between art, performance and technological development, such works have resonances within and among different practises and theories, which "may have been overlooked" in their original contexts "due to disciplinary and other constraints" (Salter, 2010, xiv).

Subfields of computing science explore many similar concepts and affects as do new media artists – for example, the relationships between body, mind, perception and behaviour using immersive virtual reality systems (Christou and Parker, 1995, pp-55-87; Sherman and Craig, 2003, page 18; Whyte, 2005, pp.8-12) or the links between creative design and production processes (Viļumsone and Dāboliņa, 2012, page 49; Nitchse and Richens, 2006). A fusing

of scientific and digital art methods is also beneficial to art history, where "scientific analysis and the study of art can interact and be mutually beneficial in achieving their goals", as with the spatial analysis of perspective in paintings (Criminisi, Kemp and Zisserman, 2005, page 77). As well as benefits, there may be pressures associated with these processes of adoption and adaptation, and a sense that conformity is being imposed.

Quaranta (2012, page 1), surveying multiple texts, points out that defining new media art (with sub-categories including interactive art, algorithmic art, computer art and network-based art) is difficult. Pragmatic decisions and subjective points of view are often deemed necessary, as are deferrals to the less evasive language of more rational disciplines:

> Whatever one may think about new media art, when it comes to curating the definition becomes strictly technical and medium-based. New media art is the art that uses new media technologies as a medium – period. No further complexity is admitted. Beryl Graham and Sarah Cook, for example, seem to be well aware of the sociological complexity of new media art, but willingly put this aside to focus instead on the art that displays “the three behaviours of interactivity, connectivity and computability”, wherever it is shown and whatever it has been labeled.

For Tribe and Jana (2006), discussing why new media art might be seen to constitute a "movement" rather than simply being the product of a niche special interest group, "this shift [is] part of a much larger historical trend: the globalization of cultures and economies". To be a new media artist, one must critically engage – remain aware of how language, like society, changes in relation to communication technologies. Technical definitions alone are thus reductive; but so too must artistic ones be interrogated. New media present artists and practitioners with new possibilities and insights through the application of new techniques. Participation, experimentation and interaction are central to much new media art, just as they are to new media used in other contexts (Manovich, 2001; Rogers, 2008, Goldberg, 2010; Salter, 2010)

Machin-Mastromatteo, 2012; Olorunnisola and Martin, 2013; Porter and Hellsten, 2014).

As participants, users and/or spectators may allow data from their bodily interactions with a digitally mediated environment to be captured, represented and transformed. This could be via the provision of textual information, the speed at which it was typed, the modulation and pitch of a voice, the motion path of a movement, or any number of other inputs. Such interactions take conceptual artists closer toward the fulfilment of aspirations like the "dissolution of borders between experimentation and quotidian life", which combine both spontaneity and mathematical logic (Salter, 2010, page 303). On a technical level, participation may be heavily engineered; system responses are largely automated or programmatic – but this does not mean that they are emptied of creative or political significance. As Salter (2010, page 302) writes:

> At first glance, the use of machines involving the military paraphernalia of industrial capitalism seemed like a strange approach for artists interested in a form, however much abstracted, of political critique. Yet, as Vasulka eloquently pointed out, the potential of interactive systems and scenarios was not only to enable observers to communicate with the machine through its own intrinsic languages of binary code but also to generate an act of potential resistance, an "interference pattern" in the autonomous behaviour of a system such that unscripted behaviours and patterns might emerge between the machine's life and our own.

"Metamedia", a related term, is worth noting. This signifies the study of the "theoretical effects of mass media" – what Stanford University's Humanities Department call a "short circuit between the academy, the art studio and information science exploring media and their archaeological materiality" (Stanford University Metamedia Collaboratory, 2011). In order to "to move beyond the hype of new media expectations" historically situated accounts enable a more rigorous and useful understanding of "changes amongst actors

within the contemporary art world" – for instance the current pressures on art institutions as entrenched hierarchies and power relations shift (Arora and Vermeylen, 2013, page 1). Like other types of multimedia, new media art is challenging to classify and catalogue (Naphade et al, 2006; Balzano, Del Sorbo and Tarantino, 2010; Vukadin, 2014). Through systemic modes of classification, display and self-reflexivity, artists can position "technologised media" to "expose truths meant to be concealed" (Dziekan, 2012, page 33).

At the same time, there remains a commercial aspect to art (including even radical art, once it is popularised) that must be acknowledged. Arora and Vermeyln (2013), considering social media and expertise in the visual arts, examine concepts like "interactivity" (Grover and Stuart, 2010, page 7) and the new patterns of knowledge construction created between "institutional actors" in digital environments (Arora and Vermeyln, 2013, page 197). They suggest that despite an increased role for 'amateur' commentary, the role of expert remains valued and valuable both culturally and economically, regardless of challenges brought about by online participation; the "status derived from training, experience and institutional linkages instils trust in the potential consumers of art" (page 208) and social media often reflects as much as challenges existing hierarchies.

CONCLUSIONS

The term "new media" generally implies some combination of the latest digital multimedia systems enabling interaction and participation of various kinds and in various (usually public) spaces. In general, they rely on the internet, the World Wide Web and many-to-many communication channels, focusing on user input or user generated content. Social media are a *subset* of these and Web 2.0 is the conceptual architecture (or platform) commonly utilised *by* new media (Grover and Stewart, 2010, page 9). Web 3.0 is based on a "linked data paradigm" (Ngonga Ngomo, 2014, page 449) supporting more sophisticated and 'intelligent' methods of data manipulation and organisation than did Web 2.0. However, even technical distinctions can be unclear; all of these groups

possess commonalities or even dependencies. Further, different groups use the various terms differently for different purposes.

As a way to understand both the technical characteristics of new media and the concepts with which they are associated, the terms "social media" and "Web 2.0" remain useful and can be used as structural aids not only by web designers but by theorists and researchers studying digital technologies. More is required for critical than technical classifications. Matheas (2005, page 101) contends that "procedural literacy, of which programming is a part, is critically important for new media scholars and practitioners [and] its opposite, procedural illiteracy, leaves one fundamentally unable to grapple with the essence of computational media". To describe attitudes to those media, it is necessary to add to this procedural literacy an interdisciplinary critical literacy.

The debates and complexities unearthed when examining new media emphasises why specific discourses and value-systems of the disciplinary communities which make use of them must be accounted for. Terminology, and what precisely it implies, often depends on the research question and its contextual frame. Hand (2008, page 19) states:

> In discussing what is thought to be at stake for culture as a consequence of digitization I suggest that three key motifs – access, interactivity, and authenticity – are continually invoked as central problematics, encompassing a diverse range of intense debates. There is intense cultural preoccupation with, and great disagreement about understandings of access to digital culture, what is meant by interactivity, and how notions of authenticity are problematized in digital cultural life. These themes encompass economic, political, technical, and social dimensions.

The ideological principles of both groups and individuals are as informative of new media ecologies as technical ones. In different discourses, as in different environments, the same characteristics and effects can be perceived and valued differently. For Pressman (2014, page 365), "the terms involved [in

defining new media] are not stable and true but qualitative and changing; and yet, they are often employed rhetorically as if there exists a common definition […]. This paradox renders it vital that we rigorously and repeatedly examine the ways in which *new* and *old* are used".

Deciding on qualified, relative definitions may thus be best for both critical and practical projects, with meaning being dependent upon the purpose of the research, the audience for whom it is intended, and the particular type of new media being considered. Further questions then arise about the nature of the disciplinary lens.

CHAPTER TWO PART I: DISCIPLINE AND KNOWLEDGE

In this chapter, the nature of academic disciplines is examined and discussed. Works by seminal theorists and critics writing from different perspectives and in different decades are identified. Found to be analytically concise and informative of the research methodology, these are mined for useful concepts and understandings of disciplinary structures and of the university as an organisational and cultural system. Some focus on classificatory processes, some on processes of internal disciplinary development, and others on embedded power relations. All touch upon the often pragmatic nature of disciplinary transformation and the formation or dissolution of particular alliances. In line with constructionist theories of knowledge creation, disciplines are shown to be artificially if somewhat unpredictably developed categories wherein particular types of knowledge and particular academics are associated. Political as well as epistemological, this is the result of often unarticulated social processes of meaning making.

New models and modes of knowledge production are then discussed. These, though subject to intense debate, are generally considered to be the result (theoretical or otherwise) of altered economic and research agendas affecting universities worldwide. The impact of digital technologies on discipline boundaries is considered in relation to these, with some key empirical studies on the topic considered. It is suggested that interdisciplinary ways of working are facilitated by and reflected in the use of digital infrastructure (of which new media become a part). New media can themselves be seen as interdisciplinary artefacts because of the diverse ways in which they can be used, examined and understood. As the most effective way to understand scholarly collaboration, discipline can be interrogated and critiqued. Nevertheless, discipline-specific aspects of technologies, their use, and how they are perceived remain evident, including in responses to policy and other governance instruments.

To aid the reader, the figure below illustrates the understanding of discipline, sub-sets of a discipline, and the core of a discipline used in this thesis as a result of the literature review now described.

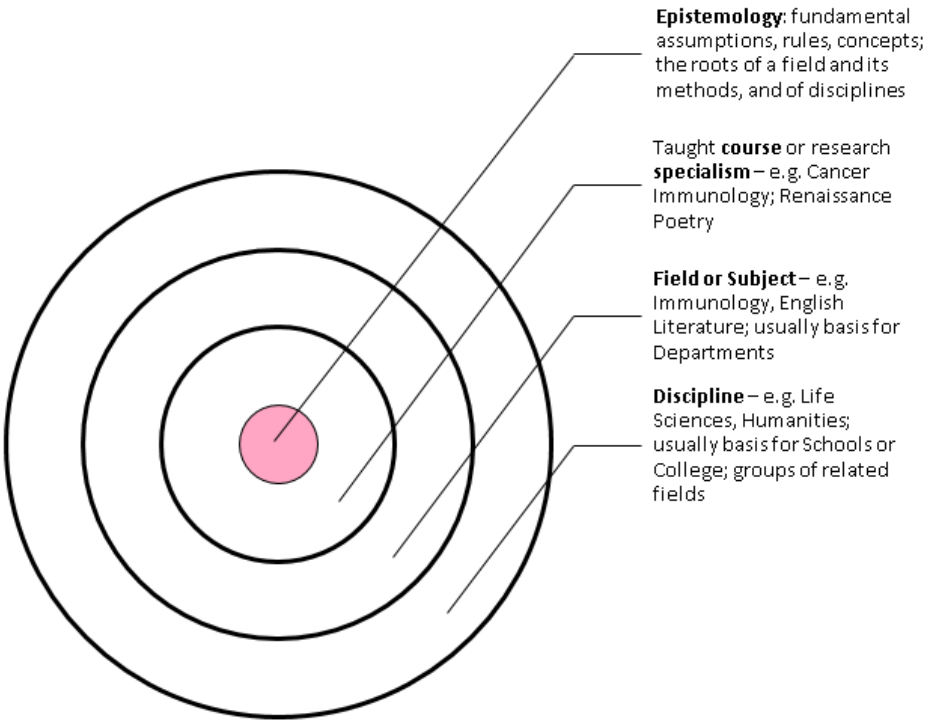

Figure 2 - The relationship between discipline, field, specialism and the disciplinary core.

A good example of an *interdisciplinary* field would be Biomedical Engineering, which could be located in Schools of either Life Science (or Biomedical Science), Engineering, or taught and researched within and across both.

THE ORDERING OF DISCIPLINES

Critiquing from an "archaeological" perspective the historical "ontologies" of knowledge, Foucault (1970, page 172) explores the symbolic ordering of familiar divisions between types of discourse, positioning these within what he terms an era's "historical a priori" – i.e. the order underlying a specific culture during a period of history. Deeper than "the mentality or the 'framework of thought' of a given period", and more complex than a simple progression of supposed "rationality", this a priori "delimits in the totality of experience a field of knowledge". It gives rise to the "organization", "arrangement", and the "mode of being of the objects" that "provides man's everyday perception with theoretical powers," defining "the conditions in which he can sustain a discourse about things that is recognized to be true". The associations within and between "epistemological fields", "empirical domains" and their "regional ontologies", are caught up within unfolding socio-historical processes of classification which, subject to the "irruptive violence of time" (page 144), may undergo directional explosions. These are then controlled, mastered and re-ordered. Such processes are innately artificial:

> It is difficult to escape the pre-eminence of linear classifications and hierarchies [...] but to seek to align all the branches of modern knowledge on the basis of mathematics is to subject to the single point of view of objectivity in knowledge the question of the positivity of each branch of knowledge, its mode of being, and its roots in those conditions of possibility that give it, in history, both its object and form.
>
> Questioned at this archaeological level, the field of the modern épistème is not ordered in accordance with the ideal of a perfect mathematization, nor does it unfold, on the basis of a formal purity, a long, descending sequence of knowledge progressively more burdened with empiricity. The domain of the modern épistème

> should be represented rather as a volume of space open in three dimensions – page 378.

In these dimensions Foucault (1970) arranges the deductive sciences (maths and the physicial sciences), the empirical sciences (biology, political economy, the sciences of language) and the "various philosophies of life" such as philosophy and religion (page 378). The human sciences (those which seek to analyse human experience and to problematise knowledge), sit outside of this "epistemological trihedron" (page 379). They are illustrative of the contingent nature of knowledge classification, an enterprise always reliant on accepting that identification and difference are the fundamental units required for any analysis of life (page 172). Rather than being positioned anywhere in particular, the human sciences have a "derived" character. Borrowing methods and styles from each of the other three knowledge domains mentioned above, they are distributed among them in a "cloudy" (page 379) fashion which threatens their existence by enacting and prompting the transgression of boundaries. Although he does not use the term they are, in this ontology, an early example of interdisciplinarity.

Whether or not this classification is accepted, Foucault (1970) reminds us that disciplines "do not come about by themselves, but are always the result of a construction the rules of which must be known, and the justifications of which must be scrutinized" (page 28). Signs, labels and modes of enquiry are arranged into taxonomies and synthesised within disciplines that become normalised, for some time period, in accordance with socio-historical forces. As discourses around interdisciplinarity and the shifting boundaries of academic knowledge become prevalent, such an understanding is useful to the study of norms, rules and "signifying totalities" (page 398) within Higher Education.

In *The Problem of Epistemology*, Fleck (1936), in a "sociological anticipation of Kuhnian historical relativism" (Fagan, 2009, page 279) foreshadowed debates about the "social constitution of scientific objectivity", theorising and exploring "thought collectives" as the "communal carriers of a thought style"

(page 1). Directed and restricted assumptions and procedures are formed through processes of discovery and experiment in the pursuit of knowledge. Proving useful to a given line of enquiry these are passed on through instruction, becoming "styled" through processes that ultimately embed them within a field of enquiry. Made familiar and habitual to members through practise, these naturalised "thought styles" are the basis for relatively distinct epistemologies and the groups of fields that comprise disciplines (Fleck, 1936, page 84, page 92); "apprentices" are guided into a "special realm of thinking" that distinguishes one field of knowledge from another.

If it has enough members, becomes officially established, and exists for a long enough period, a thought collective will become more rule-bound and formal as well as less creative (Fleck, 1936, page 103). The scientific disciplines (i.e. the traditional 'hard' or empirical sciences) exemplify the established and stable thought collective. Stability is not however guaranteed in perpetuity:

> For the sociology of science, it is important to state that great transformations in thought style, that is, important discoveries, often occur during periods of general social confusion. Such "periods of unrest" reveal the rivalry between opinions, differences between points of view, contradictions, lack of clarity, and the inability directly to perceive a form or meaning. A new thought style arises from such a situation. – pp. 177-178.

At the same time, a new thought style should not be considered innately revolutionary or transgressive. As cultural structures embedding patterns of knowledge, disciplines are formed around the "perennial debates" that typify particular realms of intellectual investigation (Abbott, 2001, page 122). Rather than illustrating instability, sub-fields can be seen to result from a largely predictable series of "fractal distinctions" – a "proliferating lineage" that encourages "self-replication" of the discipline's master template. An "illusion of progress" is thus, in many disciplines, produced "from a reality of tradition" (page 147). This is clear in disciplinary *social* structures, expressed as faculties and departments. These constitute "the macrostructure of the labour market

for faculty" – groups of professors with exchangeable credentials collected in strong associations – and the "microstructure of each individual university" (page 126). Like disciplines, academic positions, and the holders of positions, are arranged in a "constructed" space (page 190). With particular attributes then attached to them, they can be encoded as variables and "objectively" measured in relation to one another (Bourdieu, 1988, page 78).

Abbott (2001, page 123) acknowledges that in recent years, "the steady increase of semi-applied fields – education, communication, business, accounting, engineering, and so on – has made the traditional liberal arts and sciences faculties a smaller portion of the whole" than in previous decades. However, even when cultural structures are in flux, social structures remain remarkably stable, as evidenced by the relatively static "departmental maps" (page 123) of most modern universities and by the limitations on movement between fields by academics.

For Abbott (2001), even the "unexpected fractal relations" of interdisciplinary cultural structures act as forces which "maintain the relative separation of disciplinary cultural lineages" (page 148). While new fields such as the digital humanities allow us to question the extent to which disciplinary classifications are entrenched, new approaches are generally "forced back" towards a "disciplinary core" of "safe and familiar fundamental concepts", explicable to certain audiences and supporting career progression within specific, "generational paradigms" (page 149).

THE POLITICS OF DISCIPLINARY REPRODUCTION

Delineating and analysing what he terms the academic "habitus", Bourdieu (1988) explains that often, the defence of both individual positions and scholarly "territories" in universities leads to the entrenchment of techniques wherein mechanisms of adjudication "reproduce the very logic of the game [they are] supposed to referee" (page 14). When faced with external "threats" (for instance, the loss of social, cultural or economic capital), new and politicised alliances may form between previously distinct groups (page 15;

page 188). These new solidarities can serve to reinforce systematic and "classificatory" thought structures that maintain the direction of a discipline and the position of its members in a "field of power", even if they alter its relative positon in the *academic* space (page 188). Seemingly non-conformist behaviours and attitudes enable dialogue and renegotiation, but not fundamental revolution. Writing of May 1968 (a moment of deep civil unrest and student protest in France) he concludes:

> The crisis in the academic field as specific revolution calling directly into question the interests associated with a dominant position in the field cancels out that detachment from specifically academic interests which could be introduced by the relative autonomy of specifically political logic: primary reactions to the crisis clearly [had] as their principle the position of teachers in the university field, or, more precisely, the degree to which the present and future satisfaction of their specific interests depends on the conservation or subversion of the power relations constitutive of the academic field.
>
> If these political attitudes, whose social determinants are thus revealed in broad daylight, can appear as conversions or apostasies, it is because, as long as the university order is not threatened, the taking of sides [...] can be motivated not by the position in the academic field but, especially for the professors closest to the 'intellectual' pole, by their position in the field of power and by the political option which is traditionally attached to the subordinate positons in this field (Bourdieu, 1988, page 189).

At moments of turbulence, groups often survive through "solidarities founded on structural homologies" of those who are not in the "highest echelons" of the academic hierarchy (page 177). Counter-intuitively, these alliances may reproduce the fundamentals of a system founded on competition, domination and temporal distances (or, differences). Levels of strategic control and technical "mastery" vary between individuals and fields, ensuring points of comparison between them, such as indices of cultural prestige and political

influence (page 47). Disciplines which appear to be at contemporaneous moments of development evolve separately, having their "own specific time-scale and history with its specific dates, events, crises or revolutions, and rhythms of development" (page 180). This means that apparent solidarities and synchronicities may be momentary and tactical rather than lasting.

Who is included and who is excluded further enforces disciplinary distinctions; only a "threshold level of expert members" is permitted in a given field (Swales, 1990, page 26). Those who *are* permitted must demonstrate a requisite fluency and proficiency in its language, behaviours, and norms. This does not however mean that the "formative contexts" from which a theory or school of thought originates will be interpreted in an equivalent or predictable way by the audiences which receive them; for example, discourses based upon empirical work may be interpreted rhetorically or have "rhetorical effects" (Nystrand, 2001, page 95). This may lead to necessary new "alliances" between "disciplinary insiders" and practitioners within and outside university departments, cutting across entrenched methodological and "institutional divisions" and at the centre and margins of disciplines (Miller, 2001, page 111).

The position and potential role of those outside a field or thought community is also important to how its functions and the extent to which it accommodates outside opinions. Although the most stable "thought communes" tend to become "isolated formally", less stable fields and the circles forming around them generally differ from other types of communities in that those outside the officially designated group *may* still be considered members – to some extent – if they express thoughts and make contributions according to its style (Fleck, 1936, page 103). Only when a thought community's "elite" are in a more comfortable position than "the masses" can it remain largely detached from the external public opinion on which it is dependent (pp. 105-6).

These ideas remain relevant. Seeking contributions from groups in the public sphere (and in the private sector) is increasingly now promoted as essential and as a way to demonstrate and increase the value of academic research

(Department for Business, Innovation and Skills, 2009, pp.17-18). Nowotny, Scott and Gibbons (2002) argue that "near absolute demarcation criteria" have "failed" within universities (page 56) and that even when academics, acting on a desire for "institutional protection" and self-preservation insist that the epistemological core of their discipline is distinct, "boundaries between academic sub-systems are now too porous to justify such a view" (pp.-57-9). However, although academics and disciplines may change position, adapting might, in Bourdieu's terms, be a strategy to ensure the survival of both economic and "social capital" (Bourdieu, 1988, page 47).

INTERDISCIPLINARITY

Interdisciplinarity has a long history within knowledge creation and pedagogy which has perhaps made the term overly-familiar despite little real elucidation until recent decades, when it has been heavily promoted as a necessary way to address complex problems too large to be resolved by the application of exclusive, specialised and field-bound knowledge (Swoboda, 1979, page 50). This has been facilitated in part by new information and communication technologies (Borgman, 2010, page 179) supporting the creation, storage and analysis of large, often geographically distributed datasets (Woolgar and Coopmans, 2006, page 5). Understanding what interdisciplinarity *is* not simple however; competing theories or perspectives are evident, yet little empirical work has been done to examine them until relatively recently (Lattuca, 2001, page 13).

Lattuca (2001, pp.78-119) proposes four types of interdisciplinary scholarship – Informed Disciplinarity, Synthetic Interdisciplinarity, Transdisciplinarity and Conceptual Interdisciplinarity. These arise from comparisons of how interdisciplinary work is implemented and viewed by individuals within a particular area of research. Each can be characterised in terms of the teaching issues and research questions within them and the "types of question it is legitimate to ask" rather than by the "level of [disciplinary] integration achieved" (page 86). Some taught courses or research questions are only *informed* by different disciplines while others link (synthesise) or cross them.

Conceptual Interdisciplinarity comprises courses and questions with no compelling epistemological/disciplinary basis and might also therefore be thought of as *pre*-disciplinary (page 86). Transdisciplinarity is an articulation of these conceptual frameworks, providing a test-bed for a grand synthesis of theories and methods comprising parts that would traditionally be distributed amongst disciplinary areas (page 82).

Enacting interdisciplinarity is for many reasons complicated. Academics may agree that they support combining disciplinary approaches without either fully understanding the implications or being willing to do so in practise, often due to some combination of personal and institutional complications (Scott, 1979, pp. 306) – for instance, a lack of time, resistance from "disciplinary factions" (Lattuca, 2001, page 197) or the absence of either policies or systems for recognition and reward. Interdisciplinary projects are dependent for success and the affordance of legitimacy not only on policies and administrative procedures enabling them to thrive, but on the ways in which new working practises are developed by individuals and teams adapting to the methods of other disciplines at the same time as reappraising their own (Salter and Hearn, 1996, page 94).

Universities are sites "comprised of people from different identity and organisational groups", with "the views, values and orientations of group members represented through primary and secondary discourses, including their conscious and unconscious perceptions, ideologies, thoughts and behaviours" (Botterill and de la Harpe in Davies, Devlin and Tight, 2010). The "sociological dimension" of disciplines (Swoboda, 1979, page 50) and the strength of disciplinary identities "affect the abilities of teams to accommodate, blend and develop shared goals, agreed priorities and outcomes, and consensus" (Botterill and de la Harpe in Davies, Devlin and Tight, 2010, page 90).

For Abbott (2001), "the apparent motion of interdisciplinary relations merely emphasizes and indeed supports a networked disciplinary social structure that is of extraordinary tensile strength" (page 147). However, in some contexts,

discipline is not the right aggregator from which to make reliable inferences about behaviour or attitude (Borgman, 2010, page 151). Disciplines are *symbolic*, existing in "the minds of the beholders" (Cohen, 1985, page 10) as much as in physical, observable reality. Further, participating in interdisciplinary projects may be motivated by an individual's concerns and preferences rather than his or her affiliations with any particular group of academics; the "reasons for collaboration very often relate to the individual's own resource stock which can be used to gain a competitive advantage" (Rijnsoever, Hessels and Vandeberg, 2008, page 1257).

When disciplinary traditions are disrupted, conflicts within them can become pronounced; for instance, the existence of factions, sub-groups or disagreements over meaning and technique which may have been less evident within more familiar systems. Emerging organisational and epistemological patterns incorporate subjective and agent-specific factors and assumptions in ways different to those which were evident in the past (Becher and Trowler, 2001). Talja, Tuominen and Savolainen (2004, page 87) write that:

> A central question related to collectivism is […] how a "domain" can be defined, for instance, is it a paradigm, theory, specialism, or discipline? How far can we assume the existence of a consensus inside a domain or a professional group? Hjørland and Sejer Christensen (2002) argue that in a specific field like psychology there are many thought-collectives that will have different relevance criteria and that will interpret terms differently. Epistemological postulations and theoretical starting points of a domain may be discontinuous [and] discourse communities will not necessarily or over a longer period of time agree on the meaning or topic of a specific document.

Similarly, Bazerman (2009, page 1) notes that:

> While useful in suggesting the social distribution of writing, the term discourse community has been criticized in being imprecise and

> inaccurate, by emphasizing the uniformity, symmetrical relations and cooperation within text circulation networks. Social collectivities in communication are often contentious, by design or accident. People within them are cast into or adopt different roles with different discursive power, rights, obligations, and expectations.

Transgressive understandings of how research and teaching should be conducted can be difficult to explain with real precision as there is no established vocabulary upon which to draw. Those with a commitment to interdisciplinary ways of working may have to work hard to persuade colleagues less convinced of its advantages. The attitudes of academics involved in interdisciplinary projects often differ from the ones typical in their 'native' fields (Lattuca, 2001, page 134). Accordingly, understanding how groups of academics function in these new environments may require theories other than those centred only on discipline; many studies employ social constructionism as a theoretical frame, which is useful when analysing shared or divergent meanings and practises.

"Communities of practise" (Lave and Wenger, 1990) are one such model which can be used to identify, classify and explore academic communities, particularly on a smaller scale than at the level of discipline. These address the creation of shared identities through *practise*, which Wenger (1998) describes "as the source of coherence of a community", evident in three dimensions: "mutual engagement, joint enterprise, and a shared repertoire of ways of doing things" (page 72). Active participation and "reification" – the production of objects and artefacts "as a tangible expression of ideas and feelings, giving form to our experience" (page 58) – are necessary to sustain the group, rather than objective or subjective notions of truth. They are both situated and pragmatic, privileging social processes and highlighting the role external objects – for instance, computers – play in learning and knowledge creation.

Undoubtedly, familiar "disciplinary territories" (Becher and Trowler, 2001, page 15) have given way to multi-modal, interdisciplinary and cross-sectoral forms of study and research as well as to fragmentation – even within single

disciplines, where consensus over methods and styles is not always the norm (Lattuca, 2001, page 113). Disciplines and particular scholarly communities associated with them may diverge – those at the periphery can work in distinction from those at the core, giving rise to new understandings and genres. This may include the way in which research is published, how it is constructed, assessed and reviewed, and the format in which it is made available; for example, as a poem, a personal essay (Thompson-Klein, 1996, page 142) or as a digital dataset or blog post, rather than as a traditional journal article (Borgman, 2007, page 99).

Unfamiliar or experimental media and methods have risks as well as benefits associated with them. The ways in which researchers' work can be improved and enhanced by unconventional, open or new media based practises; for instance, finding papers and tracking citations through Google Scholar (Eisen, 2014) which increases readership and visibility (Davis, 2011, p.2129). They might also be exploited by those who are unscrupulous; predatory Open access journals being one notable example (Bohannon, 2013; Bartholomew, 2014; Beale, 2014).

Although interdisciplinary journals "provide focal points for needs and interests" and "outlets for work that may not find a ready niche in traditional disciplines", they also face "multiple pressures for definition," being "caught at the epistemological crux of a dichotomy that pits innovation and openness against rigour and legitimacy" (Thompson Klein, 1996, page 27). Maintaining links and "a presence in the parent body" (Thompson-Klein, 1996, page 26) is useful strategically, as is using the "interpretive authority conferred by participation in a traditional institution"(page 7). Likewise, finding potential audiences, contributors, and reputable publishers becomes easier when the subject of study is rooted in an established discipline or field and engages with established theories, methods (McDermott, 1994, page 52), genres and media (Borgman, 2007, page 99).

NEW MODES OF KNOWLEDGE PRODUCTION

The interplay and dependencies between the internal world of the university ecology and the external world beyond its traditional 'ivory towers' are a common topic in recent work on the organisation and administration of science, scholarship, and the pressures and incentives which influence academics and disciplines as a result (Krull, 2000; Nowotny, Scott, and Gibbons, 2001; DeWit, Dankbaar and Vissers, 2007; Hessels and van Lente, 2008). Nowotny, Scott and Gibbons (2001, page 5) propose that a new "Mode 2 Science" is now establishing itself. More "dialogic" than its Mode 1 ancestor, it incorporates "multiple views" and accommodates the perspectives of "audiences" out-with the academy including an interested public and private sector partners (page 91). Mode 2 academics make greater use of ICTs than do those working under Mode 1, signposting the way to a more synergistic and collaborative future where anachronistic divisions between the university, the public and industry are redundant. Transdisciplinarity is the characteristic way of working within Mode 2 Science.

This is not to say that Science is now un-anchored, as if becoming a "formless postmodern space" (page 201) – stability and norms are still required (page 93) and knowledge production "has to be managed" (Nowotny, Scott and Gibbons, 2003, page 189); however new processes of discovery and knowledge application necessarily change the form of the scientific (read academic) space. Parallel developments in technology, science and philosophy have reconceptualised time and space into the "more capacious category of space-time", hence science and society begin to "co-evolve as an aspect of coalescence" (page 49). In this Mode 2 scenario, the distinction between academics and those who would previously have been deemed 'outsiders' is less meaningful. Research projects become "reflexive articulations between science and society" to greater and lesser extents (Nowotny, Scott and Gibbons, 2001, page 108). Underpinning this is awareness that boundaries are constructed hence fluid, echoing the theories of discipline previously described:

> The notion of 'boundary work' implies not only that boundaries are not fixed and permanent but that they need to be actively maintained. Moreover, their definition, mapping, and maintenance, often serve a social function […]. Social contingency and professional expediency influence the choice of 'stories' about Science […]. Defining the sciences, mapping their territory in public space, making and reshaping them in the image tailored for the specific time and the occasion are all part of 'boundary work'. And scientists, as 'boundary workers', are actively engaged in such activities as an integral part of their scientific endeavours (Nowotny, Scott and Gibbons, 2001, page 57).

Changes occurring in both the conceptualisation and enactment of science are understood as parts of a move toward a society where knowledge becomes active and present in its "context of implication" – i.e. wider society beyond the university – entering a "social space of transformation" (page 201). That space is typified by, among other things, "socially distributed expertise" and "changing rules of engagement" whereby professional relationships become vertical rather than horizontal (i.e. non-hierarchical) and where institutional structures and traditional modes of interaction are "aided" and altered by "the pervasive role" of ICTs (page 105). Mode 2 is "more dialogic" than "Mode 1" and "incorporates multiple views" which would previously have been separated by traditional classifications.

Some critics point out that this was always the case – not just for science, but also for the arts and humanities, which were always 'Mode 1' (Godin, 1996, p.470) Others propose that it was universities as institutions which *parted* science from its original multi-varied and accommodating Mode 2 form (Weingart, 2000). Through rigorous analysis, Hessels and van Lente (2008) identify a number of problems with the "manifesto" of Mode 2 science, finding it incoherent and its "linear historical perspective" problematic, despite some adequate claims. Citing Whitley (2000), they observe that the "disciplinary characteristics that influence the shifts in balance between different modes of

knowledge production need not be limited to the content of their inquiries but include features of social organisation" (page 758). Further, many of its stated unique characteristics appear in other theoretical approaches to transformed academic knowledge systems (page 746).

In another exploration of the Mode 1/Mode 2 hypothesis Heimeriks et al (2008) find, through examining the links and references made on departmental webpages to other sources, that even when considering disciplines with "more Mode 2 characteristics than Mode 1" – and vice versa – the picture cannot be seen as black and white; the relationship between departmental data sharing patterns has more to do with whether or not information flows are "open" (as with information science) or necessarily restricted (as with, for example, the life sciences) rather than with Mode characteristics (page 13). Based on these findings, the authors argue for the recognition of nuance rather than the adoption of simplifying dichotomies (page 16), and a recognition of variation within disciplines as well as across discipline groups.

Regardless of its limited theoretical strength and predictive power, a possibly biased political commitment and a lack of engagement with sociological theory (Hessels and van Lente, 2008, page 754) there is agreement between its authors and those of competing approaches (such as Academic Science, Post-normal Science and Triple Helix) on several points; particularly, the market like activities of modern HE, an interdependence with industry, a focus on utility and dynamic trans- or cross-disciplinary methods based on collaboration resulting in new disciplines (Hessels and van Lente, 2008, pp.746-8). At the same time, the combination of correspondences and disagreements noted by Hessels and van Lente when analysing reactions to Mode 2 by authors from various disciplines, itself reveals the importance which academics place on how they are positioned and controlled.

SIMILARITY AND DIFFERENCE

This uneven inclusion of digital technologies is evidenced by variance in rates of uptake and in the application of common technologies within specific teaching, research (Kling and McKim, 1999, Herman, 2001; Fry and Talja, 2007) and communication activities (Research Information Network, 2009). It is also evident when examining the types and flows of information being shared in digitally mediated environments, something which is influenced by a number of factors, only one of which is discipline. The emerging dynamics of scholarly research, exchange and interaction are in many ways traditional and in other ways innovative – patterns are not stable or singular; for instance, the extent to which outbound links on academic websites show "an international orientation" only partly relates to discipline and assumptions about the importance of ICTs (Heimeriks, 2008, page 1613).

Scientific research is "carried out in an endless variety of ways" and "modern science is a patchwork of very different activities, joined together under an umbrella label" (Rip, 1997, cited in Hessels and van Lente, 2008, page 743). Some disciplines or sub-fields incorporate change more readily than others because it has always been fundamental to their conception of knowledge and to their methodologies. Writing of social science research, Dunleavy, Bastow and Tinkler (2014) explain that "in the modern world the transformation of information systems and now scholarship itself via digital changes condense and accelerate many [of the field's] necessities, creating a vastly extended set of interfaces between academia and business, government and civil society".

The social sciences do not produce "immutable laws that once established last unchanged" because "every social science focuses on constantly shifting human behaviours [and is] conscious that human beings have an innate and un-erodible capacity to change what we do in response to being told why we act as we do, or how we are expected to act in future" (page 2).

At the same time, although the social sciences will never achieve the detached, theoretical certainty that may be seen to characterise STEM (Science, Technology, Engineering and Medicine) subjects, they *are* beginning to use many similar methods for collaborating, gathering and analysing data and of

demonstrating relevance to society under the influence of the current "impacts agenda" – for example, the practises of the open social science and big data movements, and the development of a "rapid advance plus moderate consensus model" of "pushing the frontiers of knowledge" (Dunleavy, Bastow and Tinkler, 2014). This is qualified by recognition that "in the social sciences the full concept of a scientific paradigm is rarely applicable" (Bastow, Dunleavy and Tinkler, 2014, page 250).

As well as being central to governments' "responses to the development of the information society", scholars, to varying extents, remain able to offer criticisms or engage with it in different ways; for example, by contributing to debates about risk, trust and "a variety of concerns across the spectrum of scholarship and wider public polity" (Lips, Taylor and Bannister, 2005, page 1). Adema (2012, page 2) writes eloquently of how open access publishing is understood by Humanities scholars as opposed to those in other disciplines:

> Experimentation with digital, open, online publishing increasingly takes place with a specific result, or outcome, already in place: to ensure that a new publishing or business model is sustainable, that it is effective, in order for it to become a model which can be monetarised with the ultimate goal to increase return on investment. However, […] not all experimentation in digital online publishing abides to this discourse. A series of radical experiments in the Humanities – in cultural studies more specifically – endorse and promote an alternative set of values, based on different underlying ethics. Here experimentation is understood as a heterogeneous, unpredictable, singular and uncontained process or experiment".

This may be seen to reflect and replicate traditional disciplinary divisions. Attitudes, methods and communication preferences are combined in a defence of those working in cultural studies, further entrenching and to some extent politicising their position in opposition to those elsewhere. Academics questioning the suitability of a new business model seek to retain their definition of "experiment" for strategic as well as epistemological reasons. In

Bourdieu's terms, doing so locates cultural studies at a particular position within the academic field and in the social and economic space beyond it (cf. Bourdieu, 1988, page 188). Additionally, scholars in the arts and humanities have more flexibility than those working in disciplines that are tightly controlled, hierarchical and more deeply bureaucratic (Whitley, 2000, p. 178, 239).

Some fields, such as ancient history or pure mathematics are essentially "remote" from business logic; accordingly, commercial actors have "little or no authority" in those fields (Rieger, 2010). Nevertheless, the role of such "epistemic conditions is rarely taken into account when governance instruments are designed or investigated" and applied as though they could be "universal". This can cause attitudinal divisions that are often discussed in relation to discipline. Examining the digital humanities and the attribution of meaning to new media by both "enthusiastic users" and "technophobes", Rieger (2010) reports:

> Several of the informants contrasted science's progressive impression with the retrospective inclination of the humanities. The informants in this study often associated technical terms such as "digital" and "infrastructure" with quantitative epistemologies. […]. A professor of philosophy reflected that there was a "hierarchical relationship that has been created and gets reinforced constantly." […]. A doctoral student in English voiced her concern that there was a lot of interest within English now in building bridges to the sciences "partially because science has a higher status in our culture now and that there is a desire to hook up with them [because] students and parents value this sort of thing." My conversations and observations revealed that the informants perceive ICTs not only as productivity and knowledge management tools but also as the frontier of a potential dividing line reinforced by the status of power associated with quantitative research traditions.

Economic Insights (2014, page 41), undertaking consultation work for the Department of Business, Skills and Industry, examined literature on the competition for internal funds and resources within universities, reporting that "there were differences between disciplines in terms of their views although these were not systematic", for instance, science-related disciplines sometimes placed greater emphasis on competition than humanities-related disciplines – particularly in terms of attracting funding. One possible explanation for this is that the level of funding required to undertake research in humanities-related disciplines is typically lower than that required for the sciences.

Similarly, in an empirical investigation of the effects of a particular governance instrument (indicator-based block funding for research) within six academic disciplines, Gläser et al. (2011, page 292) considered a number of organisational and social factors to conclude that the altered authority relations which bring about change in institutional, departmental and individual research pursuits manifest in field specific ways. The need for a certain amount of funding depends on the methods and techniques used to address research problems, with the need for expensive or extra resourcing determined by epistemic concerns and modes as much as by wider environmental factors such as institutional budgets and policy orientation.

This influences the options available to and the decisions made by researchers when responding to changes in funding and assessment procedures; for example, the extent to which they are able to diversify their "research portfolios" is affected by the "decomposability of research processes" (page 303) and the relative importance of personal interpretation when constructing empirical evidence (pp. 303-317). Braun (2011, page 2), describing how disciplinary reproduction and infrastructure intertwine, writes that:

> Universities can be regarded as the main place for disciplinary reproduction. They confer academic titles necessary for the pursuit of a scientific career; they deliver the infrastructure for disciplinary reproduction […] they put certain resources at the disposition of

> scientists that are needed for their academic careers (some research money; logistical help for funding applications etc.); and most important of all, they give jobs to scientists that form the point of departure for academic creativity. This is why each new scientific field must, once a certain critical mass and intensity of communication is reaches, settle down in universities. Only then, a continuing financing (above all in the form of salaries) becomes possible. Last but not least, universities have authority to set up the main institutional embodiment of disciplines, i.e. departments as well as faculties.

Common influences, experiences and practises link together those in a discipline, even as power and knowledge structures alter. This may be true even at the level of individual cognition – for instance, the greater historic reservations of Humanists when compared to scientists or engineers about digital research may originate in an early preference for books that partly explains fears around computers and thus particular "attitudes and learning styles" (Saule, 1992, page 597).

Conversely, questions of "public prestige and government funding" that encourage competition or comparison can conversely "awaken awareness of some foundational affinities that the daily academic practice" may "tend to fragment and sublimate" (Dunleavy, Bastow and Tinkler, 2014, page xii). Moving closer to traditional 'allies' in related fields to form new, enlarged communities of practise may be a useful response. Pasuchin (2005, page 127) suggests that dance, video and music are becoming one interdisciplinary entity – the Digital Arts – in an ecology dominated by multi-media. Here, a "strict separation between artistic-pedagogic areas is becoming less possible".

This is not always predictable. Rieger (2010) found enthusiasm for the digital humanities among some groups traditionally considered reactionary (for instance, historians), many of whom found new media inspiring and a catalyst for "artistic endeavours". Like them, many academics and practitioners working in the creative arts frame "digital media as a platform for creative expression and artistic endeavors". This suggests changing boundaries and

potentially distinct sub-groups or communities of practise working within and across disciplines as a result of new models, policies and technologies, which present something of a challenge to the discipline-based study of academic attitudes, however important discipline remains as an organising principle.

CONCLUSIONS

Classificatory processes assign intellectual areas of enquiry a particular field and an associated discipline. Although not always apparent, this is at root an artificial, strategic and increasingly politicised method of organising both knowledge and academics (individually as well as in groups). Both rhetoric and policy position academics in a complicated space comprised of power relationships which in general have been remarkably persistent; as long as they are actively defended and maintained. The separation into disciplines has clear practical advantages but it can also bring about competition and conflict, as is evident at moments of social upheaval and change. In the present day, the emergence of "Mode 2 science" (Nowotny, Scott and Gibbons, 2001, page 5) has engendered much debate around the value of academic research to the public (Hessels and van Lente, 2008, page 758) at the same time as interdisciplinary approaches are suggested as beneficial to collaborative research, often on a global scale.

Differences in the thought styles and working practises of academics can become evident in ways which lead to new insights, methods and communication practises. When theoretical and conceptual shifts are occasioned by the inclusion in a discipline of digital technologies, it is more likely that they will be discussed as revolutionary, signalling the emergence of a new 'paradigm'. Elsewhere they are instrumentalised with less apparent disruption; although making possible some novel areas of research they primarily supplement or improve existing methods and processes, leaving paradigms undisturbed. Processes of reward and evaluation often remain entrenched and disciplinary cores are strong, possibly discouraging fundamental reform.

Nevertheless, the processes characteristic of disciplinary reproduction are viewed by many critics as outdated, challenged by inter and trans-disciplinary approaches often typified by the use of networked technologies and digital data. Disciplines are not uniform and often contain many different fields or subjects, as exemplified by the Sciences. Communities may be formed around shared problem areas, practises and artefacts that would traditionally have been separated and distributed among fields. The influence of disciplinary tradition upon how academics view ICTs and new media has not altogether disappeared. Partly this is because of continued disparities in resourcing and infrastructure requirements that can be linked to epistemologies and methodologies.

While the influence of disciplinary cultures remains strong, the effects of new media on academic practise will vary according to the particular contexts within which research is carried out. It may be unrealistic to expect a clear or predictable picture to emerge based on the disciplinary lens for identifying attitudes towards new media; that their reception is connected to government policy, institutional agendas, and the requirements of new research areas, must be considered when asking academics how they feel about new media. However, it seems likely that the role of discipline will remain in some ways evident, particularly as emerging models of knowledge and HE, including interdisciplinary ones, often utilise these divisions as an organising principle.

CHAPTER TWO PART II: INFORMATION SCIENCE, NEW MEDIA AND ACADEMICS IN HIGHER EDUCATION

The main literature review undertaken for the thesis identifies common themes and gaps in recent research addressing digital technologies, new media, universities and the attitudes of academic disciplines or communities (i.e. the research most *directly* related to its aims). Distinct discourses around new media and academia are identified and discussed, with work rooted in information science and other applied social science subjects emphasised. Issues around governance, administration and public impact are important contextually hence works addressing these are discussed where relevant. Descriptive works are included as are empirical studies. In accordance with the theory of an information ecology (Nardi and O'Day, 1999a), this facilitates a deeper understanding of how and why new media might be positioned in particular ways by disciplinary and other academic communities. The digital humanities (which interact closely with information science) are also considered and treated as a case study of disciplinary attitudes toward new media and how those may be expressed in theoretical work as well as practise.

A synthesis of aspects of all these is attempted in order that related points can be considered together. For example, discussions about what might be termed abstract properties of new media are considered in relation not only to epistemology and pedagogy, but also as they relate to organisational structures and to managerial agendas. A relative absence of recent empirical work on academic attitudes is noted, as are some useful studies which examine digital technologies and new or social media in relation to attitudes and/or disciplinary communities, some through the analysis of original data. The sub-textual attitudes of authors in each group are discerned from close readings which suggest certain normative positions within and across discipline groups. Some resistance to norms is evident both within particular disciplines, to which this deviation is linked, and across them, where concerns are shared.

The chapter begins with an overview of how political and economic agendas encourage the prioritisation of computational research and new media use in HE, utilising and supported by particular understandings of innovation. New models of pedagogy and research, and new areas of enquiry, are considered in relation to these. The non-neutral, instrumental nature of policies is highlighted, as are the tensions these policies may introduce to disciplinary cultures; for example, their effects upon concepts, methods, tooling, self-governance, and the relative distinctiveness of disciplines. New models of scholarship frame and embed modified practises and attitudes, just as "public policy instrumentation […] reveals a fairly explicit theorization of the relationship between the governing and the governed" (Lascoumes and Le Gales, 2008, page 4).

Subsequently, the multiple meanings of new media and the ways in which they can be understood in opposition to as well as in accordance with normative definitions are considered. Detailed analysis is undertaken to determine how authors across disciplines frame and describe new media as both constructs and tools. This analysis and the identification of key and important terms directly informed the data gathering instruments described in Chapter 4 – in particular, the adjective pairs used in semantic differentials, used to capture the stated attitudes of respondents toward new media.

To illustrate how particular understandings of new media can be ideological, contentious and at times strategic – both for disciplinary communities and individual academics – debates around open access publishing are considered as is the development of the digital humanities as an extremely important and at time interdisciplinary domain which gives rise to many debates relevant to the aims of this thesis; for instance, the extent to which academic communities or fields are "open" or "closed" to new members (particularly academic journals), illuminating how disciplinary communication has been enacted traditionally, and through internet technologies.

Finally, empirical studies rooted in information science which directly assess academic attitudes to new media are identified and summarised, with key findings identified and gaps in existing research noted.

SEARCH TERMS AND PARAMETERS

Literature concerned with UK academics is considered before work which focuses on other countries because the population sampled for empirical research in this thesis was UK academics working in HE. Ensuring comparability and relevance is particularly necessary in the case of empirical and/or ethnographic studies, where local conditions and situations may be central to the formation (and analysis) of practices, policies and attitudes. However, despite important variables (even in one geographic region) such as institution type, personnel structure, infrastructure, funding, and socio-cultural demographics, research into new media and education conducted in many non-UK universities remains informative – particularly when common properties are the primary areas of discussion.

Discourses formed around research agendas and pedagogy in European, North American, Australian and South African universities are, according to the literature, largely analogous to those in the UK (Abbott, 2001, page 122; Czerniewicz and Brown, 2008; Herstad and Brekke, 2008; Eijkman, 2010; Serrano-Velarde, 2011), particularly with regard to "the development of entrepreneurial cultures" and communication networks that are "international in scope" (Juárez, 2013, page 75). Similarly, areas such as eScience and the Digital Humanities, alongside new media in general, can be read in global, political contexts (Aarseth, 2004; Boud and Lee, 2009; Thornton, 2009; Finnemann, 2014), regardless of differences in detail, for instance, local policies responses.

Books, journal articles and reports published between 2000 and 2015 are prioritised, primarily because media termed 'new' before those dates are generally no longer considered to be so. The focus of the research is on *contemporary* understandings of new media. However, many of these refer

back to prior technologies, concepts and disciplinary perspectives, either as parts of historically progressivist, linear narratives, or in search of less obvious definitions. Further, differing approaches identified in the review highlight how simple divisions into 'new' and 'old' can be misleading; for instance, when assessing which theories and methods are most suited to the study of new media. Various interpretations of digital technology which are no longer deemed 'cutting edge' remain influential. These are thus referred to where appropriate.

Similarly, many academics describe media as 'new' which would be considered old by computer scientists – for instance, email, blogs and eBooks. Crucially, this may be linked to the disciplinary community to which they belong and the extent to which it incorporates (in general) new concepts and tools. It is also revealing of attitude; as the review highlights, and in keeping with the organising principle of this thesis, distinct thought styles may originate in and develop in accordance with orchestrated managerial and cultural strategies around the role of digital technologies in research, teaching and other agendas, which encode disciplinary thought styles and privilege the logic of some over that of others.

Finally, the search process itself revealed much about the ways in which literature on new media is positioned within different disciplines. In information science database searches, exact phrases – such as " "new media" AND attitude" or "new media" AND "university" AND "attitude" – often returned no or very few relevant results. A wider approach, using keywords instead of exact phrases, and literature searches in apparently less relevant fields, highlighted both a gap in existing information science research, and the importance of work located elsewhere. Like digital technologies, universities and disciplines accommodate multiple, complicated and often inter-related views about meanings, value and purpose. A number of apparently tangential results proved useful for determining what an examination of new media in the academy must take into account. Accordingly, the search parameters

originally utilised were broadened to include useful understandings beyond information science.

NEW MEDIA AND THE UNIVERSITY: TRANSFORMED POLITICS, POLICIES AND PRACTISES

Rhetoric around new media is evident in multiple discourses at both the macro and micro levels of academia. On a large scale, that which addresses innovation, globalisation and the knowledge economy promotes a particular view of education and development which directly influences how new media are used and managed in accordance with those assertions (Bell, 1999, page 172). Here, the structural and practical changes necessary to capitalise on their (supposed) affordances are a common topic. On a smaller scale, conceptual and discipline-centred debates about the nature of new media position scholars in relation to views about how to understand them and which theories to use in order to assess their social significances. These debates may appear distinct – one is politically biased and strategic, the other esoteric. In reality, they closely correlate. Adopting a stance on how revolutionary new media are, for example, depends on what we consider them to be; epistemological as well as pragmatic perspectives determine the ends (if any) to which we believe them the means.

In a global knowledge economy, and in an entrepreneurial culture typified by risk and self-re-invention, research has to become a reliable income stream which can help universities mitigate against risk while "collaborations between employers and universities have a significant role to play in providing the supply of highly skilled people to meet demand from businesses both now and in the future" (UK Commission for Employment and Skills (UKCES) and Universities UK, 2014, page 4). These "global shifts in economic and research policy" have shifted the "prime emphasis on the outcome of research to the educative work of producing the researcher" (Lee and Boud, 2009, page 97).

Deem, Hillyard and Reed (2007) discuss the formation and dominance of neo-liberal New Managerialism (NM) and New Public Management (NPM) theories

as part of a "cultural revolution" with a series of inter-linked effects upon "the discursive strategies, organizational forms and control technologies" embedded within and used to legitimate public services. Networks, personalisation and customisation are among the concepts it privileges (page 6). Universities are "by no means exempt from these underlying structural pressures and the ideological momentum that they generate" (pp.4-5) and, the authors suggest, have become more like "workplaces" than "communities of scholars" as a result.

RHETORICAL INNOVATIONS

Making universities into "more effective and economic driver[s]" (Thornton, 2009, page 22) capable of securing competitive positions in global markets, means utilising the capabilities of networked communication. As a result, almost every aspect of the university is affected by policies concerning new technologies, with business models assigning a prominent role to digital literacy and other "higher level skills" (UK Commission for Employment and Skills, 2014). The online visibility of 'branded' universities, their staff and students is also important (Rantala and Suoranta, 2008; Spring, 2008, page 116; Maringe and Gibbs, 2009, page 98; Joepen, 2012; Thornton and Shannon, 2013). Communicative and administrative processes which were previously separate begin to merge or "converge" (Busch, 2011), becoming parts of a common business model based on "social media ideology" and the building of "brand equity" (Hussey, 2011, page 254).

Numerous policies formulated by the Department for Business, Innovation and Skills aim to get "business [working] more closely with universities and research institutions to create more opportunities to commercialise their research" (Department for Business, Innovation and Skills, 2014a). For instance, fifteen "Academic Health Science Networks" were established in 2013 to "help local NHS services find the research and informatics, services, education and training they need to be innovative" with the "use of new technologies [being] important to the development of new, more effective

treatments for NHS patients" (Department for Health, 2013). Similarly, the "Enhancing Big Science Impact Agenda" encourages the 'little science' of universities to transform itself within the mission-driven "big science" projects of industry (Autio, 2014, page 4).

These initiatives closely relate to the proposals of the Browne report on education and student finance (Browne, 2010), which put forth and made central to UK HE the argument that

> Employing graduates creates innovation, enabling firms to identify and make more effective use of knowledge, ideas and technologies. Internationally successful businesses employ high levels of graduates, and 'innovative active enterprises' have roughly twice the share of employees educated at degree level than those that are not active in innovation.

Further, the report proposed that courses "in science and technology subjects" be treated as "priority subjects […] for additional and targeted investment" using public funds, the aim being to attract students to these rather than "other courses [i.e. fields or disciplines] that they may have chosen instead" (page 47). These are viewed as more "important to the economy" (page 25) and as "delivering significant social returns" (page 47). At the same time, the arts and humanities are also implicated, with government bodies commissioning "research to evidence the UK's position relating to the transformative changes and emerging market opportunities across the [creative] sector driven by digital technologies and the convergence of creative platforms and disciplines" (UK Trade and Investment, 2014, page 18). Some "strategically important language courses" are also seen as priorities for public funding and student recruitment (Browne, 2010, page 47).

Like all policies, those affecting HE are not impartial (Vedung, 2003, page 21). By definition, they reflect the desire of their creators to legitimate and enforce compliance with a particular ideology and attendant modes of behaviour. As Lascoumes and Le Galès (2008, page 4), in the context of public governance

note, the "technical or functionalist approach" to policy, taken by many of those who study it, "conceals what is at stake politically". This is because every instrument constitutes a condensed form of knowledge about social control and ways of exercising it […] instruments at work are not neutral devices: they produce specific effects, independently of the objective pursued (the aims ascribed to them), which structure public policy according to their own logic."

The "context of a specific vision of our economic and social future" (Garnham, 2002, page 253) within which many initiatives exist can be traced to a "neo-liberal" European Union agenda (Serrano-Velarde, 2011) wherein research and teaching are "transformed by post-industrial frameworks of knowledge" (Alheit, 2009, page 119). Education, training and service improvement are explicitly linked to "wealth creation" and "the delivery of innovation" through private sector partnerships, with the United Kingdom promoted as a "platform for innovation" with "research capabilities" which include "Research Councils and universities" (Nicholson and Davies, 2012, page 18). Policymakers view the move "from an elite to a mass higher education system" as "the principle mechanism by which to create a supply of potential 'knowledge' workers" who can "fill the expanding number of 'high-skill' jobs in the economy" (Wilson, 2008). Students can be regarded as "inputs" and graduates the corresponding "outputs" of academia (Fandal and Blaga, 2004).

Theoretically, the contribution of technology can be measured and assessed (Fernandes, 2012, page 9), even when used in "artistic" and "informal" modes (Heidling, 2012, page 89). People with the traits characteristic of "innovation personalities" can be "steered into ordered, planned and manageable tracks" (Böhle, Bürgermeister and Porschen, 2012, page 2). However, whether innovations will achieve what was intended is unpredictable. Growth models which "try to reproduce in a schematic fashion how that contribution [of technology to value production through processes of transformation] works" are generally unsuccessful, partly because they do not make "the concept of technology […] clear" (Fernandes, 2012, page 9). With complex "interdependencies" between the "material, the social and the cultural"

(Böhle, Bürgermeister and Porschen, 2012, page 3) there are recognised "limits to innovation planning" (page 4).

In *Digital Media Revisited*, Aarseth (2004), citing the failure of the Wireless Access Protocol (WAP) for mobile phones and the unexpected popularity of the Short Message Service (SMS), observes that:

> the successful invention of new communication technologies seems to happen independent of, and seemingly in opposition to, large, concerted, industrial or research efforts and predictions. Large-effort, commercial products and technologies certainly play a part in these evolutions, but the key element is the playful, sometimes anonymous, individual or collective effort – page 6.

Because of such unpredictability, and differing understandings, devising ontologies and knowledge management schemes for digital media in HE is necessarily more complicated than for companies "leveraging" other types of unstructured information in order to "compete in today's economy", although attempts to do so are increasingly common in universities (Milam, page 35). Brennan, King and LeBeau (2004), in a report on the role of universities in social transformation, write of recent literature on this topic that it is overwhelmingly "normative", with "the hopes and aspirations of politicians and policy strategies are assumed to be achievable realities" (page 16). However,

> Where the focus of debate is not normative – and is based on empirical study of the workings of higher education institutions – greater emphasis has been placed upon the internal changes within institutions that have been brought about by broader social changes. Contradictions abound. Academic work appears to be buffeted by all sorts of external forces. It is subjected to greater managerialism, greater instrumentalism, greater competition, new forms of control and accountability, and so on.

> And yet institutional autonomy is increasingly celebrated, especially in countries where for long it appeared to have been compromised. Moreover, several studies, e.g. Henkel, 2000, report evidence of the continuing resilience of traditional academic cultures. What this body of work reveals, above all, is the danger of assuming that policy intentions will become empirical realities without major modification, if not downright subversion, during the implementation process within universities (Brennan, King and LeBeau, 2001, page 16).

Change within universities is not simply a direct result of forces acting *upon* them, but of complex interactions both inside and out (Smith, Lewis and Massey, 2000, page 34). Policies can be modified locally in response to a "plethora of micro issues" (Smith, Lewis and Massey, 2000, page 49) around implementation and purpose and can be interpreted differently (Vedung, page 22). For some, "the higher education process is being disaggregated into constituent parts of what was once a unified value chain, and the jobs of academics are being broken up" […] within the context of intense competition for profitable (cherry-picked) subject areas" for eLearning and distance learning (Tapsall, 2001, page 1). For others, "new media will facilitate the emergence of effective new models of electronic learning, seriously challenging the dominance of the traditional institutions of academia," (Dutton and Loader, 2005, page i).

Smith, Lewis and Massey (2000, page 50) write that "despite long traditions of collegial decision making", it is a "peculiar feature of decisions about technology that these well-worn processes are seldom respected, as the wisdom of how and why to use technology is expected to be apparent to all". Those promoting a "revolutionary" new model of HE may portray it as an "inevitable force that cannot be resisted" (Weller, 2011, page 26). However, knowledge management (KM) practises predicated on such assumptions may have unintended consequences among academic staff, including fatigue and frustration (Wagoner, 2006 McLellan et al., 2006). Negative attitudes may

result from critical or political concerns or because of practical ones around workloads, resources, implementation, and loss of autonomy (Wallace and Young, 2011).

As Blustain (2008, page 29) observes:

> Policies about uncontroversial things are routinely followed, seldom discussed, and sometimes not even written down. Policies that prove controversial or difficult to implement, on the other hand, throw into relief the clashing interests, the challenges to tradition, and the conflict over new behaviors that get lumped under the generic heading of ‘resistance to change.' An uproar or high noncompliance indicates that the policy has hit a nerve. This is especially true in higher education, where institutions are sensitive to, and protective of, their prerogatives, autonomy, and ‘traditions.' Of a policy's many functions, therefore, one of the most potent is its role in the change process and policy study can be invaluable in planning and administration. In addition to serving as a barometer of attitudes, an analysis of policy can inform us how well behaviors are (or are not) aligned with new strategies, directions or technologies.

STRATEGIC UNDERSTANDINGS AND ATTITUDES

Writing of law and legal studies, Thornton (2007) states that "knowledge, education and credentialism have become highly desirable in the information age, but treating them as tradable commodities has profound repercussions for what is taught and how it is taught" (page 1); "the swing from social liberalism to neoliberalism [has caused] the critical scholarly space to contract in favor of that which is market-based and applied" (page 23). For her, "competition policy" as the "driver of research" (page 23) has diminished the ethics and the ideals previously typical of her field, limiting the areas deemed appropriate for study. Collaboration and concern for the discipline are replaced with rivalry, resentment and self-preservation behaviours (page 666). In more general terms, the idea of the "university as a public good"

(2007, page 666) has disappeared and objections are "smothered" by "the multiple individual and institutional financial benefits that flow from the market" (page 666). Distinctiveness is erased and replaced with "homogeneity because the assumption is that all institutions are producing the same product" (2009, page 21).

In other fields, the move toward applied research is seen as beneficial – for instance, in urban and housing research, which, generally "seen as an applied subject […] has struggled to assert itself in academic terms and, thus, to carve out an intellectual space for itself within the academy" (Manzi and Smith-Bowers, 2012, page 133). They find that their field has benefited from what Allen and Marne (2012, page 99) term "applied creativity and innovation", in partnership with industry clients and local governments, although embracing "corporate discourse" and relying on external funding is partly a necessary meant by which to increase student numbers as a result of "accelerated threats" brought about by competition (Manzi and Smith-Bowers, 2012, page 135). Other authors, while acknowledging problems with processes such as "internationalization", consider it "a means to providing quality educational experiences, restructuring and upgrading the higher education systems and services" in response to global requirements (Maringe and Gibbs, 2009, page 83).

Rhetorical constructions in some of the literature create a sense that certain (positive) attitudes toward these developments are 'correct', and that the benefits of new media are self-evident. In an overview of digital humanities resources, Mattison (2006, page 27) states that "new alliances between computational specialists, humanities scholars, and librarians are yielding new tools, new insights into the human condition, and new online resources for lifelong learners everywhere". Tapsall (2001, page 34), referring to the "borderless education bandwagon", links such hyperbole to the political and economic agendas described above, which push universities toward a focus on distance learning and away from creating opportunities for the socially disadvantaged, with a focus on "cyberspace solutions" and "return on

investment". This is more beneficial to some disciplines and departments than to others.

Through a detailed analysis of "techno-rhetoric" and "innovation ideology", Aarseth (2004, page 420) argues that many of the key concepts which scholars of new media studies (a field with uncertain legitimacy insofar as it not sufficiently distinct from media or communication studies) have adopted into their lexicon are "terminally (or at least, terminologically) ill". Common interpretations of concepts like "virtuality" and "hypertext" are as much ideologically as technically defined (page 416). She proposes that "hypertext" is a "a rhetorical strategy for a [particular] group of researchers to take control of a field", demonstrating that it is more an "ideology" than a "concrete technology", its meaning always changing because its proponents wish it always to be present in the "paradigm" of digital textual communication (page 9). Similarly,

> "Interactivity" has meant much as a rallying point in the funding and spreading of digital media and digital media research, and most researchers in the field have personal reasons to be grateful for this, but the rhetorical and political merit of a term should not be enough to grant it a pseudoscientific status (Aarseth, 2004, page 8).

Wouters and Beaulieu (2006, page 49) find that the hopes ascribed to new technologies create boundaries which exclude certain academics and disciplines; specifically, the "current conceptions [of eScience which] are firmly rooted in, and shaped by, computing science" (page 53). A "sociology of expectations" affects the writing of a "future script" which is reflected in "the design of e-science websites, the drafting of funding proposals and national programs as well as the creation of demonstrators and pilot projects" (page 49).

Viewing it "through the analytic lens of epistemic cultures" they illustrate the "limitations of e-science and its potential to be reinvented" (page 48), suggesting that it has not evolved sufficiently from a historically-rooted aim to

"co-ordinate resources for megaprojects across all continents" (page 54). Effectively, it is "restricted to areas of computational research in the sciences and humanities" (page 49) through particular configurations of hardware, middleware and the creation of big datasets, although definitions of practise are ill-defined. Other types of eScience are neglected in official discourse – for instance, women's studies is concerned with network cultures but is "not computationally-oriented or involved with large-scale digitisation projects" (page 64).

Fagerjord's deconstruction of Bolter and Grusin's theory of "hypermedia" (Fagerjord, 2004) is similarly loaded, but at a theoretical angle. He demonstrates how concepts used in attempts to build a theory of new media (for instance, 'convergence') may be based on nothing more than a creative interpretation of certain supposed affordances. Their two proposed media logics – *immediacy* and *hypermediacy* (Bolter and Grusin, 1999) refer to the extent to which a media object appears to be "mediated" rather than "opaque" in relation to "the real" (page 21). He finds these constructs analytically insufficient, neglecting the communicative role of media (Fagerjord, 2004, page 305) in favour of a model over-reliant on technical specifications, aesthetics and circular definitions (pp.293-314). Similarly, they ignore the attitudes and perceptions of individuals and their cultural contexts, ascribing too much weight to the media themselves and overlooking the multiple and situated reasons beyond "seeking the real" that cause individuals to engage with media (page 304).

Ultimately, descriptions and perceptions of technology and innovation refer "as much to the position of the observer as to the nature of the object" (Liestøl, Morrison and Rasmussen, 2004, page 11) and may or may not be deliberately politicised hence new media must be examined from more than one perspective. A "distrust of techno-rhetoric" should not "blind us to other aspects of the relationship between ideology and technology" (Aarseth, 2004, page 415), or how they might be used creatively and subversively. Flanagan (2004, page 361), dismissing the "attractive rhetoric" that sees new media as

"tool[s] for liberation", proposes (somewhat contradictorily) that activists might "seize them" and use them in ways which challenge patriarchy (page 379). Qvortrup (2004, page 240) suggests using an analysis of "poetics" and "poetical composition" to understand the interfaces between creators and users of new technologies not in terms of essential truths or properties, but with an awareness that "common sense understandings" are always subjective and contingent (page 250).

Woolgar and Coopmans (2006) explore how understandings change in relation to new technologies by reconsidering the concept and practise of "virtual witnessing" – a 17th century invention fundamental to the foundations of scientific research[3] – in relation to the distribution and "status" of digital data. In non-digital environments, a scientific fact can be established and verified through the use of particular, theoretically objective conventions, removing the need to witness it directly. The definition of "virtual witnessing" in publications detailing computational techniques is significantly different – these discourses treat not the description of an experiment, but the availability of "raw [computer] data" as "the new rock bottom point of reference" (page 16).

This represents a fundamental shift in how the scientific community constructs and validates its knowledge. Instead of taking this for granted, it is important to recognise that "ideas such as "data", (including "data mobility") and "network" [are] the currency of discussions and actions of members of the eScience tribe" (page 10) and "the production, currency and use of the new Grid technologies does not at all guarantee the effects ascribed to them" (page 13).

[3] Virtual witnessing is being convinced, through the sharing of information via certain literary, numeric and social protocols, of the accuracy of an experiment and the material conditions under which it occurred.

INSTRUMENTATION AND METHODS

For Savage (2013), the crisis in positivist understandings brought about by new forms of "digital knowledge" have led (in part) to a renewed interest in the teaching of methods as socially constructed. This can be linked to "a profound re-organization of academic disciplines (page 13) and a reassessment of the "interplay between theory and method" where cultural theory again needs to address empiricism (page 14). Instruments and methods of study have increasingly become objects of analysis in their own right, partly because of the alternative perspectives revealed by digital cultures and interdisciplinary projects. Critiquing what is habitual and familiar, academics "rethink [their] theoretical and methodological repertoires" (page 4), recognising them more fully as "modes of instantiating social relationships […] implicated in forms of ordering and power" (page 5).

By enabling novel "assemblages" of society at even the most "mundane" levels (Savage, 2013, page 5), social networking sites, digital auditing processes and data processing algorithms, make the changeable and relative nature of meanings and values more "salient". Challenging the traditional opposition of science and the humanities, techniques for gathering and analysing digital data like the "standardized data" entailed by digitisation (page 15), highlight the fact that qualitative research, just as much as quantitative, can be used instrumentally and in ways which are non-neutral. Likewise, quantitative methods can support anti-instrumentalist and non-deterministic readings (pp.15-20). As part of the move toward interdisciplinary research, this might to some degree challenge discipline-based distinctions of what is an appropriate technique. It also foregrounds common, difficult processes adaptation and redefinition.

A National Centre for Research Methods (2009) report, discussing how digital data "augments, enhances and problematises conventional methods of research [in the social sciences]" states that a "key challenge" is specifying what makes digital methods distinctive, particularly as there are many opportunities for convergence between online and offline methods, reflecting

the blurred boundaries between spaces and the integration of digital technologies into everyday life (page 6). Participants in a series of workshops and seminars found that the advantages of online ethnographic research include "access to [a part of] everyday life" and groups with a "notable online presence", quicker processes of data gathering and analysis, the greater comparability of standardised data created by different researchers using the same software packages, opportunities for collaborations beyond their field, and the improved feasibility of longitudinal research (page 7).

However, although social science must be "responsive to, and congruent with contemporary social formations" (page 4), and digital methods are important "parts of a toolkit for interrogating contemporary life" (page 6), researchers must be cautious about seeing digital tools as ‘black boxes' without critical engagement and using such tools without enough attention paid to methodology" (pp.6-7). Likewise, research questions should be genuinely important ones, rather than those based on "the allure of quick and easy data" (page 7). Housley et al. (2013, page 245) summarise the differing views of sociologists thus:

> Even though we are in the midst of this rapid [digital] innovation, it is nonetheless possible to distinguish three basic lines of argument about its current and prospective impact on social research. Some commentators suggest this innovation generates methods and data that can act as a surrogate for more traditional quantitative and qualitative research designs such as experiments, sample surveys and in-depth interviews. Others argue that digital communication technologies re-orientate social research around new objects, populations and techniques of analysis. It can also be argued that digital social research augments, but needs to be used in conjunction with, more traditional methods.

These need be mutually exclusive. Woolgar and Coopmans (2006), in an interdisciplinary piece, describe a "Science and Technology Studies approach" to understanding eScience which considers the "social shaping of e-science

and of e-social science" – in particular, "the social and economic determinants of the design, uptake and use of [new, computational] technologies and the implications of the Grid for the nature and practice of natural and social science" (page 3). Resisting technological determinism in favour of a "sophisticated" perspective they "argue[s] that the "social" and the "technical" are reciprocally elaborated". This suggests a need:

> To consider bidirectional "impacts", for example, both how substantive research problems in the natural and social sciences shape the development and use of Grid technologies and how these technologies occasion the re-framing of research problems and/or methodology […]. In other words, an understanding of Grid technologies sees them as both thoroughly situated in particular contexts of research practise, and yet highly consequential for the ways in which research is organized, conducted and communicated […]. This reinforces what we see as a central feature of a "social shaping" perspective on Grid technologies in science, namely, that it is necessary to interrogate the currency and meaning of what are perceived as the central components of e-science. The key is to develop and maintain a working scepticism with respect to the claims and attributions of scientific and technical capacity – page 5.

Although fields within scientific disciplines are "by no means uniform", and scientists "find, use, and disseminate information in a variety of ways" (Research Information Network, 2010, page 4), they are more clearly and closely linked to the production of commodifiable products and outputs of a kind prioritised by government and industry than other disciplines, hence there are greater incentives and pressures placed upon them for rapid technological change. This can restrict space for discussion, debate, or scepticism about the "hype" (Woolgar and Coopmans, 2006, page 19) in an environment where funding decisions reinforce neo-liberal understandings of the role technology and openness should play in knowledge production (Graham, 2006; Peters, Liu and Ondercin, 2013).

Hard science is unlikely to address publicly how its fundamental assumptions and methodologies have altered because of digital technologies. Discussions in physics, chemistry or the earth sciences are more likely to document new processes, applications and experiments than to describe their social evolution. Even as new methods and ways of working are established, important distinctions remain; because of the reasons why they use them, scientists and historians have different relationships with information, media and technology (Herman, 2001a, pp.393-397). Strategy as much as epistemology means that many in the 'hard' sciences treat their instruments and data as fundamentally objective and neutral. For Savage (2013, page 15), they can distance themselves (both personally and as a group) from taking "responsibility" for the wider consequences of how they apply them because they are unconcerned with issues of materialism or social construction.

Although new technology is often "heralded as the displacement of existing practise, there is considerable evidence to suggest that new technologies sit alongside the continued use of "old" technologies" in scientific communities (Woolgar and Coopmans, 2006, page 13). Academics will find ways to suit new technologies to existing practises and "different forms of digital infrastructure resonate differently with central elements of an epistemic culture" (Merz, 2006, page 115), their success being "closely linked to how an infrastructure is specifically embedded" to suit a community's existing requirements (page 116). Academics can become "savvy strategists" (Woolger and Coopmans, 2006, page 19) who 'play the game' through official acquiescence while retaining ingrained caution and an interrogatory approach historically typical of the scholarly mind-set (page 20).

This is true not just in the sciences but in the humanities. Regardless of the uses to which they are put, the "externalised symbolic information" of technological activities "relies upon its connection to a [distributed] social network that can interpret the symbols and access the data" (Reid, page 30). Even when novel, their interpretation also encodes traditions, power structures and value judgements. In the case of the humanities, this allows

scholars to more effectively stake a claim to the new digital territory by arguing that fundamental questions around new media are ones which are best addressed by themselves (cf. Lanstedt, 2004; Paatela-Nieminan, 2005), or by demonstrating that composition and creativity are as important as the practical or political uses to which technologies are put. Making such a case is in itself political, helping to ensure the survival and relevance of the humanities and making their contribution to digital agendas in HE essential.

For instance, Selber (2005) observes in *Multi-literacies for a Digital Age* that "functional approaches to computer literacy characteristically construct literacy as a neutral enterprise that serves the utilitarian requirements of technological society" (page 81). This means that critical theory gets neglected, while the political and politicised nature of digitally mediated educational processes is overlooked (page 82). He argues that because, "for better or worse, computer environments have become primary spaces where much education happens", the design of human computer interfaces, and new definitions of reading, writing and creation must be entrusted to those who understand the technologies of literacy best already – humanities scholars. To do otherwise "risk[s] naturalizing a set of literacy perspectives that fails to support the pedagogical practices teachers of writing and communication find most effective and informative. Further, it "endangers the status of writing and communication teachers (page 12).

Similarly, Lanestedt (2004) argues that while computing science is clearly useful, "the relevant disciplines to inform our investigations [of digital learning environments as objects of study] are media studies, pedagogy, and informatics" (page 66).

NEW AND RENEWED PEDAGOGIES FOR DIGITAL HUMANITIES

The formation of what is often termed the "digital humanities" illustrates how new media are being theorised and researched within academia as well as being politicised and used tactically. An examination of this new 'branch' of the humanities reveals the complex concepts and external discourses

influencing and shaping the views of humanities scholars. Rieger (2010), emphasising the "social context of technological innovation" states that "while technologies are being positioned as driving forces behind academic innovation, it is more important than ever to understand the cultural, social, and political implications of new media and how they are perceived and used by humanities scholars." Examining the links between perception and meaning attribution, she frames the digital humanities in three ways.

Two of these – "digital media as facilitator of scholarly communication" and "digital media as a platform for creative expression and artistic endeavours" – relate to purpose or effect. The third – "digital media as context for critical studies of digital culture" constitutes a scholarly field of enquiry. Although for some academics, the term digital humanities is "unfamiliar jargon with no applied meaning", for others it is a valuable resource supporting new insights and experiences. Again, attitudes are influenced by the "enabling and constraining structural elements of the social and technical context of scholarship", including "academic norms, institutional support systems, and the rapidly evolving information policy framework".

Many authors discussing new media from humanities perspectives utilise socio-cultural and literary theories of knowledge, semiotics and pedagogy in support of a generally positive and techno-determinist argument: that new media and digital technologies have fundamentally altered, through their unique characteristics and affordances, the ways in which knowledge and meaning are constructed (Ulmer, 2003; Kress, 2004; Wysocki, 2004; Selber, 2004; Bentkowska-Kafel, Cashen and Gardiner, 2005; Sterne, 2005; Brooke, 2009; Wysocki, 2004). This in turn alters how individuals understand content, formulate arguments and give expression to them, occasioning what Kress (2005) calls "gains and losses" both representationally and communicationally – for example, a privileging of "information" over "knowledge" and a reliance on simplistic natural language syntax in online content (page 6).

For DePietro (2013, page 61), the "cryptic spelling" and "inconsistent punctuation" of students using social networking sites like Facebook to discuss

their coursework, evidences how these platforms can accommodate atypical expressions and styles in ways which are potentially beneficial to shared, social processes of learning. New media and digital technologies "profoundly redefine what it means to be literate" (Koiro, Knobel, Lankshear and Lue, 2014, page xi). For Grover and Stuart (2010, page 11), the instructor as expert model is better supplanted by one where knowledge and meaning are "co-produced" by the "learner and educator" as "part of participatory social learning" (page 10), although there is still a clear and valuable role for traditional instruction (page 15).

In *Writing New Media: Theory and Applications for Expanding the Teaching of Composition*, Wysocki (2004, page 15) emphasises how new media change the way students write both essays and presentations, and how they compose – specifically, through the inclusion of visual images and website content or links. This has "implications not only for the tools of writing, but also for the contexts, personae, and rhetorical conventions of writing" (page 1). Crucially, new media "texts" do not have to be digital but are "those that have been made by composers who are aware of the range of materialities of texts and who then highlight the materiality" to draw attention to the forms, techniques and contexts of textual modes.

Databases can now be considered written works, which they would not have been in previous decades; hyperlinks, and tabulated data are forms of composition and knowledge construction as much as are traditional written texts (Johnson-Eilola, 2004, page 205). In multimedia environments, the teaching and study of rhetoric becomes virtual and multi-modal and as much as the physical properties of the new medium, altered conventions and codes must be interrogated. Paatela-Nieminan (2005, page 103) suggests that when teaching on new media in art education, "greater emphasis" should be placed on "providing students with a cognitive, aesthetic, process-oriented and practical approach to thinking digitally in art education rather than merely creating digital images"; as well as explaining how computer software function

as tools, computer graphics (and indeed, code) can be dealt with as modes of artistic expression.

Taking account of new media's material and spatio-temporal properties, its symbolic notations, and the techniques or interactions which it occasions, means that theories of composition, style and effect need reformulation. With this renewed focus on symbolism and interpretation, long-held principles are reappraised alongside their altered state when made binary; for instance, how the spatial relations and the positions of words and images denote meaning (Lanham, 1993; Wysocki, 2001; Kress, 2005; Hocks, 2005) and, crucially, how this can be taught.

In *Digital Media Revisited*, Liestøl, Morrison and Rasmussen (2004, page 2) propose that the "first encounters" with digital media which have already taken place have situated academics in an innovative multimodal space wherein reconfigurations of existing techniques and conceptual frameworks enable a "two-way shuttle of insights between theorizing and experimenting". New approaches are being devised to, for example, "find the cultural understanding of a medium's relationship to the real" when analysing images and text (Fagerjord, 2004, page 305) or when assessing the moral and ethical implications of "electronic mediation" (Silverstone, 2004, page 490).

Here, innovations result from a "disciplined multidisciplinarity" characterised by processes involving "increased flexibility and freedom but also increased complexity" (Liestøl, Morrison and Rasmussen, page 2). This means that research and teaching must become more creative, accommodating "tearing apart and weaving together, decoupling and recoupling, analyzing and synthesising, diverging and converging" (page 2); in other words, a mixing of modes, styles, and perspectives, no longer bound by traditional disciplinary rules or assumptions, but based around the logic of computers.

Describing how the epistemologies and models aiding education and research might be redesigned, such discourses view doing so as essential (Ulmer, 2003; Salter, 2004; Selber, 2004; Paatela-Nieminen, 2005; Reid, 2007; Weller, 2011;

Wankel, 2011; Savage, 2013). Having become prevalent (even dominant) in the day-to-day environments of both students and academics (Rogers, 2001; Weller, 2011, page 21; Saklofske, Clements and Cunningham, 2013), to develop and implement "curricula more appropriate to today's digital reality and tomorrow's digital prospects" is not just what the "members of the net generation need" but what they "have every right to expect" (Saklofske, Clements and Cunningham, 2013, page 332). This reasoning largely overlooks however "increasing agreement" that the concept of students as "digital natives" with good access to and "innate" understanding of technology is a myth" (Brown and Czerniewicz, 2010, page 357).

APPARATUSES, DESUBSTANTIATION AND DISCIPLINE

A new critical pedagogy, predicated upon a model first devised by Ulmer (2003) and developed by colleagues at the "Florida School" (Rice and O'Gorman, 2008b, page 3) is "electracy" (Ulmer, 2003). This proposes that as Western culture moves from a metaphysics of alphabet to a metaphysics of image, literacy is giving way to new skills, facilities and dimensions which are part technological, part ideological, part metaphysical. Like the structures of literacy and orality which it displaces (but does not replace), electracy is a dimensional apparatus for the creation and communication of knowledge, as well as the construction of new subjectivities. Comprising three tiers (technology, institutional formation and subject formation), new institutions, tools, methods and genres are developed to support it. The essence of "electracy" is verbal and visual creativity more than verification (i.e. heuretics rather than heuristics, or, artistic experiment rather than critical analysis); entertainment joins with schooling (a "monument of literacy") in a disruptive fashion. At the same time, scrutiny and an awareness of its own formative processes are vital to those engaging with it.

Positioned as a constructivist successor to traditional print literacy rather than (as with related ideas such as e-literacy or digital literacy) an adjunct to it, electracy suggests that education must adapt in relation to the tools and

media that are being made available to us, while still drawing on the theories and tools of older apparatuses and learning from apparatus theory and history (Ulmer, 2003, page 157). If the academy as institution embeds its knowledge within disciplinary practises and discourse communities, the internet as part of the "new institution" is more fragmented and more experimental. Although privileging creativity and experiment, electracy emerges from and is framed by capitalist logic and the "global information society" (Ulmer, 2012).

Further, it relies on group identities and practises and on the survival and advancement of a particular ideology, accepted and validated by "societal judgement" (Ulmer and Freeman, 2014, page 70) – even as differences and the processes which create subjectivity are exposed. To be "electrate" is as much a question of attitude and thought-style as it is one of learning new skills (Ulmer and Freeman, 2014, page 70). Indeed, the "invention of an attitude [in this case an aesthetic one] is part of apparatus formation", with specific values, behaviours and skills "realized through [reinforced by] public policy" as they enter a normativising "tradition-creating process" (page 70).

Reid (2007, page 127), proposes a creative "rip/mix/burn pedagogy" wherein students explore meaning, symbolism and composition online in a process which – rather than being comprised of sequential or recursive steps – unfolds continuously, illuminating the relationships between subjectivity, multiplicity, cultural value and meaning (page 153). The problem, as he sees it, is that "in an academic context, the constraints on discursive practises have less to do with how we might be able to imagine composition than they do with other institutional values and interests" such as the "marketplace exchange of compositional products" and an "ideological commitment to intellectual property, particularly as higher education becomes an increasingly capitalist and entrepreneurial endeavour" (page 157). The same logic and forces that have led to new media and digital technologies becoming increasingly important in the academic ecosystem necessarily restrict the ways in which their potentials and affordances (for Reid, these are innately participatory and open) are realised.

New theoretical models remain problematic to the study of disciplines and attitude because, although referencing the tensions involved in institutional change and in becoming fully conversant with new media, and although allowing room for some critical, potentially political elements, legitimate concerns that academics might have about embracing them are often at risk of being positioned as retrograde – as irrelevancies, or obstacles impeding the construction of new institutions. For Liestøl, Morrison and Rasmussen (2004), although the importance of institutionalised power structures should not be "underestimated" as an influence on media development, and while "grand narratives of modernity" (page 2) should be resisted, the most appropriate "credo" for understanding social change is "follow the media" (page 11).

Finding the broad abstract and theoretical structures for an emerging field such as digital humanities entails something of a disassociation from, if not a full disaffection with, previous ones. In seeking to be pro-active, authors advancing this positon often leave inadequate room for reflections on the problematic aspects of institutional restructuring. What of academics, creators and learners who do not wholeheartedly subscribe to multimodal digital scholarship? Are the fundamental assumptions and agendas underlying the promotion of digital methodologies demonstrably beneficial to HE?

The recognition and assessment of limited or pragmatic new media practises – for instance, by those still encountering new media for the first time, or working within less flexible, more traditional settings, is subjugated when the key question for academics considering digital technologies is "how to construct new concepts and theories of valuation that adhere more adequately to a technologically mediated world" (Liestøl, Morrison and Rasmussen, 2004, page 10). The extent to which those mediations actually change the world is also contentious.

Rather than being 'positive' or 'negative', changes brought about by digital technologies reflect, as Grace (2010) contends, difficult to appraise "mutation[s] of human memory" (page 256). Utilising the semiotics, modalities and principles of their predecessors, computer screens may

challenge textual and visual conventions – but they also borrow from them (Hocks, 2003; Prior, 2005, page 26). Alterations to our cognitive processes, observable in, for example, how photographs taken on mobile devices are used to express our relationship to time and place (Grace, 2010, page 261) concomitantly suggest a return to "pictorial and hieroglyphic forms of inscription" (Grace, 2010, citing Nyíri (2006), page 257). In this light, claims for the abandonment of systems of knowledge creation and communication prior to the emergence of new media, are misguided.

Similarly, Reid (2007) interrogates rhetorical and compositional forms of new media in the 19th century and in the current era to demonstrate that the traditional "humanistic realm" and modern virtual environments share "a common material space" (page 106). New media – in particular, *composing* with new media – enable insights into processes that have informed our interactions with many types of media, at many points in time, even if only now do we become aware of them (page 157) or if these commonalities remain unacknowledged (page 31).

Lanham (1994, page 11) suggests that digitisation "desubstantiates" the visual arts, radically altering their ontological relations (page 11). At the same time, previous artefacts – in a process McLuhan (1988, page 288) terms "retrieval" – are as important to understanding technology as is metamorphosis. The "new dictionary" required to study digital media foregrounds the biases of previous, distinctions (page 224), but it does not make them irrelevant. Long before the computer appeared, texts were multimodal, visually complex, virtual and unstable (Prior, 2005; Reid, 2007) with multiple entry points and a capacity for modularity (Manovich, 2001). Appropriating or extending techniques and codes "that have been variously realized historically across media" (Prior, 2005, page 26), new media initiate a rediscovery of neglected ones (Hocks, 2003, page 630).

Developing in conjunction with their communication practises, academic disciplines persist as well as adapt, defending as well as redefining their territories. Guédon writes of electronic academic journals that "the

appearance of electronic publishing has put us back in touch with the textual wisdom of the Middle Ages", renewing "the sense that information can never work fully as information unless it is subjected to commentaries and discussions" (Guédon, 1996, page 346). At the same time as they encourage new relations between authors, readers, and disciplinary communities, who begin to access and comment on work more easily, e-journals reinforce older principles of academic communication – "It has become clear that electronic publishing will not prevail on the ground of technical superiority alone; how the means of communication adapt to the communities that make use of them is also part of the equation" (page 335).

Allowing more fluid communication arguably makes such new media better suited to interdisciplinary research challenging disciplinary rigidity (page 345) but most are useful only for particular areas of study and to particular groups of scholar (page 343).

OPEN ACCESS PUBLISHING AND ONLINE TOOLS

Debates about old and new channels and methods for publishing academic journal articles – and the complex economics involved in doing so – provide a clear illustration of how particular agendas can affect attitudes toward new media, revealing politically-motivated as well as discipline-related perspectives. Often, discussions of open access publishing tend towards polemicism, with ideological debates obscuring the complexities of its costs, benefits and utility. Promotion, 'advocacy', and allegations of self-interest on the part of publishers may relate as much to government policies with a "curious focus on business and profit generation" as to questions of intellectual freedom (The Informed Team, 2013). As Poynder (2006) explains,

> The argument that OA threatens peer review is most often made by scientific publishers. They do so, argue OA advocates, not out of any genuine concern, but in the hope that by alarming people they can ward off the growing calls for research funders to introduce mandates requiring that all the research they fund is made freely available on

the Internet. Their real motive, critics add, is simply to protect the substantial profits that they make from scientific publishing.

Open access may be seen as "a form of academic consumerism" which ignores the realities of both production and academia, and which creates new hierarchies and elites (Allington, 2013) – or as a "public good" (Willinsky, 2006) which supports "research excellence, innovation, and student satisfaction" (UK Open Access Implementation Group, 2011) with demonstrable citation advantages for researchers across disciplines (Antelman, 2004; Harnad and Brody, 2009) and systemic benefits for society (Cockerill, 2006). Regardless of political ideologies, attitudes and publication practises may be stifled by lower-level concerns.

As Procter et al. (2010, page 4040) note, while "new ICTs have led to the emergence of new forms of publishing, the central position of traditional forms in scientific debates and their role in building careers and reputations means that they are still a core currency" for academics. Despite a "rapid growth" in OA publishing since 1999, its overall share of articles remains low (Laakso, 2011). A "randomized controlled trial of open access publishing, involving 36 participating journals in the sciences, social sciences, and humanities" by Davis (2011) reported on the "effects of free access on article downloads and citations" and found that "articles placed in the open access condition (*n*=712) received significantly more downloads and reached a broader audience within the first year, yet were cited no more frequently, nor earlier, than subscription-access control articles (*n*=2533) within 3 years" (page 2129).

Because a clear and simple model for open access publishing has not yet been established and because it is still an area of contestation and experiment, most academics are likely to stick to what is familiar, regardless of its deficiencies. Carter at al. (2014), although supportive of OA, write that scholars and publishers have not yet "arrived at an alternative publishing model that suits the primary goal of scientists" (page 340). For some, peer review is "a bit like democracy: it's a lousy system but it's the best one we have" (Wager, 2006)

while for others it is "deeply flawed" (Carter, 2014, page 340). As Carter et al. (2014, page 339) state,

> Publishing articles as either green or gold OA reflects the motivation of researchers to make their work freely accessible to all who could benefit from, and build upon, it, not just those who can afford to pay for subscription-based journals (including institutions). This motivation for publishing OA is particularly important when considering [the criticism] that OA papers are not more frequently cited. Not all studies of citation rates of OA articles reflect this finding, but in any case, increased citations are not the goal. Rather, the intention of OA is to promote greater dissemination of information and reusability of published material to audiences both within and outside academia.

As Davis suggests, "The real beneficiaries of open access publishing may not be the research community but communities of practice that consume, but rarely contribute to, the corpus of literature" (page 2129). Further, there may be differences according to discipline and publishing models may reflect these. For instance, many publishers now explore multiple options to suit different requirements while allowing themselves flexibility. Morgan, Campbell and Tereen (2013, page 229) write that:

> Most major publishers employ a hybrid model for all or some of their journals, usually focused on those disciplines where there is both a strong interest in Open Access and robust funding to pay for it […] There is some evidence of more success of the hybrid Open Access model in specific disciplines such as bioinformatics or molecular microbiology, which are well funded and whose members have pushed for Open Access options. Oxford University Press, for example, has published information about its experiences with hybrid journals, most recently in Bird (2010). Bird reports that in 2009, two of OUP's journals, Human Molecular Genetics and Bioinformatics, had Open Access uptake of 18% and 30%, respectively. On the other hand,

take-up in their Humanities and Social Sciences titles remains at the 2% level.

Generic new media tools and services such as Google Scholar or Facebook are more commonly used than specialist or experimental ones (Procter et al. 2010, page 4045). This can be attributed to a number of factors, including; the perceived strength and value of existing methods for undertaking certain tasks; a lack of formal and informal "encouragement" to "innovate" (page 4045-6); a lack of technical support; and the extent to which new tools offer "network externalities" – i.e. where the benefits for each user increase with the number of users – that would lead to widespread adoption by particular communities (page 4051). Those working in fields where the formation of cross-institutional networks is essential are more likely to engage with Web 2.0., (page 4044) something which reinforces the correlations between the characteristics of 'old' (offline) and 'new' (online) territories and communities. As with any media, the "access points" of new media may be "hierarchically arranged, ideally to the point of closing all access ways except the predetermined ones" (Brighenti, 2010, page 96).

NORMATIVITY IN STUDIES OF ACADEMICS AND NEW MEDIA

Previous studies reveal the extent to which academic and technological systems have changed in the past 20 years, as well as the importance of studying attitudes toward new technologies. In 1997, Budd and Silipigni Connaway undertook a study of "the habits or attitudes of university faculty towards the use of networked information," writing that "little is known about this matter". Mailing (by post) a questionnaire to 6 different departments at 8 universities across the country, they asked about "accessibility to networks, submission and/or subscription to electronic journals, use of networks for other purposes (such as access to data sets or searching library catalogs), and effects of networked information on collaboration" (page 843). They found that:

> In general faculty tend to be conservative in their use and attitudes, since their institutions tend to be conservative. This is particularly evident regarding submission of work to electronic journals, which tend to be perceived as not contributing to instrumental goals, such as promotion and tenure. On the other hand, there are indications that networked information does have an impact on some faculty members' patterns of collaboration. Specifically, there seems to be some geographic and disciplinary broadening. There are some apparent variances in responses by such demographic variables as gender, rank, and departmental affiliation.

Much recent literature with some consideration of academic attitudes reveals a certain unstated consensus about the relevance of digital technologies and new media to scholarship, sometimes with a lack of analytical rigour. Rather than discussing in objective or dispassionate terms whether they are advantageous for academics, attitudes and use are studied with a view to advancing new media's centrality or persuading academics, and the reader, of their benefits. Underlying much of this is a particular view of knowledge creation and exchange. Eijkman (2008), in "Web 2.0 as a non-foundational network-centric learning space", offers a clear (though detached) elucidation of a perspective loaded with pedagogical and social connotations:

> The epistemological implications inherent in [the] Web 2.0 architecture of participation invites a radical reframing of our approach to knowledge and learning from a foundational to a non-foundational epistemological perspective. By way of introduction, those at the foundational end of the epistemological spectrum approach knowledge as ultimately having an external objective basis in the "real" world against which it can be justified. Such knowledge is, in the final analysis, acquired through an individual mental process akin to information processing in which academics are the reliable sources of knowledge and credentials.

> However, those at the non-foundational side of the spectrum have a very different understanding namely that "the 'reality' that we impute to the 'worlds' we inhabit is a [socially] constructed one" (Bruner, 2003, p. 169). They approach knowledge as a socio-cultural artefact, a product of, and justified by, historically situated interchanges among members of particular discourse community (Gergen, 2003). It follows that knowledge acquisition, whether formally or informally, is therefore always an inherently social process. All learning is always about the collaborative acculturation of persons into a community or network of practice and its knowledge systems, dispositions and practices (page 94).

He concludes that "architectures of interdependent acculturation are congruent with Web 2.0 and its architecture of participation as they are better epistemologically placed to realise the potential of Web 2.0 to position students on trajectories of acculturation into their new networks of practice" (page 96). Academics with "sceptical attitude[s]" are described as "wedded to" an outdated (i.e. "traditional" and "foundationalist") view of learning which must be supplanted because it revolves around "abstracted second order knowledge" (page 99) and which is "alien from, and alienating to, the way humans learn naturally" (page 98). Using Wikipedia as exemplar, it is left unexplained how individuals and groups learned or passed on knowledge successfully before the online encyclopaedia (and other online resources) made knowledge available digitally.

The logical extension of this view – and of the political agendas discussed above – is to develop research and teaching models around the architectures and affordances of Web 2.0 or social and new media. In "Public issues, private concerns: social media and course management systems in higher education", Sarachan and Reinson (2011) use terms and concepts derived from non-academic social networking sites to discuss course management systems (CMSs). Because students prefer (they suppose) to be online, these systems must be designed to function in similar ways to these favoured online spaces:

> Social media and their changing nature present compelling public and private dilemmas for higher education. Instructional delivery faces obstacles to effectively reaching students who often prefer online communities and spend considerable recreational time using these social networking sites. CMS has limited appeal as an inviting space for students. An effective learning environment provides a communal place for student–professor interactions and an accessible and interactive space for collaboration and global knowledge distribution (Sarachan and Reinson, 2011, page 227).

Across thematic volumes, chapters in the book series *Cutting Edge Technologies in Higher Education* are also generally positive and techno-determinist in their stance, promoting as much as analysing the ways in which social media can be incorporated within the classroom and curricula to develop skillsets, foster "openness" (Wilks and Pearce, 2011; Dawson and Al Saeed, 2012), "catalyze learner engagement" (Schell, Lukoff and Mazur, 2013, page 233) and improve "competitiveness on a global level" (Dawson and Al Saeed, 2012, page 1).

This provides a good illustration of what Bourdeiu (1977, page 653) refers to as the creation of a discourse "market". There, "linguistic capital" (page 653) is generated via the attribution of particular meanings to particular terms, in support of a particular apparatus of linguistic production. These relate to systems of linguistic and social dominance (page 654). Through "bureaucratic procedures, educational structures and social rituals […] the state moulds mental structures and imposes common principles of vision and division" (Bourdieu, 1994, page 7), marginalising competing perspectives in favour of those which are most profitable to a situation. Discourse becomes a "symbolic asset" with different values in different markets (1977, page 651).

Kukulska-Hulme's "How should the higher education workforce adapt to advancements in technology for teaching and learning?" (Kukulska-Hulme, 2012, page 247) takes the Open University (OU) as a case study. Analysing their mobile learning strategy, she proposes that "for faculty members, there must

be opportunities for concrete experiences capable of generating a personal conviction that a given technology is worth using and an understanding of the contexts in which it is best applied." The paper incorporates findings from an internal study where Open University staff were interviewed about their view of the university's Mobile Learning Guide, showing awareness of problematic aspects of new media in HE:

> There was a range of reactions to the idea of introducing mobile learning within Open University courses; some enthusiastic, some neutral and some sceptical or negative. Where interviewees expressed concerns about the value or usefulness of mobile learning, their comments indicate that these concerns may have resulted from misconceptions about the way that mobile technology might be integrated into course production, or what constituted mobile learning.
>
> It turned out that the Guide had not been not widely read by the recipients in the sample. Some of the reasons that interviewees gave for this included the perception that neither reading the Guide nor mobile learning constituted a core activity for course leaders; that a number of different Guides had arrived at once and presented too much extracurricular reading in one go; and that course teams were already stretched to capacity and could not accommodate any extra work. Furthermore, although the transition from print-based to online teaching and learning had been realized across most of the university, there were still some course teams for whom this transition remained a more pressing concern than moving on to the introduction of mobile learning (page 250).

Use of the word "misconceptions" as an explanation for concerns is clearly interesting, as is the demonstrable link between work pressures, priorities and attitudes. She then states that while there was a "good level of interest in mobile learning",

> academic staff were deterred by the perceived amount of time and effort they would need to invest in understanding mobile learning when it was considered peripheral to the delivery of their courses. There was some scepticism about the use of mobile technologies in delivering courses but also evidence of shifts towards more positive views when benefits became obvious. One way to enable identification of benefits is through Mobile Learning Experiences. However, to fully engage with mobile technologies, faculty need to acknowledge that they are professional role models to their students. This means adopting a lifelong learning stance and embracing the opportunity to combine research and inquiry with teaching and learning (page 252).

At the same time as attitudes are being evaluated, the utility and positive value of mobile technologies in higher education is presupposed, with staff expected to develop a set of core competencies and behaviours, primarily because "mobile learning will continue to develop rapidly due to external influences as well as pressures and opportunities within institutions" (page 252). The research is framed in such a way that attitudes are treated as constructs to be modified or "improved" via skills development, the goal being arrival at a certain viewpoint common to staff and students as "co-learners" (page 251).

Similar rhetorical constructions are used by D.L. Rogers when she talks about "overcoming barriers to adoption" (Rogers, 2000, page 20), and P.L. Rogers, who writes about "the advantages and the necessity of infusing instructional technologies in higher education", partly in response to market pressures (Rogers, 2001, pp3-5). Gillard (2004, page 1) contends that

> with regard to the adoption of innovations that purport to improve preparation for and classroom delivery of curriculum, IT educators who teach primarily theory classes must not be a laggard or part of the late majority, need not be an innovator, but should be an early adopter (preferably) or in the lead of the early majority.

Ford, Bowden and Beard (201, page 105) explore "how social media ha[ve] been used in the context of a need to enhance academic excellence and drive efficiencies in the face of funding constraints and changing demographics" at the University of Bournemouth. Discussing "stakeholders" both within and outside the university, the authors conclude that "when used appropriately, social media can facilitate the collaboration that will be essential to overcome the challenges facing higher education" (page 125). Social bookmarking has, they state, been used to "foster group cohesion, reflective practice, and evaluative skills in students" (page 105) and at an institutional level has created "professional and administrative efficiencies" while "microblogging has made a difference in promoting reflective learning, group cohesion, and professional awareness in students" at the same time as "enhancing academic and professional networks" (page 127).

Even if demonstrably useful, other types of offline (or online) collaboration and learning are not assessed as comparators for the 'enhancement' of excellence. The case studies cited are in essence vignettes or 'snapshots' describing instances of use in universities of particular new media systems or services (for instance, social bookmarking among geographically dispersed midwifery students at Bournemouth University), rather than the analysis or demonstration of benefits, which are inferred. Indeed, the authors begin by noting that the chapter was "written shortly after the UK Government published its vision entitled Higher Ambitions: The Future of Universities in a Knowledge Economy", within an economic context where "technology can help universities move from where they are now to where they need to be" (Department for Business Innovation & Skills, 2009, page 106).

Technologically-determinist and management-biased research such as this considers the possession of particular attitudes wise and pragmatic for individuals at a time when universities must make use of ICTs in order to enhance teaching, learning, and curriculum development and prepare students for the labour market, contributing to "the much sought efficiencies" (Ford, Bowden and Beard, 2011, page 106). It may not however take account

of empirical evidence about the uncertain utility of new media epistemologies and tools, and the complexity of ascertaining what they are.

For instance, writing about how web-based learning may supplement processes of learning, self-directed learning, communication and professional development in medical students, and be appreciated by them, Schwantes et al. (2008) write that, "while Web-based instructional programs are being used with increased frequency to promote a student-centred approach to learning, there is limited evidence regarding the impact of a learner designed website for enhancing cardiac auscultation skills" (page 99).

Kirkwood and Price (2014) query what is "enhanced" by "technology-enhanced learning" (TEL), finding little evidence and confusing definitions that tend to consider only equipment and infrastructure, imparting little clarity (page 7) and with little elucidation of what *value* is being added by TEL. Conceptions of enhancement are inconsistent, although this may "reflect differing traditions and disciplinary practices" (page 22). They find that rather than innovation, technology is most commonly used "to replicate or supplement traditional activities" (page 8).

Rogers (2000) draws upon previous research to emphasise that "while there is no significant difference in academic achievement between traditional and technology-enhanced courses" and that outcomes are not a result simply of the technology or medium used for teaching, there are "measurable and critical advantages to investing in technology for teaching and learning", particularly in how it enables, supports and facilitates "teaching and learning *enterprise* [my emphasis], both from the students' perspective and from an investment perspective" (page 4). Indeed, as Wankel and Wankel (2011, xviii) write, "it will become increasingly impossible to be competitive while using the communications media of the past.

Some, who do not whole-heartedly agree with this or its underlying ideology, nevertheless adopt stances of tacit acceptance, with varied degrees of excitement. In a special issue of *On the Horizon*, Conway (2010), a "strategic

foresight practitioner" involved in education management, writes that "the value of new media is still being defined as we come to understand how these new tools and services can be used in our lives and work […] Higher education is in transition, whether we like it or not. And that transition is marked by disruption" (page 246). Changes then are not about evidence or about the desires of staff, but about external forces and agendas, and the inferred – but again, not always evidenced – desires of students, viewed through the lens of government policies and market logic.

For Cady et al. (2011, page 87), in a case study of virtual worlds and virtual learning environments:

> Since the prevalence of virtual worlds in society has grown exponentially in recent years and virtual worlds have demonstrated an incredible power to engage participants in ways in which traditional education has not, virtual worlds provide us an excellent opportunity to create engaging, collaborative, and academically challenging learning situations. Also, given the new media literacy of many of younger students, we in higher education are in many ways meeting them where they already are …or should be.

Addressing Facebook as a communication, teaching and learning mechanism within HE, Bateman and Willems (2012) find that in much public discourse, a "social and cultural expectation that Information Communication Technologies (ICT) should be ubiquitous within peoples' daily lives is apparent" (page 53). Yet, "while there is much excitement at the possibilities that such technologies offer, there are increasing anxieties across institutional and individual practitioners, in regard to possible consequences of their use" (page 53). Their discussion of the "pitfalls" of using Facebook, which sit alongside descriptions of the benefits, are based on their own observations and constructed case studies, using an "autoethnographic" methodology (page 57). The concerns acknowledged include blurred boundaries between personal and professional relationships, a lack of privacy, identity theft, cyberbullying, a lack of transparency or ethical accountability with the

potential to undermine academic integrity, and confusion about who information being shared is intended for (page 55).

In a theoretically engaged study, Perkins (2011) assesses "the challenges to widespread adoption" of Open Educational Resources – including "questions about the ability to reuse and adapt materials, methods of indexing and distributing materials, materials design, pedagogical assumptions, infrastructure costs, long term sustainability, quality control of content, establishing credibility, intellectual property issues, access to resources in areas without stable information and communications technology (ICT) infrastructure, and ways of mitigating against cultural hegemony" (page 60). Using Rogers' Theory of Perceived Innovations as an analytical lens, he highlights individual and cultural differences, noting that "dimensions of compatibility include the manner in which an innovation fits extant values and beliefs, previous ideas, and expressed needs" (page 62) and that "individuals operating within an organizational context are part of a larger political system that may have other goals" (page 63).

As Kirkwood and Price (2014, page 26) find in their critical review:

> Transforming learning is a complex activity that frequently necessitates reconsideration by teachers of what constitutes 'teaching' and 'learning'. It requires sophisticated reasoning about the goals of any intervention, the design of the evaluation and the interpretation of the results within the particular educational context. Further research needs to examine the relationship between these factors and their bearing on the potential of technology to transform the student learning experience.
>
> There is increasing recognition of the limitations of much research that has been undertaken to understand the relationship between technology and learning (Cox and Marshall 2007; Oliver, 2011; Oliver et al, 2007). Research is often characterised by a lack of critical

> enquiry (Selwyn, 2011) and a limited range of research methods and approaches.

Weller, in *The Digital Scholar: How Technology is Transforming Scholarly Practice* (Weller, 2011) addresses new media from a largely balanced perspective. Using concepts like inclusion, participation and ease of access, he foregrounds inter- or multidisciplinarity, "permeable boundaries" (page 64) and the new types of knowledge creation and exchange brought about by digital technologies. However, although clearly optimistic in his depiction, he allows more room than other authors for critique. The claims made for new media, which attribute radical changes in thought-style or behaviour to their use, are often unsubstantiated – or at least, insufficiently justified (pp.17-20). Abandoning traditional models and methods is not always based upon common agreement, and attitudinal positions can be unclear. Citing Czerniewicz and Brown's study into ICT use (Czerniewicz and Brown, 2008) he reports that when surveyed, academic staff in South African universities,

> [Didn't] know whether or not their colleagues thought computers were important. When they did report knowing about their colleagues' use and attitudes towards computers, they were divided about their opinions as to their colleagues' values and use, indicating limited support networks and communities of practise.

A combination of "enabling and constraining factors" act together to facilitate and/or deter ICT use. These include a complicated and fluid set of "technological resources, resources of personal agency, contextual resources, and online resources" (Czerniewicz and Brown, 2008, page 3) – in simpler terms, access to the technology, a desire to use it, and institutional or professional support. Even when enabling factors *are* in place, they are not straightforward predictors of use or of a positive attitude.

The local conditions of an institution, like the preferences of an individual, intersect with broader socio-economic factors that cannot be so readily manipulated (page 9), reflecting a complex set of influences upon disposition

and attitude (page 1) within the "technological habitus" of academics (Czerniewicz and Brown, 2012, page 44). Discussing students' use of ICT in terms of embodied and objectified cultural capital, they identify a disjoint between what higher education 'values', and the practices of students, who know what is "valued, but [who] used what they had available in order to best operate within the field (page 44).

Although primarily focusing on how to incorporate digital tools within generic models of teaching and research, and on describing models that will help overcome "barriers" to the acceptance of digital scholarship (pp. 128-140) or publishing (pp. 141-153), Weller directly and sub-textually provides space for the consideration of institutional and managerial agendas in relation to digital technologies on campus.

EMPIRICAL STUDIES ON ACADEMIC ATTITUDES

The few recent studies identified which directly measure the attitudes of academics toward new media paint a subtler and nuanced picture than the idealistic or rhetorical constructions about new media in universities suppose. They also consider differences between disciplines, and in relation to a number of other demographic factors. Some focus only on particular departments or universities, while others examine multiple institutions. Feng and Widén-Wulff (2011, page 763), considering "scholarly communication and possible changes in the context of social media" sent an online questionnaire to 126 researchers at Åbo Akademi University in Finland. The study addressed four key questions: do researchers use Web 2.0 tools for scholarly communication? What kinds of Web 2.0 tools do researchers like to use? In what parts of the scholarly communication processes do researchers use Web 2.0 tools, and what *expectations* do researchers have when they participate in scholarly communications?

There is a practical and somewhat narrow focus on ascertaining what researchers at Åbo expect from Web 2.0 centred library services; central for the authors is determining "how to build the standardized process and

environment of scholarly communication, provide combined modes, and estimate the scholarly capital" generated as a result (page 274). However, while the role of disciplinary or other communities is not addressed, the range and complexity of attitudes *are* captured, throwing up interesting areas for potential further study. In one question, a five-point Likert scale (Agree-Disagree) was used against various statements about the degree to which "online scholarly communication could replace traditional communication by using Web 2.0".

Although the majority agreed or somewhat agreed that Web 2.0 would improve local and cross-institutional collaboration, writing scientific publications, and disseminating information, around 20 percent disagreed or somewhat disagreed with these statements. Further, while "most of the participants either agree or somewhat agree with its importance (77 per cent) and appreciate the convenience of collaborative possibilities created by new tools (85.7 per cent)," 57.9 per cent "agree that the copyright issue will become more complicated" and that it will be "more difficult to evaluate the reliability of information (50 per cent)" (page 270).

In a theoretically grounded empirical study, Eijkman (2010) describes Web 2.0 as a "disruptor of traditional academic power-knowledge arrangements" (page 173) and finds the use of Wikipedia to be a "divisive issue amongst academics, particularly in the soft sciences" (page 173), although the majority – of 137 academics in Australian universities – are at least cautious users and recognise a need to address the "disruptive effects that Web 2.0 has on the political economy of academic knowledge construction" (page 173). As well as accuracy (of information), debates about Wikipedia address form and process, and the "core premise of [the] paper is that the actual cause of any apprehension about Wikipedia lies at a deeper, epistemological level" (page 174).

Adopting a dialectic rather than dichotomous approach, and refusing to label "academics as conservative or progressive based on their approach to Wikipedia and Web 2.0", he finds that factors influencing their disposition

include and that both old and new have something to offer. Further, there are "no statistically significant relationships between attitudes to student use, their personal approaches to Wikipedia or Web 2.0 and variables such as gender, age, discipline, or even years of teaching experience" (pp.177-8). As one of the few pieces of research directly in line with the approach taken by this thesis, it is worth quoting its findings about disciplinary differences at length:

> Regarding respondents' views of the nature of knowledge, a factor analysis indicates two distinct epistemological groups. A significant difference exists between respondents from the “hard” and “soft” disciplines regarding ideas about the social construction of knowledge. Hard sciences (e.g. engineering, IT, business, economics, sciences) tend to have more of an absolute concept of knowledge ($t(42.373) = -2.675$, $p < 0.025$ for the social factor, and $t(84) = 3.431$, $p < 0.01$ for the absolute factor) when compared to the “soft” sciences (e.g. arts, education, humanities, languages), which tend to have a social constructivist view. At the same time, there was no significant relationship between the concept of knowledge as being socially constructed (using the factor for social) and general attitude towards Wikipedia (Kendall's Tau-b (88) = 0.057, p > 0:05). However, and contrary to expectations, responses to an earlier question indicated that the “hard” sciences viewed Wikipedia significantly more positively than the “soft” sciences (on removal of one outlier the correlation was even stronger: $r(79) = 0.499$, $p < 0.001$.

Examining social media within research lifecycles, the Research Information Network (2010, page 8) found, in a set of interviews, case studies, and a survey involving 1308 UK academics, that

> Overall, there is little evidence at present to suggest that web 2.0 will prompt in the short or medium term the kinds of radical changes in scholarly communications advocated by the open research community. Web 2.0 services are currently being used as

> supplements to established channels, rather than a replacement for them. While a small number of researchers are making frequent and innovative use of web 2.0 tools, the majority use them only sporadically, or not at all. There is relatively little hostility to new mechanisms, and some of those who use web 2.0 tools only occasionally nevertheless express considerable enthusiasm for change. But for most researchers the established channels of information exchange work well; and, critically, they are entrenched within the systems for evaluating and rewarding researchers for their work".

As with Eijkman's study, the authors find that "the influence of age and position is more complex" and "the differences are not nearly so marked as some have assumed" (page 19). Although they provide only illustrative statistics, these findings are also worth quoting at length:

> [F]frequency of use of the kinds of web 2.0 tools associated with producing, sharing and commenting on scholarly content is positively associated with older age groups, at least up to age 65, and more senior positions. The propensity for frequent use is highest among the 35-44 age group and lowest among those under 25; and highest among research assistants and lowest among PhD students. Again, however, it is important not to over-emphasise the differences […] differences between the age-groups from 25 to 64 are relatively small. There are also discipline effects. [R]espondents in computing science and mathematics are disproportionately represented among frequent users; while researchers in the medical and life sciences are relatively under-represented, along with those in social sciences, arts and humanities (Eijkman, 2008, page 22).

This further confirms the multiple and unpredictable influences acting upon academic attitudes and practises, the utility of both old *and* new technologies and processes, and the need for a nuanced methodology for their study. Simplistic models of academic communities and practises, and basic methods

of attitude capture used in support of rhetorical, unexplored assumptions are not sufficient for research wishing to fully address the complex shifts brought about by new media.

CONCLUSIONS

Research on new media and digital media in UK HE with a focus on academic attitudes, rather than the attitudes of students, is not particularly common. Some useful empirical work exists, as does work providing a wider contextual framework informative to attitudinal studies; for example, papers in information science or organisational studies which refer to influencing academics' perspectives in service of particular aims, or in line with particular epistemologies. In general, work on new media and academics focuses on behaviour and systemic development, with attitude being a secondary concern where it is one. While addressing conceptual or cognitive issues is not always relevant, and is dependent on the nature and purpose of research, concentrating only on generic issues of application and embedding – for instance, teaching students with new media, their utility in scholarly research 'lifecycles', and how to develop ancillary services or policies around them – can limit discussions and analyses which deviate from the norm.

Studies describing academics found to be sceptical about new media are far less evident than in previous decades. Scepticism or critical distinctions, when they are discussed, are treated as less defensible or justifiable than in earlier work which acknowledged and examined the diversity in behaviour and attitudes among researchers when adapting to the "electronic era", and "disciplinary-rooted differences" (Herman, 2001b, page 431); for example, "the psychological and philosophical reservations which may be at the root of humanists' tendency to view computers and computer-aided research differently than their counterparts in the sciences or social sciences" (page 435) and the different learning styles and methods of instruction required as a result of both this and distinctions of content, style and interpretation such as a reliance on printed text and linguistic nuance (Saule, 1992, page 3).

Notably, there is no significant discourse or body of work on *attitudes* to new media in academia, specifically, when considering them as something other than behavioural predictors, and as distinct from pre-ordained outcomes (for instance, increasing 'democratic' participation or improving the digital literacy of staff and students). When attitudes *are* addressed, questions are often conflated with concerns around a lack of engagement or trust – what Murray and Pérez (2014, page 85) call "foot-dragging", and increased uptake or promotion of particular pedagogical models, research strategies or behaviours (Hall and Elliott, 2003; Research Information Network, 2011; Murray and Pérez, 2014; Rhema and Miliszewska, 2014).

In both information science and the humanities, and whether considering abstract or formal systems, somewhat normative views emerge concerning how new media should be understood and used within Higher Education; chiefly, to strengthen collaborative research (Research Information Network, 2011), assist productivity (Massy and Wilger, 1998; Rogers, 2001; Hall and Elliott, 2003), and better engage with students (Saklofske, Clements and Cunningham, 2013). Although concerns and critical questions are raised around theory, implementation and social factors affecting use (Dutton and Loader, 2004; Aarseth, 2004; Kukulska-Hulme, 2012b), academic new media are largely discussed in positive (and at times rhetorical) terms. In general, they appear to represent a beneficial (though at times difficult to implement and control) paradigm shift.

Close reading, and reading across disciplinary groups, allows scrutiny of *why* authors adopt particular points of view. Within discussions of policy and governance, for example, works critiquing aspects of a politicised and biased digital agenda stand out. In the humanities, terminology and meanings tend to be more contentious than overt politics. Such debates may be seen to represent a sub-textual defence of academic territories and methods; in particular, humanities scholars working toward the development of the digital humanities, and sub-communities within eScience, such as those advocating grid technologies for the computation of large datasets. Writing on new media

and academia which discusses management, marketing, and the methods used to encourage staff to adhere to the particular policies governing their use of new and social media offer insights into the attitudes of staff toward technological change.

A belief in the benefits of digital services and technologies underpins academic writing, which may be as much anecdotal as empirical and which may explain a drift away from the consideration of attitudes (in particular sceptical or pragmatic ones) when compared with previous decades. The definition of what is useful career-wise may impose negative value judgements on older or other ways of working. For example, the Research Information Network undertook a series of case studies in the Physical Sciences, finding that,

> These technological advancements are part of a positive feedback loop: as collaboration-enhancing technologies advance, scientists engage in more cross-institution sharing and international collaboration, which in turn creates demands for newer, more efficient, and larger scale technologies to support collaborative research. Rather than spending a career becoming an expert in the quirks and anomalies of particular datasets, scientists are able to access more data and more easily compare it to other datasets to advance their scientific research. It is not yet clear what this means for career trajectories and the evolving roles of scientific team members, but new opportunities are likely to become available for scientists skilled at large-scale data analysis – *Research Information Network, 2011, page 88.*

Earlier studies of academics and technology in the 1990s, when networked computing, the internet, and email were genuine novelties in the academic workplace, tended to give more consideration to disciplinary and other contextual distinctions affecting use and attitude – different perspectives on how useful new technologies actually were in relation to the aims and traditions of a field, were treated less dismissively. Many case studies on attitudes to new and social media consider how they can be utilised to meet

the similarly pre-supposed needs of digitally literate students and of staff who (if not early adopters or innovators) must run to catch up. This is particularly so with literature from education studies and administration studies, but also within media and communication studies and to some extent information science.

Uptake, usage and acceptance are predominant concerns rather than any explicit critical perspective. While epistemologies and paradigm shifts are often discussed it is generally in other fields that critiques of new media in the academy or new media more generally are located. Studies are often viewpoint or position pieces that might feed into policy design, at an analytical remove from the agendas informing them. It is not possible to find clear research to use as a guide in terms of the theory or methodology most suitable for this thesis, necessitating a fresh and interdisciplinary approach. The interdisciplinary literature reviews above, and the emergence of themes around terminology, rhetoric, and socio-cultural understandings of what new media are justify the choice of semantic differentials as a primary data gathering tool. Between the lines of much Information Science research on new media and new technologies are discourses of potentially huge significance to understanding disciplinary communities in higher education.

Both common themes and a gap in literature on new media and academia are evident when considering Information Science and Education Studies. Other than explorations of the digital humanities, much work on new media which is abstract, descriptive or philosophical is not yet integrated into the field. Further, much recent work is undermined by the role played by a particular ideological, technologically-determinist and managerialist agenda dictating in advance what the affordances of new media are or should be, even those which aspire to ethnography.

While accommodating some critical and philosophical perspectives the most common sentiment appears to be that new media are essential. Being more advanced and beneficial than previous technologies and enabling new methods, academics and universities must learn how best to understand and

make use of them to meet the demands of their students, funders, and the government. Problems discussed are generally ones concerning implementation and the development of new pedagogical models (Stern and Willits, 2011; Sarachan and Reinson, 2011). Social media rather than new media are the primary focus of this discourse, which positions them as standard bearers of a new epoch for HE and for pedagogy. Little reference is made to the needs of specific disciplines or communities of practise.

Figure 3 below shows the structures most commonly discussed in the literature in relation to universities, academic disciplines and new technologies (of which new media are a subset) relevant to this thesis. These are vital contextual elements, refining and extending the illustration previously provided in Figure 1, which was devised prior to detailed analysis. A Venn or Euler style diagram has been used to show that elements are not always entirely separate and that relationships (even when hierarchical) are subject to change. Structures and meanings are maintained and negotiated through processes that are informed by both internal and external agents and agendas. Politics and political agendas (at international, national and institutional levels) inevitably influence discipline characteristics and attitudes within them – whether common or more radical ones.

The practises, communication methods and audiences important to a discipline emerge at the intersection of discipline (as structure, supporting epistemological traditions and group cohesion) and discursive formation (as a series of participatory processes and preferences, expressed and encoded in styles, genres and methods). Demographic factors are ever present although they are less well discussed in literature on disciplinary cultures. Certainly, they are important parts of the power structures that shape and maintain discursive traditions and academic hierarchies; for instance, they are observable in the distinction between Professor and student, and both formalised and implicit measures of acceptance into a field of study or research. All of these intersect with attitudes to new media in that part of the university where an academic is based.

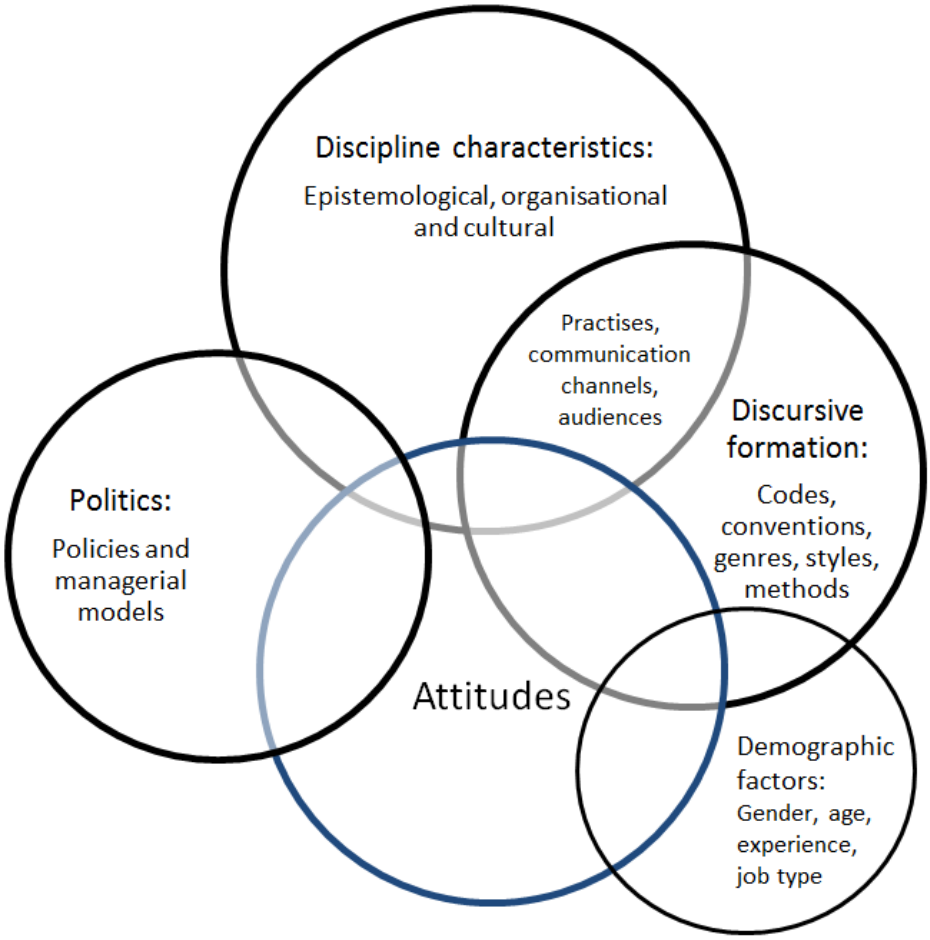

Figure 3 - Relationships between the structures and processes that influence academic perceptions of new media.

Structural influences on academics' perceptions of new media	Key literature	Supporting literature
Discipline characteristics	Bourdieu (1988) Foucault (1970) Whitley (2000)	Abbott (2001) Dervin (1999, 2003) Lattuca (2001) Knudsen (2011) Talja and Fry (2007)
Discursive formations	Bourdieu (1988) Fleck (1936) Lave and Wenger (1990) Whitley (2000) Talja, Tuominen and Savolainen (2004)	Abbott (2001) Bazerman (2009) Fagan (2009) Hjørland and Sejer Christensen (2002) Sterne (2005) Hessels and van Lente (2008) Miller (2001)

		Nowotny, Scott and Gibbons (1999) Woolgar and Coopmans (2006)
Politics	Bourdieu (1988) Deem, Hillyard and Reed (2007) Gläser et al. (2011) Lascoumes and Le Gales (2008) Lips, Taylor and Bannister (2005) Thornton (2009) Smith, Lewis and Massey (2000)	Aarseth (2004) Giddens (1984) Adema (2012) Blustain (2008) Borgman (2010) Department for Business, Innovation and Skills (2014a, 2014b). Dunleavy, Bastlow and Tinkler (2014) Krull (2000) Tapsall (2001) Thornton (2007) Wouters and Beaulieu (2006)
Attitudes	Ajzen (1981) Forgras, Cooper and Crano (2011) Nardi and O'Day (1999a) Kaiser and Byrka (2013) Olsson (2010)	Becher and Trowler (2001) Blustain (2008) Czerniewicz and Brown (2012) Dunleavy, Bastlow and Tinkler (2014) Rieger (2010) Rijnsoever, Hessels and Vandeberg (2008) Saule (1992)
Demographics	Lerman and Cellini (2009) Tsui and Gutek (1999)	Scott (1979) Lave and Wenger (1990) Becher and Trowler (2001) Lattuca (2001) Miller (2001) Borgman (2010) Weller (2011)

Table 1 – Key and supporting literature informing the areas identified in Figure 3 above

CHAPTER THREE: METHODOLOGY AND RESEARCH PHILOSOPHY

In this chapter, the key theories informing the thesis and its empirical research are described. Partly because of a shift toward interdisciplinary research and partly because of the interdisciplinary nature of new media, a range of approaches are relevant. Accordingly, both structuralism and post-structuralist understandings of academia, attitudes and technology are included, with a combination of qualitative and quantitative methods found to be essential. Interdisciplinary approaches are extremely relevant and are used to inform both data gathering instruments and analysis of the resultant statistics. Nevertheless, the theoretical base remains rooted in work from information science (or social informatics) which accommodates enquiry into social and context-dependent processes of enculturation and meaning-making.

Nardi and O'Day's concept of an information ecology (1999b) provides a useful starting point for the study of attitudes because it allows us to contextualise academics, their epistemologies, technologies, and points of view without becoming reliant on a particular interpretation. At the same time, organisational theories of academic disciplines – here, that proposed by Whitley (2000) – provides a means for selection, measurement and comparison. A link between the metaphor of a dynamic ecosystem and the more rigid map of academic organisation is provided by Dervin's writing on the communication flows and dialogues that take place between communities to create meaning (Dervin, 2003).

Competing and complementary theories of attitude as a psychological, social but measurable construct are considered, alongside discussions of how attitude and behaviour may relate in a way which is axiomatic rather than causal. This includes Ajzen's theory of planned behaviour (Ajzen, 1981) and Kaiser and Byrka's understanding of risk (Kaiser and Byrka, 2013), with a simpler approach found adequate for the purposes of the thesis. Finally, the methods and instruments used for sampling from the population of UK academics are described and justified.

INTERDISCIPLINARY COMMUNICATINGS

Within information science, new media can be studied from many theoretical standpoints employing multiple methodologies and methods: through empirical analyses using cognitive and neuropsychological techniques (Vorderer, Klimmt and Ritterfeld, 2004; Holsanova, 2010; Hughes, Rowe, Batey and Lee, 2012; Blachnio, Przepiórka and Rudnicka, 2013; Kalyanaraman and Sundar, 2013); through qualitative and ethnographic studies of information behaviours and activities (Howard, 2002; Goggins, 2011); using theories drawn from business science, such as innovation (Rogers, 2003) and change management (AntonSon and Wendels, 2009); or through the development of concepts such as the "Information Ecology" (Nardi and O'Day, 1999b) and "Media Archaeology" (Huhtamo, 1997, Huhtamo and Parikka, 2011), the latter of which combines media and communication studies with historical (and, in a Foucauldian sense) archaeological approaches.

Although grounded in information science, the thesis is multidisciplinary in that discourses and literature from multiple fields are directly informative of its methodology. In part this is because it considers attitudes toward and understandings of new media within and across largely distinct disciplines. In order to do this, as when addressing interdisciplinary artefacts such as media, research cannot be limited to only one epistemological perspective. By asking questions that have no fixed epistemological or discipline-specific foundation, the research enacts elements of "synthetic interdisciplinarity" and "conceptual interdisciplinarity" (Lattuca, 2002). In the first of these, "problems which sit at the interstices between fields" are explored using methods and data associated with different disciplinary traditions (page 91). In the latter, research includes "issues and questions without a compelling interdisciplinary basis" which may imply "a critique of disciplinary understandings" (page 84).

The need for such an approach became evident when researching new media, which are analysed and written about from almost every academic (and commercial, and populist) stance. Established models tailored to a limited number of fields do not have sufficient explanatory power to address all of

these. A variety of background literatures, methods and ways of understanding are required for both the examination of disciplinary norms within universities as systems of knowledge production, and the attitudes of the social beings working within them. The approach to the literature is perhaps more akin to work conducted in the humanities (or digital humanities). By way of explanation, Resnick's summary (Resnick, 2012) of multi- and interdisciplinarity is useful:

> Multidisciplinary research is bringing disciplines together to talk about issues from each of their perspectives. They may collaborate, but they maintain a separation of their disciplines in that process. When the project is done, those disciplines go back to where they came from to start other projects. Interdisciplinary is bringing those same folks together in the same way, but using that expertise to create new instruments, models, approaches that couldn't occur if they were separately handled.

Central to the thesis is the notion that academics' engagement with new media relates to – but is not wholly dependent upon – the epistemological, socio-political and communicative characteristics or constructs that typify the disciplines wherein they work. Theories and models used to support this assumption are organisational theories of academic disciplines, and socio-cultural writing on the same topic. The typology devised by Whitley (2000) to describe the sciences, and its extension by Fry and Talja (2007) to include the arts and humanities, is used as a normative framework. Theories supporting the conceptualisation and measurement of attitude as a cognitive (as well as a social) construct, allow us to critically interrogate that framework. This approach is anchored by a combination of perspectives derived from post-structuralism, social constructionism and systems theory. These do not necessarily conflict and at times supplement each other; they can be treated as a dialogue or conversation.

While the research does not directly examine *processes* of attitude formation or meaning making, Dervin's (2003) "mandate" for a reform to the theoretical

and methodological foundations of information and communication science is highly informative. For her, the concept of difference is vital to the field; yet difference, as she points out, is often fundamentally misunderstood – from the theoretical level downwards – thus, in the manner of a misapplied syntax, it becomes misleading in application. Instead she proposes:

> What is important about difference across time is that it begins to force us to attend to difference as fundamental, not as noun but as verb, as differencing. In doing that we can begin to genuinely capitalize on the study of communication […] because difference makes a difference in communication; difference makes differences come into existence in communication; differences rigidify in communication; differences are bridged in communication; and differences are destroyed in communication. Likewise, structures that attempt to homogenize difference as well as those that attempt to display it come into existence in communication; maintain, rigidify, and disappear, in communication. Homogenizing and differencing are reconceptualised as communicatings (Dervin, 2003, page 107).

Post-structuralist thought, to which Dervin's work is linked (Olsson, 2010, page 276), acknowledges multiple points or areas of association between attributes, values and perceptions; although situated and "anchored in materiality", meanings "soar through space-time" (Dervin, 1997, page 730). Knowledge and information are socially constructed (i.e. the result of social processes such as the negotiation of meaning), hence they continuously, and gradually, transform (Olsson, 2010, Liu, 2013). Further, simplified presumptions of causality do not always reveal what has contributed to a given event, attitude, or phenomenon, or why it is significant to a group or individual.

Theoretical frameworks and methods used to examine difference – including those of this thesis – must not assume that the differences they reveal constitute fixed, objective statements of truth. Systems (like disciplines) alter in accordance with our outlook and its historical a priori. Similarly, the

behaviours and attitudes of individuals communicating and engaging with technologies, media, and information are located in specific social and technical environments, which are nevertheless mutable. Studying them with accuracy means acknowledging that our observations may not have longevity, or may be differently interpreted.

INFORMATION ECOLOGIES

Although often used to support an arguably too "neutral" variety of systems theory, environmental metaphors are helpful when studying organisations and need not exclude post-structuralist perspectives (Goddard, 2014, page 331). Dervin (1997, page 32) notes her own refusal "to be cowed by the polarized arguments of either the more post-modern contextualists who see nothing but tyranny in systematization, or the more modern contextualists who see nothing but chaos in a fully implemented contextualism", identifying the " 'in-between' " as an "appropriate position".

In theoretical "information ecologies" (Nardi and O'Day, 1999a; Malhotra, 2002*;* Treré, 2012), a series of multi-layered processes involving mediated artefacts, groups, and individual cognitive processes (Egenström 2002) give rise to "rich psychological interactions" (Rijken and Mulder, page 49) wherein "users, systems and hybrid forms influence each other reciprocally" (page 50). For Nardi and O'Day (1999b), the information ecology is: "A system of people, practices, values, and technologies, in a particular local environment". Users and their technologies "coexist" and "coevolve" (Treré, 2012, page 2361). External factors, including competitive and organisational pressures naturally influence this coevolution.

The changing model of Higher Education in developed countries, in which digital technologies are vital, reflects a deliberate and managed move toward a particular vision of how a university should operate socially, politically and economically (Carayannis and Formica, 2013). The modern University should integrate "a diversity of (partially competing) paradigms" (page 50), while seeking to become a "self-replicating" "innovation ecosystem" based on

competitiveness and the commodification of knowledge (page 49). Exemplars integrate their curricula with "advanced learning technology", alongside a "much greater purposeful socialization of staff, students and faculty" (Haltiner and Pall, 2013, page 241).

Technologies and media are not merely "simple instruments" or tools, but "political agents" (Treré, 2012, page 2362). They are the products of particular socio-economic and material circumstances and may be used in harmony with, or in subversion of, the agendas which gave rise to them. As Hand notes, "political power is increasingly played out in, and expressed through, digital network technologies" (2013, page 399) which "[provide] the possibility of undermining traditional political institutions, hierarchies, and power relations" (page 400), although they may also replicate and further entrench them, operating at "both poles of [a] machinic movement territorializing structure and anarchical distribution (Galloway, 2004, page 64).

Because it "unfolds in the course of action", the "implicit" arrangement and the patterns of interaction between those in an ecology (both users and systems) is "unpredictable". This is despite the more controlled and necessarily restrictive boundaries demarcated by its "explicit order" (i.e. the precise and managed arrangement of organisations and technologies) (Rijken and Mulder, 1996, page 50). With individual agency ever present, new situations cannot be designed per se but are instead "facilitated" by designers who provide the tools and the conditions by which new patterns of interaction or attitude can occur, something which both designers and users can take advantage of. Explicit structural limitations make "radical changes" "improbable", yet the perceptions and behaviours of individuals and groups "cannot be controlled or predicted beforehand" (page 60). Innovative uses of technology may be what a systems developer would term unanticipated "growth paths" influencing product development (Rijken and Mulder, page 51) or they may constitute deliberate political acts of disruptive "disobedience" (Jordan, 2002, page 120).

Returning to the central focus of this research, it begins to become clear that the attitudes of those within an information ecology or system are loaded with historical, cultural and political significance, which may or may not be evident to individuals (alone and in groups) when they think and act. Predispositions and evaluations are not just created by individual minds, but are guided or influenced by others, and the structures which attempt to contain them.

FLEXIBLE DEFINITIONS OF NEW MEDIA

New media's characteristics are as important as their contents in influencing how they will be incorporated into existing environments and how they will contribute to "new patterns of human association" (McLuhan, 1964, page 3). These characteristics are both physical and abstract and they are the source of intricate debate, occasioning both conflicting and complementary attributions. For instance, social media may be seen to encourage socialisation and communication, or to facilitate harassment and isolation (Schurgin O'Keeffe, Clarke-Pearson, and Council on Communications and Media, 2011, page 801; Turkle, 2011). Utilising various models of production and participation, they are developed in line with private, commercial concerns as often as they are public, consensual or democratic ones (Jenkins, 2007, pp.240-261), and at the same time as addressing "asymmetries of power, privilege and knowledge production", new media are a source of "gratification and entertainment" (Papacharissi, 2010).

Huhtamo, a 'Media Archaeologist', reminds us of "the cyclically recurring elements and motives underlying and guiding the development of media culture," and the ways in which "discursive traditions and formulations have been 'imprinted' on specific media machines and systems in different historical contexts, contributing to their identity in terms of socially and ideologically specific webs of signification" (Huhtamo, 1997). When proceeding with a study of new media and our perceptions and attitudes toward them, researchers must remain cognisant of such imprintings, patterns, and historical contingencies. Further, many new media or new media-based works combine old and new forms or ideas and are not

necessarily easy to theorise (Baudrillard, 1972); misleading assumptions and over-statement much be avoided, as must simplistic claims of linear progression.

Because of such scale and complexity, information scientists inevitably focus their research on specific tools, sites, services, user groups and behaviours when addressing the role of new media in universities, using a variety of field specific theories and models. They do not often enough adopt the post-modern perspectives advocated by theorists such as Dervin, despite a clear relevance to communication studies (McKechnie, Serantes and Hoffman, 2011). Adopting the wrong metatheoretical approach and ignoring the multiple discourses around both academia and new media may engender reductive and technologically determinist narratives which limit our understanding. This further underlines the need for some inclusion of interdisciplinarity methods and modes.

Authors in many fields propose that new theories are required to fully understand new media. Bolter (2001), writing about new media studies in the humanities, points to a divide between existing theory and practise. He suggests,

> What we need is a hybrid, a fusion of the critical stance of cultural theory with the constructive attitude of the visual designer. This new media critic that we are imagining wants to make something, but what she wants to make will lead her viewers or readers to re-evaluate their formal and cultural assumptions – page 30.

While accepting that any model of what comprises social reality (for instance, the dual nature of structure and agency) might be critiqued (cf. Giddens, 1984; Archer, 1995; King, 2009), this thesis accepts that structure and agency interact in important ways. Relativist frameworks and models provide a method for mapping and comparison which need not exclude understandings of fluctuation, dialogue and subjectivity. As Fagan (2009), writing in another context, puts it, "normative accounts" are required for the philosophy of

science – but they must be both useful ones, and ones which can be "interrogated" to enable effective critique academic practise, because "epistemic norms" are constructed *through* practise. A "critical epistemology" requires a framework capable of explicating both implicit and "idealized" norms" (Fagan, 2009, page 1) about scientific (or any other) disciplines.

THE CLASSIFICATION OF ACADEMIC DISCIPLINES

Academic disciplines possess particular organisational, social and communicative characteristics that allow us to discriminate between them and position them in relation to one another (Foucault, 1970; Abbott, 2001; Whitley, 2000). These characteristics support disciplinary epistemologies (i.e. the nature of knowledge produced and fundamental assumptions about that knowledge) and are expressed in the acceptance and use of particular analytical methods and techniques and the mechanisms allowing work to be validated, accepted and shared. In simple terms, the assumptions and procedures of medical science and medical scientists are distinct from those of geographers or social scientists.

Formed around particular questions, concerns and lines of enquiry, common materials, symbols and terminologies are defined and appropriated by those working on certain topics. Particular "genres" emerge and are taken possession of by groups and subgroups of scholars, helping them to solidify their identities (Nystrand, 1982). Accordingly, genre-specific modes and channels are devised allowing group members to discuss problems and findings in ways deemed useful. Stated public goals help delineate the audiences for whom work is intended and the expected purposes to which it will be put (Hine, 2006; Gläser et al. in Whitley, Gläser and Engwall, 2010).

A combination of pre-established consensuses, and debates rooted in the conditions of a field's emergence, dictate and guide the orchestration of disciplines (Bourdieu, 1988; Foucault, 1970; Leistye, Ender and de Boer, 2010). The individual academics aggregated by a discipline will – to greater and lesser extents – agree about what is appropriate to their enquiries, and how to adapt

to changing policies and agendas which may pressure them to move in particular directions (De Boer, Enders and Leistye, page 35). This means that academic fields can, in theory, be classified according to a broadly shared set of core attitudes, behaviours and competencies as much as by epistemological fundamentals or methods. As with other types of community, boundaries must be actively maintained. Organisational and administrative criteria delineate the complex organisational and cultural relationships of academia and academics.

Established, familiar categories following the dominant Anglo-American model have been well maintained institutionally by most modern universities (Abbott, 2001, page 122). They provide an administrative and analytical utility which is vital to how most European and American universities are organised, how they function, how they contribute to public discourse, how they "reproduce" their internal logic (Bourdieu, 1988, page 15) and how they maintain "the relative separation of disciplinary cultural lineages" (Abbott, 2001, page 148). Fringe areas will themselves possess a core and a periphery, reproducing according to the underlying social structure of established 'source' fields in a process that Abbott (2001) terms "institutional cloning" (page 129). At the same time, "interdisciplinary discourses can become themselves a new academic territory or a new discipline engaged in turf battles with competing and affected disciplines" (Krishnan, 2009, pp.24-25).

Typological discipline characteristics are then prescriptive but mutable rule-sets for the orientation of academic discourses. They contain within them the potential for unexpected and technically controlled transformations. Any analysis utilising the notion of epistemic norms must recognise the socio-cultural and cognitive influences which give rise to normativity and to seeming objectivity within knowledge systems which inform and are informed by the internal interactions of members of the group. It must also recognise that academics of *all* disciplines can be seen as a particular community, distinct from those of other professions; scholars *across* fields possess many shared or similar values, principles, modes, thought-styles and ways of working. As

"knowledge workers" (Garnham, 2002, page, 266) they are subject to a broadly equivalent set of public and private pressures, governed and dictated to by increasingly homogenous managerial instruments that may not take account of subtler discipline-based distinctions (Gläser et al. 2011, page 291).

THEORETICAL FRAMEWORK USED FOR EMPIRICAL DATA GATHERING

The undeniably structured and deliberate arrangement of institutions and academic disciplines provides a framework for understanding and classifying the objects and subjects of our study – new media, academia and academics – even while accepting their mutability. In *The Intellectual and Social Organization of the Sciences*, Whitley (2000) classifies and positions both the super- and sub-fields of science in relation to one another along certain proposed dimensions. This work is used as both the theoretical framework of the thesis and a sampling frame for gathering primary, empirical data. In it, two master variables – task uncertainty and mutual dependence, sub-divide onto two axes. Task uncertainty contains technical uncertainty and strategic uncertainty; mutual dependence contains functional dependence and strategic dependence.

Mutual dependence refers to the extent to which researchers pursuing projects in a field must utilise the research ideas, procedures, methods and results of colleagues, demonstrating its usefulness to their own areas of investigation via common standards of assessment (functional dependence). It also refers to the extent to which co-ordination with colleagues is essential not just to the pursuit and execution of the research but to how it might influence the development of particular work programmes and agendas in "reputational organisations" (strategic dependence) (page 90). In other words, to what extent does the research address "collective intellectual goals", engendering "material rewards" such as "access to resources"? (pp.87-88). High levels of strategic dependence imply at least a fairly high level of

functional dependence., however they "vary relatively independently of each other within certain limits" thus can be considered separately (page 90).[4]

Task uncertainty refers to how easily a researcher is able to proceed with the identification of appropriate methodologies, methods and techniques by following standardised, established rules and guidelines familiar to those working in his or her field, in order to pursue his or her research; to what extent are the instruments and machinery that will be used obvious, predictable and documented? If task uncertainty is low, the interpretation of results and the assignation of value and utility will also be somewhat predictable (technical uncertainty). For Whitley, this also implies the degree of stability of whatever is being studied (phenomena or raw materials) and the "fluidity of the problems posed" (page 122). This might be seen as a measure of convention within a field or discipline, with implications for the amount of strategic task uncertainty – i.e. the formation of goals based on the assignment of priority to particular problems, which may be more or less subject to change and debate in the eyes of "possible publics" (page 123).

In brief, disciplines can be assigned generalised positions at the high or low ends of each of these axes and their sub-divisions (or somewhere in between); the relationships between the four vary and are interdependent to varying degrees. Disciplines can thus be ordered according to their location in each dimensional space, allowing their organisational and reputational characteristics to be studied in relative terms and over time.

Disciplines with diverse characteristics and from relatively distinct positions within Whitley's typology were identified for strategic, purposive sampling. This would allow a representative sample to be obtained (given a sufficient response rate), containing an adequate range of academic perspectives. At the

[4] High mutual dependence means that the procedures, results and topics of a researcher's project are closely and directly interconnected with those of colleagues. There is little personal autonomy or independence for the typical researcher in such a field.

same time as acknowledging that not all disciplines could be included, some were chosen to align more closely with the aims of the thesis (i.e. art and design, as particularly distinct from the sciences, and computing science, given the focus of the thesis on new media). Not all of these are directly assigned a positon by Whitley, although he does reference each area to greater and lesser extents. Those selected are shown in Table 1 below:

Positions on Whitley's axes: **Mutual Dependence** (Functional dependence/ Strategic dependence) **Task Uncertainty** (Technical task uncertainty/Strategic task uncertainty)	Field	Organisational Characteristics
Low/Low High/High	Art and design	Most closely resembles a fragmented adhocracy; to some extent unstable
High/Low Low/High	Computing science	Most closely resembles a professional adhocracy
High/Low Medium/Low	Healthcare sciences (includes Dentistry, Medicine and Health Science)	Most closely resembles a technologically integrated bureaucracy; elements of professional adhocracy
Medium/Low Medium/High	Politics and International Relations	Combines elements of a fragmented adhocracy and a polycentric oligarchy

Table 2- The academic fields (each representative of a discipline) chosen for primary data gathering, classified using Whitley's typological characteristics.

Of these, Whitley positions only politics directly (page 159); the location of arts and design can be inferred rather clearly from his general description of both

"fragmented adhocracies" (page 158), and of the humanities (page 99), to which they most closely correspond.

To elaborate: art and design has low levels of functional and strategic dependence in that practitioners working in one area are not dependent on the techniques, results or aims of those in others to make meaningful contributions. The discipline is extremely diverse, with fields including fine art, product design and computational art, each one of which may be contributed to by those outside the academy. In the sciences, fields and sub-fields tightly incorporate findings and techniques from a core or 'parent' field and are more heavily controlled and formalised in their aims, methods and explanations; concepts such as verification and replicability are intrinsic. Likewise, there is a wider and less clearly defined audience for art and design products or ideas than for the sciences, where those likely to be interested in findings and able to incorporate them are reasonably limited, their problems and procedures being more "esoteric" than "exoteric" (Whitley, 2000, page 159). A broader range (or exploration) of methods, styles, concepts and theories are permitted in sub-fields of the arts than in the sciences.

The position of politics is more mixed. Although some fields or areas of enquiry are central to the discipline and thus more influential (for instance, political economy), the work of those in other areas (such as critical global politics) is not by necessity dependent on these to make meaningful contributions. There is some standardisation of methods and techniques and some amount of agreement about findings can generally be expected. At the same time there may be much diversity on these measures. Disputes over meaning or value are valid; for instance, in the analysis of political events or the consequences of policies on those affected by them. Likewise, the "hierarchy of problems" and the "significance of research topics" (Whitley, 2000, page 123) is to some extent uncertain; relevance and value to the public is generally evident but there is uncertainty about the intellectual goals and ideals of the discipline and what it is most important to address (page 123).

Whitley mentions medical fields in relation to professional organisations outside the university yet seems to find difficulty placing it within his framework (page 20). Healthcare science is thus both a problematic and highly relevant area to include here, not least given Whitley's assertion that HE is itself becoming "a type of professional work organization" (page 19). Talja and Fry (2007) observe of nursing science that, "in the same way as its adjacent fields, medicine and health science, specialties within [it] differ", however "it is established as a distinct reputational organisation where research efforts are to some degree coordinated" (page 7). Accordingly, health science is assigned the same position here.

Although he does not mention computing science directly, it is heavily implied by his description of "artificial intelligence"[5]:

> A similar diversity of audiences and goals but with a stronger core of technical expertise [than in biomedical fields] is artificial intelligence. Here, a common reliance on large computers and elaborate programming skills provides the basis for organizational boundaries and identity which are reproduced through international conferences and journals. However, the varied goals pursued, and frequent changes in them, means that distinct sub-groups form around different problems and topics […] with growing commercial relevance (Whitley, 2000, page 191).

Further, he sees the increase in computational methods and logics as symptomatic of changes occurring in disciplines and their organisation in HE (page xvii, page 277), making them another interesting example clearly of direct relevance to this thesis.

[5] Initially published in 1984, it is likely that what he referred to then as AI is what has now become established as computing science in the university ecosystem.

Given that fields can be positioned relatively within Whitley's proposed dimensions, 'medium' has been included where this reflects a more accurate characterisation of the field under consideration, particularly in comparison to humanities subjects, which he does not closely consider. Never absolute, they reflect a particular interpretation of the work of Whitley, incorporating Fry and Talja's extension of his model (Fry and Talja, 2007). There, the authors extrapolated from his variables to categorise academic "case studies in relation to one another based on the presence of qualitative indicators such as a hierarchy of problems, establishment of standard research techniques, degree of consensus over methods, presence of an influential lay audience, and integrative collaborative work" (page 8), in a study of academic use of digital resources. While acknowledging that this framework may itself be scrutinised, it nevertheless provides a useful and coherent frame. Further, as Whitley notes, "fields with the highest degree of task uncertainty are perhaps found in the humanities and social sciences" (page 127).

Historically, there are correlations between many variables. For instance, there is something of a proportional relationship between the level of strategic uncertainty and the variety of the audience for whom a subject's outputs and results are relevant. When audience diversity increases so does strategic uncertainty, largely due to an increased heterogeneity of findings and end products; lay audiences are more significant here and there is greater room for interpretation of results. Similarly, when there is a greater rigidity of problem formulation and description, the audience variety will be lesser than in disciplines with more flexible problem definitions. In terms of the "reputational control of employers' goals and policies", academic science generally has a high level of public goals, a high level of reputational criteria and personnel policies, and a high to medium level of governance by a reputational elite (page 243).

Although discussing dependencies between fields in relation to the changing perceptions and management of science and knowledge production over time, Whitley does not directly address interdisciplinarity or the role of ICTs.

An examination of contemporary attitudes in relation to his work is therefore useful, not least when considering the relationship between disciplinary rigidity and control, the technical mechanisms used to co-ordinate task outcomes (page 87) and the extent of "permissible novelty" (page 120) within a field. While his categorisation does not necessarily capture the complex dynamics between research and technology or "account well for contemporary multidisciplinary or transdisciplinary alliances"; nevertheless, it provides a coherent and "powerful" way to understand and compare academic fields of enquiry (Fry and Talja, 2007, page 17).

OTHER ASPECTS OF WHITLEY'S TYPOLOGY: ORGANISATIONAL STRUCTURE AND CONTEXT

Whitley (2000) further develops his typology to describe, at a broader level, organisational aspects of disciplines distinct from the characteristics outlined in his primary classification system, but which are related to them. Somewhat political in nature, these organisational characteristics and important contextual features can also be treated loosely as variables, or at least, as organising principles developed over time and expressed differently in different fields. These include hierarchy, formality of control, conflict, performance standards, and audience composition (Whitley, 2000, page 169, page 239). Naturally they are associated with levels of uncertainty and dependence; in particular, audience composition, which relates to external as well as internal issues around how a field functions in relation to others in both its discipline and elsewhere.

Some disciplines are seen by Whitley to be "fragmented adhocracies" which "have some difficulties in excluding amateurs" from making competent contributions; these are positioned in contrast to "technologically integrated bureaucratic" disciplines, typified by strict rules of governance, control, and only a few serious audiences (pp. 159-161). The former group are (in theory) those which are high in task uncertainty and low in functional dependence. These categories have been tested, employed, and found to be analytically

valid means by which to explore the dynamic compositions and structures that typify processes and patterns of innovation and control within Universities (Braun, 2011; Engwall, 1996; Knudsen, 2011, Engwall and Danell, 2011).

Several of Whitley's other terms will be employed in the analysis, primarily because they can be related closely to discourses around new media genres, interdisciplinarity, and the agendas and policies shaping the management and administration of Higher Education. Falling under the parent category of Organisational Structure, these are Problem Formulations and Descriptive Terms, Specialisation and Standardisation, Impersonality and Formality, Audience Variety and Audience Equivalence. The seven major types of political and hierarchical scientific field identified by Whitley (with an eighth type being unstable) are also referred to and can be described as follows:

1. *Fragmented adhocracy* – producing diffuse, discursive knowledge of common sense objects. Functional and strategic dependence: low. Technical and strategic task uncertainty: high. Problem formulation and description: low. Specialisation and standardisation of tasks and materials: low. Impersonality and formality of control procedures: low. Audience variety and audience equivalence: high.
2. *Polycentric oligarchy* – producing diffuse, locally co-ordinated knowledge. Functional dependence: low. Strategic dependence: high. Technical and strategic task uncertainty: high. Problem formulation and description: low. Specialisation and standardisation of tasks and materials: low. Impersonality and formality of control procedures: low. Audience variety: high. Audience equivalence: medium.
3. *Partitioned bureaucracy* – producing both analytical, specific knowledge and ambiguous, empirical knowledge. Functional dependence: low. Strategic dependence: high. Technical uncertainty: high. Strategic uncertainty: low. Problem formulation and description: high in core low in periphery. Specialisation and standardisation of tasks and materials: high in core and medium in periphery. Impersonality and formality of control procedures: high in core and

medium in periphery. Audience variety: medium. Audience equivalence: low.

4. *Professional adhocracy* – producing empirical, specific knowledge. Functional dependence: high. Strategic dependence: low. Technical uncertainty: low. Strategic task uncertainty: high. Problem formulation and description: medium. Specialisation and standardisation of tasks and materials: high. Impersonality and formality of control procedures: high. Audience variety: high. Audience equivalence: medium.
5. *Polycentric profession* – producing specific theoretically co-ordinated knowledge. Functional and strategic dependence: high. Technical uncertainty: low. Strategic task uncertainty: high. Problem formulation and description: high. Specialisation and standardisation of tasks and materials: high. Impersonality and formality of control procedures: high. Audience variety: medium. Audience equivalence: medium.
6. *Technologically integrated bureaucracy* – producing empirical, specific knowledge. Functional dependence: high. Strategic dependence: low. Technical and strategic task uncertainty: low. Problem formulation and description: high. Specialisation and standardisation of tasks and materials: high. Impersonality and formality of control procedures: high. Audience variety: low. Audience equivalence: medium.
7. *Conceptually integrated bureaucracy* – producing specific, theoretically oriented knowledge. Functional and strategic dependence: high. Technical and strategic task uncertainty: low. Problem formulation and description: high. Specialisation and standardisation of tasks and materials: high. Impersonality and formality of control procedures: high. Audience variety and audience equivalence: low.
8. *Unstable* – Low levels of functional and strategic dependence. High technical and low strategic task uncertainty. The other typological characteristics are, by logical extension, unstable.

The extent to which these organisational criteria are analytically useful for research into disciplinary cultures and new media is discussed in relation to the primary data gathered for the thesis, with conformities and deviations identified and discussed.

RESEARCH APPROACH: ATTITUDINAL STUDY

Following the literature review described above, and the formulation of a methodology which incorporates structured and post-structuralist approaches, it was decided that the study of *attitude* – a psychological construct that can be associated with both individual psychology and learned, collective processes of meaning-making – would be appropriate and illuminating. The key concepts and assumptions underlying *attitude* and methods used to capture and study them are now explained.

ATTITUDES AS PSYCHOLOGICAL AND SOCIAL CONSTRUCTS

Rhetoric around new media has been vital to their growing importance in the university, yet attitudes to new media are rarely at present considered in depth. Research into their role within academia typically focuses on use, behaviour, and the incorporation or instrumentalisation of technologies within research and teaching environments, although individual and group behaviours are intrinsically linked with symbolic mental processes and attitudes. Models such as the technology acceptance model (TAM) and the task–technology fit model (TTF) go some way to addressing this, examining how users think about and utilise new technologies. These markedly privilege behaviour and task outcomes however (Dishaw and Strong, 1999). The omission of various relevant factors means that results using these models tend to be unclear (Legris, Ingham and Collerette, 2001) and they may lack the predictive power for which they strive (Chuttur, 2009, page 11).

Intersecting with material and socio-economic factors, attitudes are not innate responses to an attitude object but are learned value judgements which "cannot be separated from [their] socio-cultural context" (Ornek 2011, page 241). Although it is generally accepted that they influence the behaviours

which create and maintain "social structures and systems" (Forgras, Cooper and Crano, 2011, pp. 3-5), the precise nature of this relationship is unclear (Schuman and Johnson, 1976; Kaiser and Byrka, 2013). Naturally, social structures and systems themselves influence attitudes, hence the interaction is symbiotic. In a further complication, discrepancies frequently exist between a stated attitude, a behavioural *intention*, and a person's ultimate behaviour (Gruber and Schlegelmilch, 2013). These may be a function of the level of risk involved in a certain activity (Kaiser and Byrka, 2013) – for instance, the extent to which it challenges norms – or a result of "neutralisation techniques" and "internalized processing structures" which make these inconsistencies "acceptable" (Gruber and Schlegelmilch, 2013, page 13).

Kaiser and Byrka note that "because people often say one thing and do another, social psychologists have [largely] abandoned the idea of a simple or axiomatic connection between attitude and behavior" (page 351) Building on the work of Campbell, who proposed that "verbal claims and other overt behaviors regarding an attitude object all arise from one behavioral disposition", they describe a paradigm for attitude research wherein "individual behavior [is] a function of a person's attitude level and the costs of the specific behavior involved". They suggest a "formal and thus axiomatic rather than causal relationship between an attitude and its corresponding performances" (page 351).

The theory of reasoned action developed by Fishbein and Ajzen (1975), and its extension – the theory of planned behavior (Ajzen, 1981) – separates attitude from behaviour and attempts to model attitude and behavioural *intention* as predictors of behaviour. The analysis of intention, the inclusion of "subjective norms" (primarily, the social acceptability of a behaviour) as a factor, and a recognition that actuality differs from perception, allows a deeper analysis of the role played by attitude and its influence on action. These theories were "born largely out of frustration with traditional attitude–behavior research, much of which found weak correlations between attitude measures and

performance of volitional behaviors" (Hale, Householder and Greene, 2003, p. 259).

These, to varying extents, are "deliberative processing models", which assume an underlying volitional control and a continuum between intention and behaviour which is in some contexts overly simplistic (Conner and Armitage, 2006, page 1430-32). Although acknowledging social influences and normative pressures, they attribute a great amount of agency and control to individuals, who are privileged over group and cultural forces as the conscious determiners of behaviours and attitudes. This must be contextualised by the recognition that social meaning enfolds agency. As Olsson, following Savolainen writes, information scientists addressing "sense-making" should "develop a more holistic approach: one that looks beyond the active [information] seeking of individuals to consider sense-making as a complex and ongoing process, one involving bodies and emotions, as well as language and intellect, both the product and the creator of a social (discursive) environment" (2010, page 273).

Giddens' (1997) theory of structure and agency, which conceives of society and social action as an ontological dualism, describes "the fundamentally recursive character of social life, and expresses the mutual dependence of structure and agency" (page 69). Power and values are created and embedded by the interaction of systems and individuals. While the cognitive schemes that people use to guide their behaviours are informed by the explicit and implicit knowledge held in both the conscious and unconscious mind, social structures with a deep historical rootedness are the medium shaping them. Structures are reproduced through "continuous flows" of human action and the interpretation of rules across space and time. As King (2009, page 262) explains,

> Society consists, in the first instance, of individuals, whose agency and consciousness must be recognized. However, collectively, the actions of individual produce social phenomena which are not reducible to the individual. Social reality has emergent properties: institutions, for

> instance, pre-exist and have determination over individuals even though these institutions could not exist without the individuals of which they are comprised. Society is, consequently, dependent upon the actions of beliefs of individuals but not firmly reducible to them.

The validity of this theory can be contested (King, 2006, page 266). However, the interaction of structure and agency as understood by Giddens and a diverse range of "major figures" (page 261) moves us usefully beyond *only* systems theory or notions of volitional control, as does his proposal that social systems can and should be challenged and transformed; rules can be interpreted and modified to suit the needs of individuals and groups, or to overcome contradictions (Giddens, 1997, page 61).

More prosaically, attitudes are further moderated by a range of subjective and demographic factors, including "dispositional differences" between individual personalities (Caccioppo et al., 1996) or between groups, with demographic variables such as age, gender, institutional background, and level of experience playing a potential role (Elias, Smith and Barney, 2011; University of Tennessee and CIBER Research Ltd., 2013, pp.41-51). Intrinsic and extrinsic motivators such as levels of personal motivation, enjoyment, and the extent of reward expectation affect participation and engagement (Cho and Perry, 2011). Stated attitudes may very when an individual is alone, as opposed to when part of a group (Rhodewalt and Peterson, 2010). They may also differ in virtual environments as opposed to in real ones (Blascovich and McColl, 2010). As the result of a new experience, a new affective response (for instance, a feeling of empathy), or deliberate processes of persuasion orchestrated by others (Forgras, Cooper and Crano, 2010), attitudes may change.

The study of attitudes is thus a difficult and imperfect science. Attitudinal research is conducted in multiple fields, using multiple methods. Common methodological issues include the psychometric validity of scales of measurement (Owings et al., 2013) and the influence of question wording upon participant responses. Although the tool used in this research to measure attitude derives from clinical psychiatry, attempts are not made to

contribute to debates around the fundamental nature of attitudes as physiological, psychological or social phenomena, or with the extent to which attitudes correlate to behaviour. Rather, attitude is used here as a descriptive and relativistic concept, with reference being made to the social, cultural and organisational structures which influence attitudes (in their own right, rather than predictors of behaviour) in an academic environment.

Setting aside scientific or philosophical debates, attitudes exist and can be expressed, hence they can be captured and analysed, whatever their origins. The primary data gathering tool selected and constructed for empirical research was a semantic differential chart, a technique for attitude measurement derived from clinical psychiatry. This is described in detail in the following chapter.

PARAMETERS AND LIMITATIONS OF THE THEORETICAL FRAME

Rather than drawing on the work of a particular theorist or theory, the research employs an exploratory mixed methodology, combining its analyses of empirical attitudinal data with understandings and approaches derived from literatures beyond as well as within information science, although social informatics remains at its core. A major part of the research was the elucidation and testing of a mixed methodology for data gathering and analysis which takes account of important contextual factors such as the economic, socio-cultural and political influences affecting not only how new media are discussed in academic discourse, but how they are positioned in actuality. To some extent this approach constitutes a form of interdisciplinarity where disciplinary boundaries are linked together or transgressed.

This is problematic for those preferring that work be rooted by a singular, established theory or school of thought; yet none were identified that would serve the aims of this thesis, being either too polemical, narrow or differently focused. For example, while certainly relevant – in particular for its separation of behaviour and attitude, and the notion that "people form attitudes and

intentions toward trying to learn to use the new technology prior to initiating efforts directed at using" (Bagozzi, Davis and Warshaw 1992), the Technology Acceptance Model (Davis, 1989) is too particular in its focus on formal modelling and its application to system design. To take another example, Feenberg's Critical Theory of Technology (Feenberg, 2005) is useful in its inclusion of critical theory and the priority given to context and power structures, but is too politically biased, advocating that digital technologies be tools for democracy.

These and various other theories or discourses are considered within the literature reviews and were informative of data gathering instruments centred on concepts and semantics. In this way, a detached (or less biased) interpretation of findings is sought which accommodates particular critical or theoretical perspectives on new media, digital technologies and universities. Similarly, both structural and post-structural understandings are included and referred to without being wholly subscribed to; rather, they are found to complement each other.

Finally, although behaviour and attitude are interlinked in a complex combination of symbolic, mental processes and physical activities, (Kaiser and Byrka, 2013), the primary focus of this research is on attitude rather than on behaviour. This is discussed further below (pp.29-37). Similarly, although there is naturally a symbiotic relationship between them, our focus is on the role of common external structures and factors rather than on individual psychology, biology or internal conditions as these affect attitudes. In light of this, the instruments used for primary data gathering capture but do not explain attitudes and are best suited to group-level comparisons and the identification of commonalities rather than singularities. Attitudinal data are analysed in accordance with established methods including tests for correlation, variance of rankings, and factor analysis however the full analysis presented by the thesis resists charges of positivism or technological determinism, acknowledging the limitations and assumptions of statistical procedures as a form of interpretivism.

CHAPTER FOUR: RESEARCH METHODS

This chapter describes the methods used for gathering and analysing original, empirical data following the formulation of the methodology described above, at a high level. Further details of the analyses conducted, and the results, are provided in subsequent chapters.

Prior to finalising the instruments to be used for gathering a representative sample of data on a UK-wide basis, a small empirical data gathering exercise was undertaken. This was exploratory in nature; its purpose was to test the sampling frame, the assumptions underlying it, and to discuss with academics the discipline-based practises and terminology around new media – derived from both the literature and their own cognitive processes and experiences – face to face, ascertaining their strength of feeling and possible relationships to ideological constructs. Eight academics in four disciplines were selected using the sampling frame shown in Table 1 above. The individuals taking part were located conveniently in nearby universities and were recruited via face-to-face invitations, email invitations, or via intermediaries (colleagues).[6]

Although modest, this first phase directly informed the refinement of data gathering instruments in advance of wider sampling and brought into focus some of the findings of the initial literature review. Accordingly, a different combination of methods was used for data gathering and analysis than was used for the main data gathering exercise, as indicated in the descriptions below. Qualitative data were gathered from participants to supplement the quantitative data provided via questionnaire answers. Phase one consisted of three distinct but inter-linked strands, carefully sequenced in order to gather as rich a dataset as possible, despite its limited size.

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[6] The first empirical data gathering exercise was conducted between April and May of 2012.

Data gathering tools utilised were intended to provide flexibility, depth, and (in the case of phase one) to give participants the opportunity to convey subtleties of thought and attitudinal perspective. These were:

- Paired, semi-structured interviews – generally considered useful for gathering an increased quantity of recorded information from diverse perspectives.
- A closed-format questionnaire, with 20 statements about discipline characteristics listed in the form of Likert items.
- A writing exercise intended to capture 'top-of-the-mind' associations made with new media, and instances of new media.
- A semantic differential chart. This last instrument involves application of a method derived from clinical psychiatry and widely used in its simpler form, which measures attitude via adjective pairs.

Analytical methods employed initially were transcript analysis, thematic coding, and (latterly) the generation and comparison of illustrative, descriptive and inferential statistics. Data was captured through digital audio recording (in the case of interviews) and on paper (the self-administered questionnaires and the writing exercise). Audio recordings were subsequently transcribed into Microsoft Word documents.

Only the second and fourth data gathering instruments listed above were employed in the main data gathering exercise. Descriptive and inferential statistics were generated for analysis based on data captured. This supported an exploration of the relationships between variables, triangulated with key findings from the literature. These analyses contributed to an assessment of the methodology and methods of the thesis.

A self-administered questionnaire was employed as the main data gathering tool. Data was captured through web-forms located on an externally hosted server as part of an online survey software-as-a-service package (Surveygizmo). Reports generated via the service were downloaded as PDFs as

was the raw data, imported subsequently into SPSS22 and SPSS23 as .sav files for statistical analysis. This, and the results are described in Chapter Six.

DATA GATHERING INSTRUMENTS AND ACTIVITIES

Academics taking part in all data gathering activities provided data in a variety of ways, as previously noted. All were presented with the same definitions of new media, tested initially during the first empirical data gathering exercise. These are now detailed.

DEFINITIONS OF NEW MEDIA SUGGESTED TO PARTICIPANTS

Prior to each session (or presentation of the online questionnaire) participants/respondents were given some possible definitions of new media to consider and were informed that no fixed definition was being employed. To avoid biasing responses and supporting inclusiveness, they were not encouraged to adopt a particular view on what new media are; definitions including and also going beyond those commonly used to describe "social media" were provided and were referenced in the interview and discussion. Instruments were deployed within a paired interview session; each strand within those is elaborated below. The definitions given were as follows:

1) Artworks that use multimedia, computers, or communication technologies in creative expression.
2) A general term covering non-traditional ways of delivering advertising or promotion messages, anything from text messaging to the Internet.
3) A generic term for the many different forms of electronic communication that are made possible through the use of computer technology. The term is in relation to "old" media forms, such as print newspapers and magazines, which are static representations of text and graphics.
4) Technologies, such as the Internet, that blur the line between media sources and create new opportunities for the dissemination of news and other information.

5) Some combination of universal access to simple publishing tools (meaning anyone can ‘publish' content), and powerful social bookmarking and aggregation services.
6) A new communication medium that, like the sky in relation to prior transportation media (water and ground), bridges the mutually incompatible characteristics of prior communications media.

Found to be useful to participants, and a good way of stimulating initial understanding and points of view, these definitions were retained for use in the main data gathering exercise. Further and full details of information given to participants is provided in Appendix III.

LIKERT SCALES

Following directly after these definitions, a series of questions about discipline characteristics were posed. These allowed the capture and analysis of belief statements addressing the organisation, culture, work methods and tooling of distinct disciplinary communities, giving some measure of the systemic structures of the information ecology wherein attitudes and beliefs are located, as well as of the attitudes themselves. Twenty statements were provided, with response options positioned on a simple Likert scale ranging from "Strongly Agree" to "Strongly Disagree". Questions were informed by a close reading of Whitley (2000), Whitley, Gläser and Engwall (2010), and Nowotny et al. (2002) as well as other literature on the organisation of knowledge and technology in Higher Education.

During phase one of empirical data gathering activity, informal observations on agreement and differences between participant pairs (and latterly, between pairs and literature on academic disciplinary cultures) were made possible by hearing them discuss answers as they proceeded with the exercise. A discussion (although not necessarily a consensus formation) between participants was central to their decisions regarding where to position answers. Questions were as follows:

1. Keeping up to date with technology is generally important in my discipline
2. In my view, keeping up to date with technology should be considered more important in my discipline
3. In general, the knowledge produced by my discipline is primarily useful only to it
4. In my discipline, there are strong hierarchies governing its organisation and the priorities of its academics
5. The general goals of myself and peers in my discipline are well understood and broadly aligned
6. My discipline is strongly influenced by what might be called a "reputational elite"
7. In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs
8. In my discipline, there is usually a broad consensus about methods and techniques
9. Interdisciplinary work is generally important to my discipline
10. The audience that my discipline shares its work with is generally varied and diverse
11. When appropriate, work carried out in my discipline is generally visible to the public
12. In my view, work carried out in my discipline should be more visible to the public, when appropriate
13. When appropriate, work carried out in my discipline is generally visible to the private sector
14. In my view, work carried out in my discipline should be more visible to the private sector, when appropriate
15. In my discipline, it is generally easy to get work recognised by one's immediate peer group (e.g. by departmental colleagues and your university)

16. In my discipline, it is generally easy to get work recognised by a wider peer group
17. A variety of views and understandings from outside my discipline is useful to my process and practises
18. I feel it is important to take part in informal collaborations and activities with academics from within my discipline
19. In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged
20. I feel it is important to take part in informal collaborations and activities with academics from other disciplines

As well as providing data, these questions/discussions guided participants into a reflective frame of mind whereby they began to think about the importance of both structure and context – in particular work environment and discipline characteristics – as influences upon how reputations, methods and technologies are positioned and used in their field and how that might then relate to attitudes toward new media. Likewise, they were devised to counter-act simplistic views on why the research was concerned with new media and what "new media" might mean in such a context.

Questions asked about discipline were modified following analysis of the first phase of data gathering, as is explained further in Chapter Five below. Clearly, the discussion was an element *not* retained in the online data gathering instrument.

WRITING EXERCISE

Participants were asked to think about "new media" and "old media" as part of a writing/thinking exercise wherein they wrote down terms or concepts (primarily nouns and adjectives) which they associated with each category. One sheet of paper was headed "new media" and a second "old media". Large coloured marker pens were provided to encourage a sense of creativity. As well as providing specific instances from the participants' personal new media vocabularies or (as discussions around word choice unfolded) cognitive maps,

the exercise allowed a space for discussions around the problems of definition and classification.

After the writing exercise, nine follow up questions were asked. These addressed why participants position new media objects or concepts in a certain way and how they make use of new media and other types of media within their research and teaching. Here, a "laddering" technique – as employed by Crudge and Johnson (2007) in their work with Repertory Grids – was used, allowing us to gain greater insights and depth of response. Enabling us to move a participant's response from the general down to the specific or from the specific up to the general, forcing them to engage more deeply with the answers they give. For example, here the questions make one downward move and then an upward move on the ladder:

Q5. If you had to give an example of something that for you embodies the concept of new media, what example would you give?

Why do you identify this so strongly as an example of new media?

Do you think there are problems in identifying typical features of new media?

These questions informed and enriched the subsequent task-based exercise, ensuring that participants were prepared to engage with various and at times abstract terminologies and concepts relating to new media. While an interesting activity, this was not replicated in any way within the online questionnaires used for the data gathering exercise, primarily due to insufficient resources and further, because of the different nature of the sample and attendant methods of analysis (i.e. inferential statistics).

SEMANTIC DIFFERENTIALS

The primary data gathering tool selected and constructed for empirical research was a semantic differential chart, employing a technique for attitude measurement derived from clinical psychiatry. Semantic differentials comprise a bi-polar numeric scale with potentially opposing adjectives positioned at either end. Despite debates on the topic (Sheshkin, 2003, page

3; Mu, Mauthe, Tyson and Cerqueria, 2012; Kostoulos, 2013), this is treated as an interval scale in most analyses of semantic differentials, as it is here, with the distance between positions considered to be equal. To do so has no negative consequence for this type of research, which is not concerned with assessing physical properties or assessing the effect of an intervention upon a population. Simply, it supports meaningful comparison of responses.

Supporting both qualitative and quantitative analysis then, semantic differentials give respondents an opportunity to convey subtle and potentially multi-dimensional attitudinal perspectives. The one used here contained paired adjectives found to be representative of multiple academic discourses on new media. These were chosen following a review of literature on new media from multiple fields in the social sciences and the humanities, including; information science, politics, philosophy, organisational studies, computing science, cultural studies and media studies. The general *concept* of 'new media' was rated, rather than individual instances.

Through these, differences and similarities in participants' attitudes toward new media can be identified at individual and group levels. In the case of the first phase of empirical data gathering, there was insufficient data to allow firm conclusions about the influence of discipline upon larger groups (i.e. there was not sufficient data for inferential statistics). Nonetheless, other types of analysis drew out potentially common and/or problematic understandings of new media, initiating further exploration. Observations were made on possible congruence and contradictions and in relation to Whitley's typology, allowing speculation on what might be found in the wider data gathering exercise. Further, terms which were less useful than others, and some which would be considered for inclusion, were identified.

Semantic differentials "permit comparisons of affective reactions on widely disparate things" (Heise, D.R., 1970). Following the tradition of "conceptualizing all knowledge as inherently perceptual" they offer "a bridge between perception and semantics" (Milin and Zdravkovic, 2011). They have been successfully used in a variety of academic fields – for instance to measure

changes in attitude as a result of mass media communication (Osgood, 1957, pp. 305-311). Scharf (1971) measured the attitudes of schoolchildren towards Mathematics while Sywack (1990) used them as the basis for a 13-year long study of library school students. More recently, they have been used within Business and Management Studies to examine the views of corporate tax students toward general business concepts (Guyette and Piotrowski, 2009) and to investigate brands as cultural symbols (Schaefer and Rotte, 2010).

Comprised of bi-polar adjective scales separated by a (usually numeric) interval of measurement, semantic differentials provide a way to measure and compare attitude toward a stimuli or construct and connotative meaning through a comparison and potentially a factor analysis of rankings. Participants are asked to position concepts – stimuli – on an interval scale in relation to a pair of "opposing" adjectives, revealing them (in theory and by extension) to lie along various distinct attitudinal "dimensions". These can be used to study "cultural and group differences" and "shifts and distortions of a basic attitudinal structure" as well as highlighting attitudinal variation and flux which "probably contributes to variations in behavior" at an individual level (Heise, page 250).

The units of measurement on the bi-polar numeric scale represent a continuum of intensity. As McCroskey, Prichard and Arnold (1964) note, "some people may hold "extreme neutral" attitudes […] and neutral responses to semantic differential scales may have different meanings for different subjects" hence the 0 point may be complicated analytically within some studies. Used to profile a person's attitude to certain concepts (or to compare the fundamentals of the concepts understood by culturally distinct groups) within clinical or social psychology, deeper evaluation of results on given dimensions – i.e. confirming whether data adheres to the standard distribution or arrangement of Osgood's traditional EPA (Evaluation, Potency, Activity) scales – was not the purpose of this study.

In general, the validity and reliability of semantic differential scales are satisfactory, with "correlation coefficients of approximately .80 between the

semantic differential ratings and Thurstone, Likert, and Guttman scales" and test-retest reliability of about .90 (Key, 2007). The 0 indicates a balanced midway point where the stimulus is perceived to be as much typified by the first term in the pair as the second. This leaves room for acknowledgement of the nuances involved in constructing real or apparent polar 'opposites'.

SEMANTIC DIFFERENTIAL CHARTS

For practical as well as methodological reasons, the generic construct "new media" was selected as the stimulus that would be rated in relation to adjective pairs. The 30 pairs selected for use in semantic differentials are listed below. An explanation of where these terms came from is provided in Appendix I: Notable Sources of some Key Terms Informing Empirical Data Gathering Exercises. Numbers shown are given here to indicate categories, as explained overleaf, and were not shown to participants.

In my view, new media are, in nature…

1. Private	3 2 1 0 1 2 3	Public
2. Elitist	3 2 1 0 1 2 3	Egalitarian
3. Corporatist	3 2 1 0 1 2 3	Civic
4. Deliberative	3 2 1 0 1 2 3	Participative
5. Subjective	3 2 1 0 1 2 3	Objective
6. Possessive-individualist	3 2 1 0 1 2 3	Developmental-democratic
7. Practical	3 2 1 0 1 2 3	Abstract
8. Normative	3 2 1 0 1 2 3	Atypical
9. Empowering	3 2 1 0 1 2 3	Enforcing
10. Symbolic	3 2 1 0 1 2 3	Literal
11. Inclusive	3 2 1 0 1 2 3	Exclusive
12. Facilitative	3 2 1 0 1 2 3	Interpretive
13. Material	3 2 1 0 1 2 3	Immaterial
14. Fixed	3 2 1 0 1 2 3	Fluid
15. Time-biased	3 2 1 0 1 2 3	Space-biased
16. Deterministic	3 2 1 0 1 2 3	Undetermined
17. Informative	3 2 1 0 1 2 3	Performative
18. Centralised	3 2 1 0 1 2 3	Decentralised
19. Top-down	3 2 1 0 1 2 3	Bottom-up
20. One-way	3 2 1 0 1 2 3	Two-way
21. Push	3 2 1 0 1 2 3	Pull
22. Agile	3 2 1 0 1 2 3	Rigid

23. Open	3 2 1 0 1 2 3	Closed
24. Free	3 2 1 0 1 2 3	Commercial
25. High definition	3 2 1 0 1 2 3	Low definition
26. Individually constructed knowledge	3 2 1 0 1 2 3	Socially constructed knowledge
27. Mental processes	3 2 1 0 1 2 3	Socio-cultural processes
28. Neutral	3 2 1 0 1 2 3	Partial
29. Emergent	3 2 1 0 1 2 3	Pre-defined
30. Restrictive	3 2 1 0 1 2 3	Transformative

Table 3 – The semantic differential pairs used for empirical data gathering, phase one

In order to encourage a recognition of diversity, and in an attempt not to steer or limit interpretation, respondents were instructed that although they might usefully structure their thoughts by thinking about particular instances of new media such as Facebook, Twitter or digital art installations, they should keep an open mind and respond to the stimuli of new media more generally. Likewise, the possible definitions provided prior were intended to guide participants into a reflective frame of mind that would counter-act simplistic views on why the research was concerned with new media and what "new media" might mean in any given context. Here, digital technology and social networks were referred to as well as new media, although not synonymously; rather, the invocation of those terms was intended to hint at contextual and individual variation.

For some of the analysis work in phase one, these pairs were divided into thematic categories, as part of an exploration of the genres and themes suggested by multidisciplinary literature of new media and how they may or may not to relate to discipline. These were as follows:

Thematic category	**Adjective pairs (constructs)**
Democratic characteristics	1-6
Symbolic relations	7-12
Materiality/time and space	13-17
Technical/Communicative mode	18-24
Fluidity/Knowledge type	25-30

Table 4 - Thematic categories used to group adjective pairs in phase one analysis

The semantic differential chart was adjusted and edited following analysis of the first phase of empirical data gathering, as described in Chapter Five below.

PARAMETERS AND LIMITATIONS OF THE DATA GATHERING METHODS

One limitation of the data gathering method used for the main data gathering activity is that it allows only quantitative attitudinal statements to be gathered to form a larger, representative sample of academics. This limits the complexity of the data gathered as it contains no original semantic or other content, reflecting attitudes only toward pre-determined terms set by the researcher, organised and controlled in a particular way. The negative implications of this were mitigated to a large extent by the flexibility of the instruments chosen and by careful interpretation of the data which was analysed in relation to discourses and literature as well as descriptive and inferential statistics. The limitations of working with primarily quantitative data remain, but are offset by the advantages of increased statistical power which supports techniques like factor analysis.

With all voluntary questionnaires, self-selection or coverage bias is a rather inevitable problem; those most interested in the substantive topic will tend to be those who respond, unless they are compelled to do so. In the case of an online questionnaire – particularly one constructed using a "list frame" of email addresses (Couper, 2000, page 467) – the related issue of what technology is required to participate presents more potential difficulties. In the context of this research, such problems are mitigated by the nature of the group being studied. Electronic communication is now a standard activity for UK academics (for instance, all will have an institutional email addresses and will use computers for at least some tasks).

Distributing a questionnaire using only online channels is thus less problematic than it would have been in previous decades, or were another group under consideration. A mismatch between the target and the frame population is unlikely as non-respondents cannot be said to be "systemically different" (Dever, Rafferty and Valliant, 2008, page 47) from respondents. Regardless of

other factors (such as age, gender or discipline) a UK academic is not a member of the "non-internet population" (page 48); certainly, not when in his or her professional environment.

DATA ANALYSIS METHODS

The focus of analysis was on assessing the extent to which, and the ways in which, disciplinary distinctions within academia can be used to explore, position and categorise attitudes toward new media. This was interpreted in relation to how academics perceive the organisational and cultural characteristics of their 'native' disciplines. Appropriate to the methodology and its incorporation of multiple perspectives, data gathered were analysed in a number of ways. Differences and overlaps in response sets within and between disciplines were assessed statistically and through thematic coding and transcript analysis of the interviews and activity sheets utilised in a first phase of empirical data gathering work. The characteristics most strongly associated with their discipline by participants, and the extent to which they agreed with one another about these and the characteristics of new media were examined. Further, data were triangulated for analysis and critique with findings from the literature review. The relationship of responses to the typology proposed by Whitley (2000) and its use as a sampling frame were assessed.

The results of the semantic differential exercises were compared between and across discipline pairs and in relation to other demographic factors. Statistical analysis was not undertaken for phase one due to the limited nature of the sample and the exploratory nature of the data gathering exercise. Adjective pairs can be grouped according to the topic and genre of literature from which they were derived. The ways in which new media are rated by academics, both in the semantic differential exercises and in writing exercises, are considered in relation to these groupings. Words and concepts were extracted from interview transcripts and writing exercises before being thematically coded, clustered and compared within and across groups.

PARAMETERS AND LIMITATIONS OF THE ANALYSIS

Much of the primary data gathered in the main data gathering exercise is non-parametric in nature (i.e. it has a non-normal distribution). Non-parametric data makes no assumptions about the shape or parameters of the probability distribution from which the sample was taken, or about the distribution of a particular variable within the population. The frequency distribution of observed values need not adhere to a bell-shaped curve and the mode, mean and median values need not be the same. Some of the more familiar inferential methods allowing us to generalise to a wider population are not particularly useful; for instance, "rather than quoting means and their confidence intervals, with non-parametric data, it may be considered more appropriate to present the median with confidence intervals" (Salter, 2006, page 1).

Calculating those intervals is not as straightforward as with parametric data and they are not as powerful statistically as are other location parameters – however, they can usefully be presented alongside box plots, medians and interquartile ranges as measures of dispersion or central tendency (Wildman and Hollingsworth, 2002, page 2). Hoskin (2008) summarises some of the disadvantages of non-parametric statistics:

> Although nonparametric tests have the very desirable property of making fewer assumptions about the distribution of measurements in the population from which we drew our sample, they have […] drawbacks. [One] is that they generally are less statistically powerful than the analogous parametric procedure when the data truly are approximately normal. Less powerful means that there is a smaller probability that the procedure will tell us that two variables are associated with each other when they in fact truly are associated. If you are planning a study and trying to determine how many [participants] to include, a nonparametric test will require a slightly

larger sample size to have the same power as the corresponding parametric test.

Data can be harder to interpret and less 'intuitive'. For example, the Kruskall-Wallis test supports useful conclusions and is similar to tests of variance, but it does not measure *true* variance (i.e. of raw values); instead, it is based on the variance of ranks (Lowry, 2013). Such issues are not a major problem as the research described here is concerned with the exploration of a hypothesis (i.e. that there is a correlation between attitude and discipline) rather than with the estimation of effects. Rather than implying "that such models completely lack parameters […] the number and nature of the parameters is flexible and not fixed in advance". This can be advantageous for exploratory research because a model "is not specified a priori but is instead determined from the data" (Salter, 2006, page 4).

As a location parameter, the properties of the median are more efficient than the mean in estimations of the population values that correspond to those of a sample for a wide range of atypical distributions (Sheskin, 2003, page 7). While under some conditions parametric tests are robust and *can* be applied to nonparametric data, avoiding measures of dispersion which could be misleading – in particular the mean (Kouiden, 2013) – and often unreliable data transformation techniques is ultimately beneficial. Acknowledging that the data does *not* adhere to a normal distribution enhances rather than detracts from the research, as long as the right methods of analysis are applied.

A limitation in terms of analysis is that meaningful analysis of particular demographic factors was not possible due to aspects of the sample. In some cases, only descriptive statistics can be provided. Although a test for variance by age was undertaken in relation to semantic differential responses, most respondents were within a limited age range. Because participants were classified according to age group (0-20; 21-30; 31-45; 45 and older) rather than only one value, exploring in greater detail how age may affect attitudes was not possible.

Partly because questions were designed to support anonymity, and partly because this was not the focus of the research, responses are not analysed in relation to geographic region or to institution type. This data was not gathered from respondents. The relationship of attitude to gender and frequency of social media use are however considered. Nonetheless, the focus of the research remains on *discipline* and attitude heterogeneity.

Due to resource and time constraints, interviews providing useful contextual information for individual responses (and pairs of responses) were only carried out during the *first* empirical data gathering exercise. Doing so on a larger scale would have undoubtedly enriched the dataset however the first exercise was differently focused and remained highly informative. Similarly, participants were asked to assess new media as a generic concept rather than to consider various individual instances of new media. Reasons for this included the risk of deterring respondents from completion of the questionnaire by presenting them with multiple charts, and the impracticality of analysing multiple (potentially thousands) of semantic differentials.

These limitations, being accounted for methodologically, do not undermine the study, contributing instead to the identification of areas for further research while the findings inform the development of the methodology and instruments described herein.

CHAPTER FIVE: EMPIRICAL DATA GATHERING ACTIVITIES: PHASE ONE

PARTICIPANT DEMOGRAPHICS

	Art and Design		Clinical Dentistry		Politics		Computing Science	
	P1	**P2**	**P1**	**P2**	**P1**	**P2**	**P1**	**P2**
Job title	Postgraduate Researcher	Postgraduate Researcher	Senior Lecturer	Trials Search coordinator	Principal Lecturer	Principal Lecturer	Senior Lecturer	Senior Lecturer
Age	40-50	31-40	41-50	31-40	55	51-60	51-60	41-50
Gender	Male	Male	Female	Female	Male	Male	Male	Female
Years in role	1-2	1	2-5	2-5	23	21-30	11-20	6-10
Years in academia	1-2	2-5	11-20	11-20	21-30	21-30	21-30	11-20
Job involves expertise in digital media	Yes	Yes	Yes	To some extent	To some extent	Yes	Yes	Yes
Job involves expertise in non-digital media	No	No	No	No	No	No	To some extent	No
Other specialist knowledge of new media	Yes	Yes	No	No	No	To some extent	No	No

Table 5 – Demographic information about the eight participants who took part in the first phase of empirical data gathering

DIFFERENCES BETWEEN PARTICIPANTS ATTITUDES TO NEW MEDIA, BY DISCIPLINE

Some variation between paired participants' responses to semantic differential items is evident, as are differences between the individuals in a pair[7]. This suggests disagreement both between and within the disciplines represented, as is shown rather clearly by the values and the summed totals of the positions selected on semantic differential charts.

Likert item (adjective pair)	Participant							
	Art&Design		Dentistry		Politics		CompSci	
	P1	P2	P3	P4	P5	P6	P7	P8
Private-Public	1	2	0	3	0	2	2	3
Elitist-Egalitarian	2	2	-1	2	0	2	1	2
Corporatist-Civic	0	2	1	2	0	2	-1	2
Deliberative-Participative	1	2	2	2	2	0	1	3
Subjective-Objective	-1	-2	1	-2	-2	0	-1	2
Possessive-individualist-Developmental-democratic	0	0	2	1	2	0	0	2
Practical-Abstract	-1	0	-2	-3	-2	0	-1	-1
Normative-Atypical	1	0	0	0	-2	0	1	-2
Empowering-Enforcing	-2	-2	-2	0	0	-1	0	-2
Symbolic-Literal	-3	-1	0	0	2	-1	2	0
Inclusive-Exclusive	-2	-2	0	-1	0	-1	1	-3
Facilitative-Interpretive	0	-1	-2	-2	-1	-2	-1	-3
Material-Immaterial	1	1	NR	-2	2	0	0	-2
Fixed-Fluid	2	2	3	3	2	2	2	3
Time-biased-Space-biased	-2	0	-2	0	-3	2	-1	0
Deterministic-Undetermined	0	1	1	1	2	0	-1	1
Informative-Performative	2	0	0	-2	0	0	-1	-3
Centralised-Decentralised	3	2	2	2	1	0	1	-3
Top-down-Bottom-up	1	2	1	2	2	2	1	-1
One-way-Two-way	3	2	1	2	3	0	1	2
Push-Pull	0	1	2	0	0	2	0	0
Agile-Rigid	-2	1	-1	-3	-3	2	-1	1
Open-Closed	-1	-1	-1	-3	0	-2	-2	-3
Free-Commercial	0	-2	2	0	0	-1	2	-3

[7] With large enough datasets, summed totals from semantic differential items can be used to model and analyse the spatial relations of attitudes toward a construct within and across groups. Here, totals have been summed in order to provide only a general comparison, allowing initial insights and observations based on a small, exploratory datset.

High-Definition-Low-Definition	0	0	NR	0	0	-2	-1	-1
Individually constructed knowledge-Socially constructed knowledge	-2	0	1	2	2	-2	1	2
Mental processes-Sociocultural processes	2	0	1	2	0	0	1	0
Neutral-Partial	1	1	1	2	0	0	1	0
Emergent-Pre-defined	-2	-1	-1	-2	-3	-2	0	-3
Restrictive-Transformative	2	2	1	2	1	1	0	2
Total	4	11	10	8	5	3	7	-5
Total Difference between pair	7		2		2		12	

Table 6 – Summed totals by category for participant responses to adjective pairs

Looking at the total difference between responses given by members of a pair, it is apparent that those in clinical dentistry (P3 and P4) and those in politics (P5 and P6) are most in agreement overall, being only two points apart in total. There is most divergence between the two participants working in computing science (P7 and P8) with twelve points of difference between them. Those in art and design are in between these, being seven points apart.

However, although the *intensity* of associations made with a concept varies within all pairs to some extent, the *directionality* of response tends to be the same, as indicated by the negative and positive signs. This is also true *across* groups. Participant pairs (and participants overall) tended to agree about whether new media are mostly one thing or another by a particular measure or characteristic, selecting a response on the same side of zero (or at zero) on the bi-directional scale. For example, no participant felt that new media are in general more private than they are.

An examination of the values selected for all Likert scale items shows that participant pair 1 (art and design) disagreed about direction (i.e. whether new media was more one thing or another) only once, participant pair 2 (clinical dentistry), twice, and participant pair 3 (politics) four times out of a possible

30. In contrast, participants in computing disagreed about directionality for 13 adjective pairs. The four radar (or 'spider') charts below illustrate this further[8].

Overall, there is a large amount of agreement between those based in art and design about what new media are and how strongly this is the case (Figure 4), with patterns on the radar often overlapping and values being close if not the same. This is also – and more markedly – the case with those in clinical dentistry (Figure 5). Likewise, participants in politics (Figure 6) disagree about only a few items, with some differences in the shape and direction of points on the chart. Those in computing science disagreed more often, thus their patterns diverge most.

Notably, the time that participants in this latter field spent considering, debating, and discussing the meaning of new media prior to the administration of the semantic differentials was shorter than the time spent by any of the other pairs (sessions lasted 1 hour 45 minutes, 2 hours, 1 hour 30 minutes and 1 hour 15 minutes, respectively) which may have contributed to the lack of consensus.

Crucially however, when looking at all four charts together, we get a sense of a largely similar response *between* groups, despite some clear points of distinction.

[8] For those unfamiliar with radar or 'spider' charts, a good overview can be found online: http://www.fusioncharts.com/chart-primers/radar-chart/

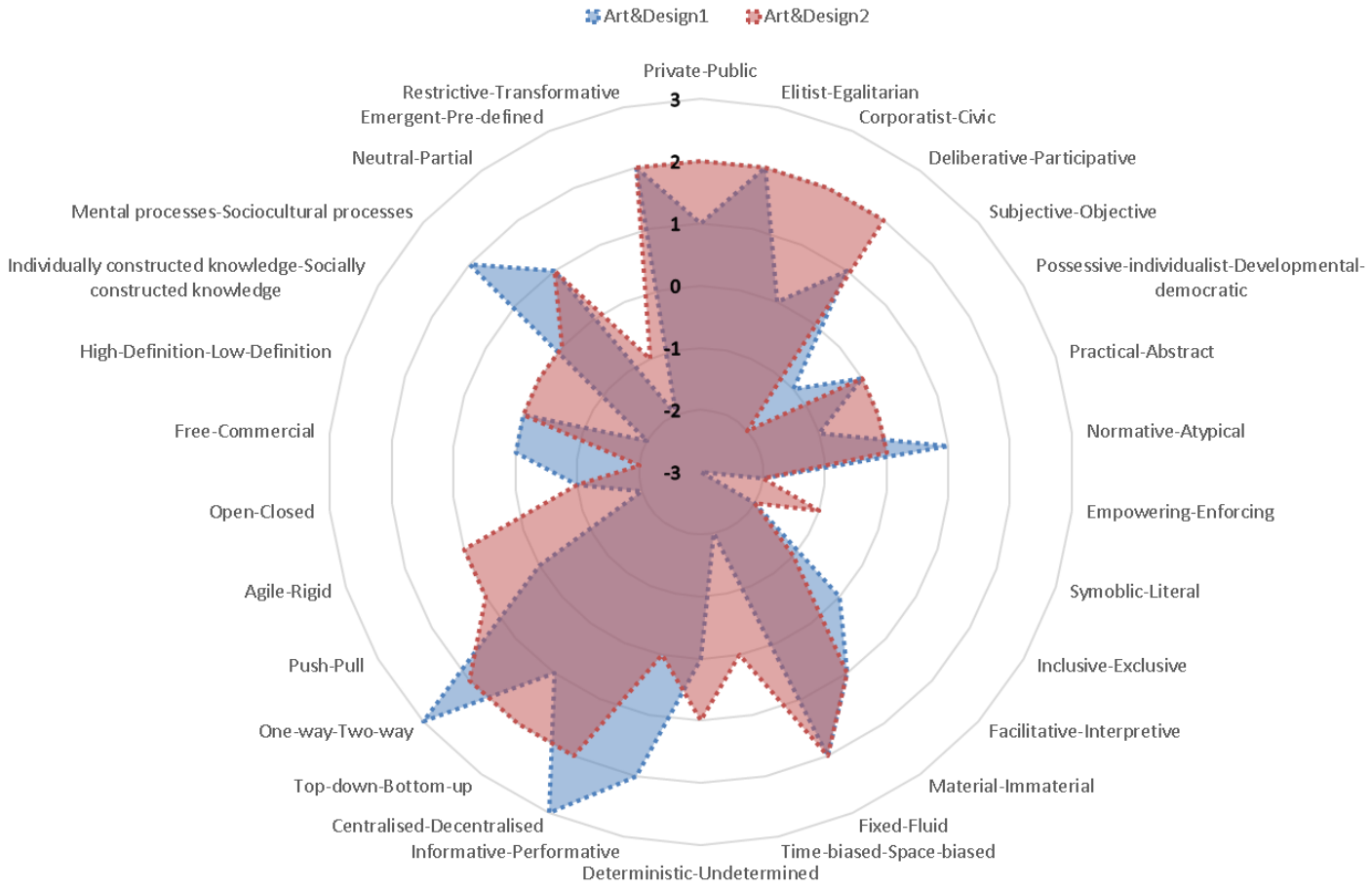


Figure 4 - Positions selected in response to semantic differential items by participants working in art and design

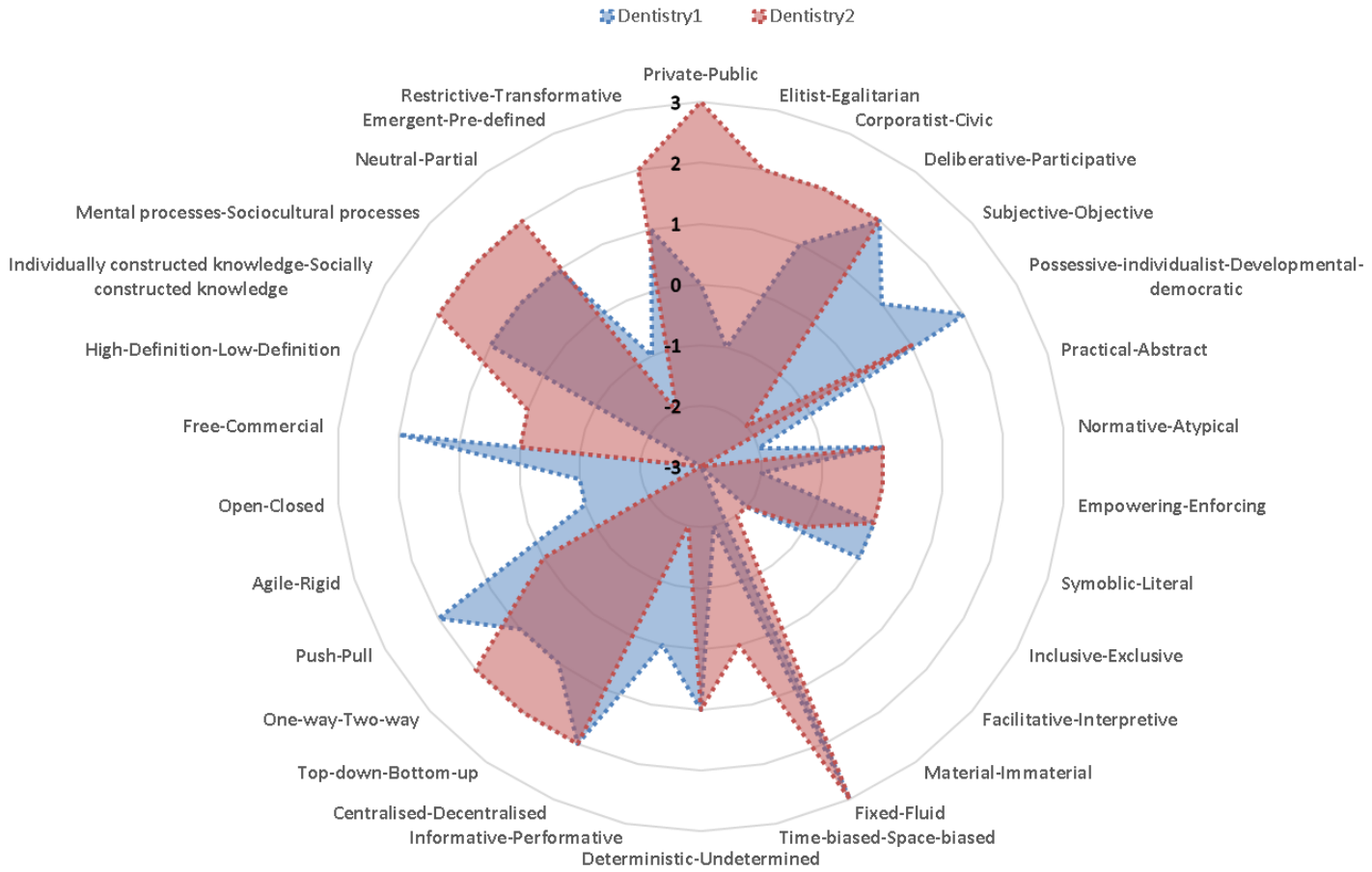


Figure 5 - Positions selected in response to semantic differential items by participants working in clinical dentistry

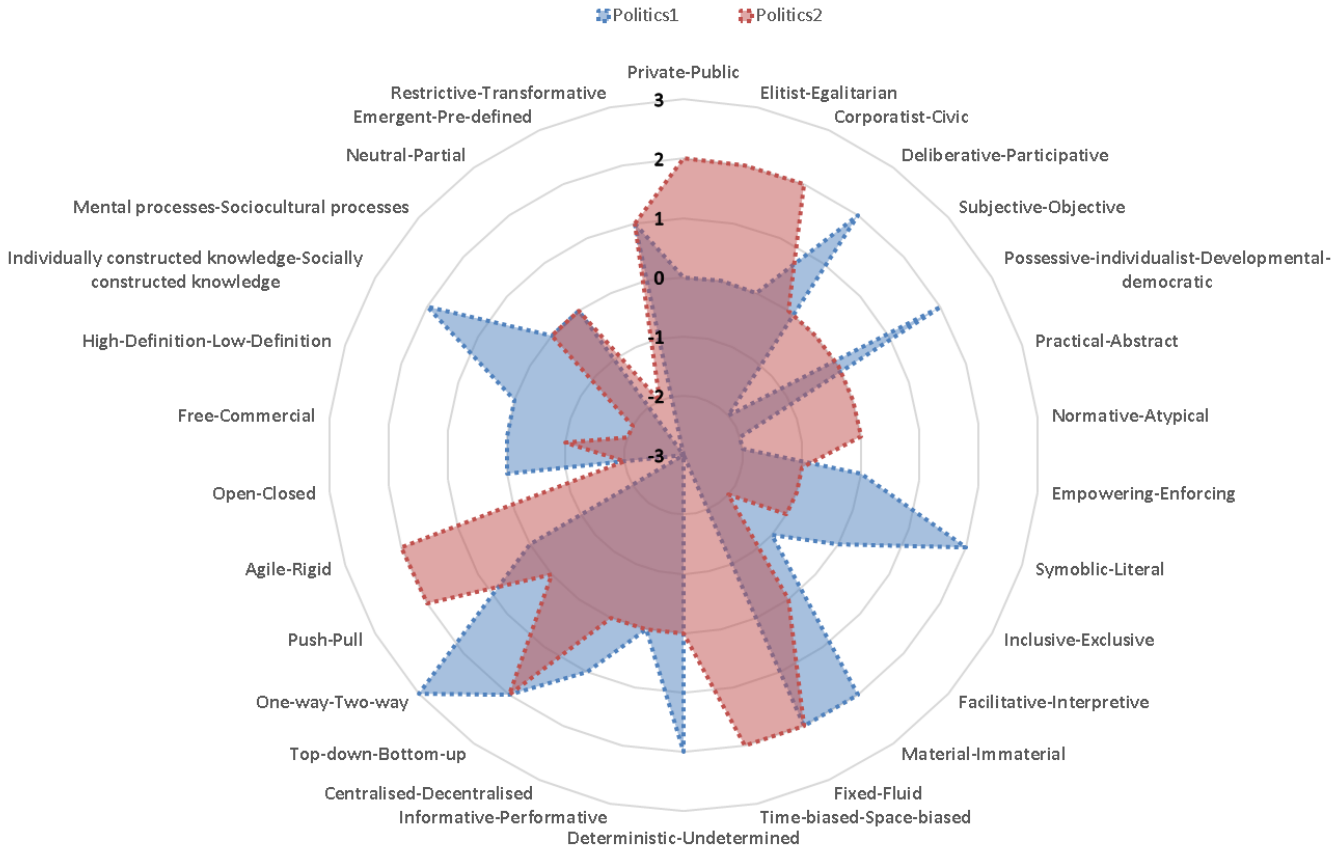


Figure 6 - Positions selected in response to semantic differential items by participants working in politics

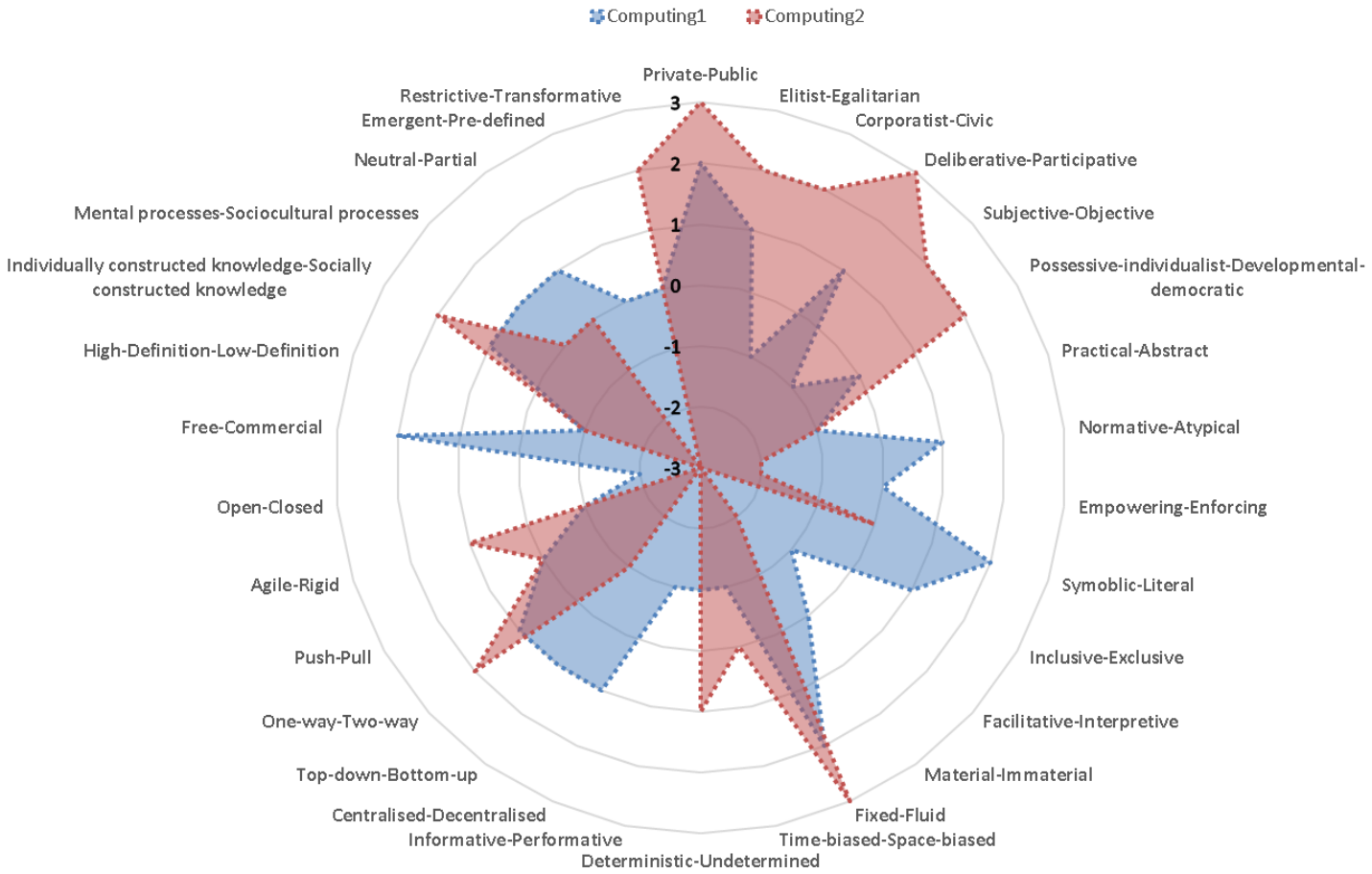


Figure 7 - Positions selected in response to semantic differential items by participants working in computer science

Table 7 below shows the total summed scores for all four discipline pairs, using the thematic categories outlined above on page 132. Here, it is again apparent that those in computing science are somewhat anomalous. There are clear differences in scores by discipline using this view, although it is not appropriate to generalise from such a small sample, and it cannot be ascertained how *significant* those differences are statistically.

Thematic category	P1, P2 Art and design	P3, P4 Clinical dentistry	P5, P6 Politics	P7, P8 Computing science
Democratic characteristics	9	13	8	16
Symbolic relations	-13	-12	-8	-9
Materiality/time and space	12	6	8	-4
Technical/communicative mode	4	2	5	-3
Fluidity/knowledge type	3	9	-5	2
Democratic characteristics	15	18	8	2
Total score by pair	30	36	16	4

Table 7 - Summed totals for participant pairs (discipline)

SEMANTIC DIFFERENTIALS: RESPONSE ACROSS DISCIPLINE GROUPS

In general, when asked to position new media in relation to a set of potentially opposing/contrasting adjectives, academics express attitudes which are more moderate or neutral than 'extreme'. In 26 per cent of responses, the midway 0 point was used, with the moderately strong 2 position being second most frequent (23 per cent). When including -2 (minus signs being used only for coding purposes), this gives the 2 positions a total of 36 per cent. The 3 positions (denoting the most 'extreme' affective or cognitive attitudinal responses) account for only 10 percent of the total.

The frequencies and relative frequencies of each numeric scale position selected by participants are presented in Table 9 below.

Value	Responses	%
3	9	4
2	56	23
1	37	15
0	63	26
-1	29	12
-2	30	13
-3	14	6
No response	2	1

Table 8- Values assigned to adjective pairs in the first semantic differential exercise, across disciplinary groups.

Breaking this down, similar distributions across discipline pairs are evident, as is shown in the graph of value distributions below, where different colours indicate different disciplines. Exceptions (possible anomalies) are the far higher number of 0 – neutral – values and the smaller number of 1s assigned by participants from politics, suggesting more caution. Computer scientists selected the extreme 3 positions in *10* instances (as opposed to 3 instances in art and design, 6 in clinical dentistry and 4 in politics) suggesting that they hold stronger than average views in some cases.

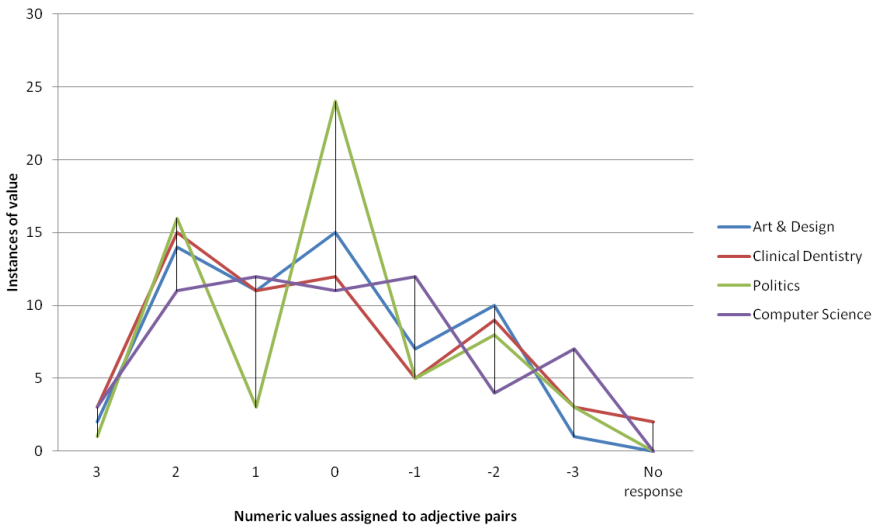


Figure 8 – Positions assigned to semantic differential constructs, by discipline pair

This same data can be presented as a frequency table, for readers who find this clearer:

	Field (representative of discipline)				
Position	Art&Design	Clinical Dentistry	Politics	Computer Science	**Total (%)**
3	2	3	1	3	9 (4)
2	14	15	16	11	56 (23)
1	11	11	3	12	37 (15.4)
0	15	12	24	11	62 (25.8)
-1	1	3	3	7	14 (6)
-2	10	9	8	4	31 (13)
-3	7	5	5	12	29 (12)
No response	0	2	0	0	2 (0.8)

Table 9 – Frequency of values selected on semantic differential interval scale by participants, by discipline

It appears that there is a moderately strong tendency *across* academic subjects toward the pragmatic weighing up of what new media mean and offer in relation to "old media" – even by those who are enthusiastic advocates with specialist knowledge (something asked about in the form assessing participant demographics) – which simultaneously reveals an amount of uncertainty about what new media represent and/or actuate – although as McCroskey, Prichard and Arnold (1964) note, "some people may hold "extreme neutral" attitudes […] and neutral responses to semantic differential scales may have different meanings for different subjects."

Some firmer non-neutral attitudes on the nature of new media are in evidence however, as indicated by a small number of terms that elicited stronger directional associations. These are discussed below.

STRONGLY PERCEIVED CHARACTERISTICS

Adjective pairs which provoked more 'extreme' associations (i.e. the highest number of 2 and 3 values) are shown below. Differences in strength of opinion cannot be seen to vary markedly in accordance with the academic disciplines of participants, with similar values and frequencies across pairs.

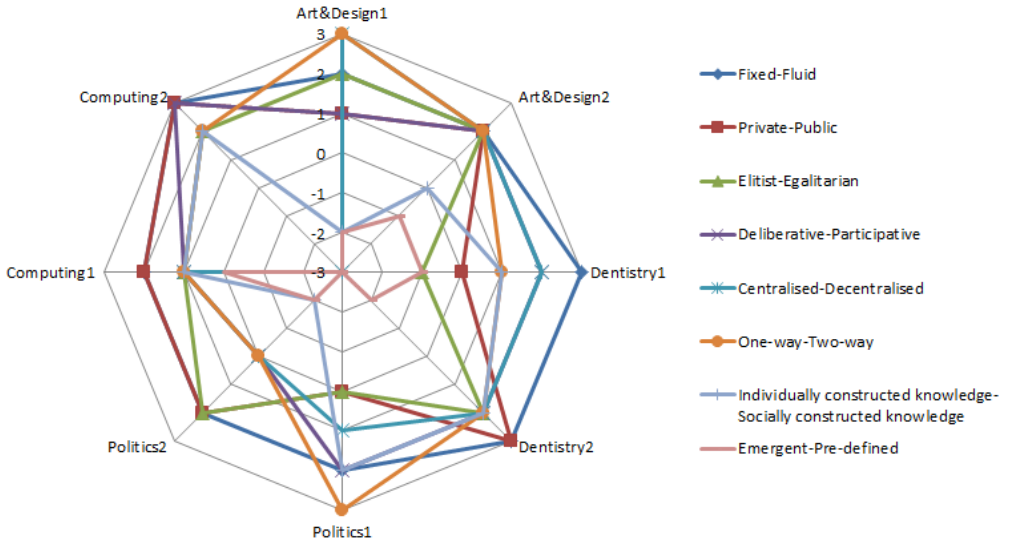


Figure 9 – Terms which evoked more "extreme" responses from participants

The comparative number of 3 and 2 positions allocated by each discipline pair is thus as suggestive of similarity as it is of difference across groups. In total, the number of 2s and 3s given by participants working in distinct disciplines was about even, as shown in the following percentages:

Discipline	# 2s and 3s	% of total assigned by pair
Art&Design	12	20
Clinical Dentistry	11	17
Politics	10	18
Computer Science	10	16

Table 10 - The proportion of stronger values assigned to semantic differential adjective pairs by participant pairs

Computer scientists were this time barely distinct from the other pairs, having selected a slightly smaller percentage of extreme positions (16 percent of the total values they selected for all adjective-pairs) compared with those in other subjects; 20 percent in art and design, 18 percent in politics and 17 in clinical dentistry, when we remove the 2 non-responses from that latter pair. Again however, there was clearer disagreement *between* participants from computer science when compared with other pairs. Here, only 2 more extreme positions were selected by participant 7 while 8 were selected by participant 8. There was more discord between those in clinical dentistry than

was previously evident, with participant 3 selecting 3 stronger values and participant 4 selecting 8. Individual differences in attitude appear as important as those that may exist along disciplinary lines.

Again, the thematic categories previously described offer another way to analyse this data. Adjective pairs from each of these groups were assigned to extreme positions on the semantic differential scales – indicating strength of feeling or association – as is shown in Table 11 below. The only exception was the category 'Symbolic Relations', from which no adjective pairs featured. This indicates that these terms may be less resonant, familiar, or of less importance to participants that those in others. Contrarily, the pair 'Fixed-Fluid' from the category 'Materiality' or 'Time and Space' was most often given a 2 or a 3 value by participants – 8 instances overall – as opposed to 5 for each of the others.

Three terms out of six from the category 'democratic characteristics' elicited extreme responses, suggesting that this may be an important category influencing academic attitudes to new media, as indeed it is in much of the reviewed literature.

Term	**Category**	**# 3s and 2s**
Fixed-Fluid	Materiality/Time&Space	8
Private-Public	Democratic Characteristic	5
Elitist-Egalitarian	Democratic Characteristic	5
Deliberative-Participative	Democratic Characteristic	5
Centralised-Decentralised	Materiality/Time&Space	5
One-way-Two-way	Technical/Communicative Mode	5
Individually constructed knowledge-Socially constructed knowledge	Fluidity/Knowledge Type	5
Emergent-Pre-defined	Fluidity/Knowledge Type	5

Table 11 - The number of 2 and 3 values selected for adjective pairs, arranged into thematic categories, across disciplines

Despite the fact that terms used in the semantic differentials were derived from a wide range of literature – thus represented a variety of disciplinary/political/epistemic understandings of new media – only two

instances of "No response" were recorded. Participants demonstrated their comprehension of terms drawn from a range of fields in the humanities and social sciences, and a willingness to engage with both practical and abstract aspects of new media, across disciplines.

Considering the semantic differential data alone, it does not appear that differences in attitudes toward new media are strongly or straightforwardly influenced by traditional disciplinary and organisational distinctions. This is true when considering both the discipline within which participants work and from which adjectives were primarily derived.

IDEALISM AND PRAGMATISM IN ATTITUDES TO NEW MEDIA

In relation to the genres and themes suggested in academic writing on new media, understandings do not appear *clearly* anchored by particular epistemological boundaries however somewhat ideological perspectives (or potentially ideological perspectives) on the characteristics attributed to new media are discernible on closer inspection and interpretation of individual responses. This emerges from a consideration of the adjective pairs themselves (and what they imply), rather than simply their numeric coding. By way of example, the three responses summarised below illustrate different reasoning's about the nature of new media in relation to issues of democratic participation. If the question was, "are new media a force for a more or less democratic means of communication and participation?" – it might be hard to reconcile any one of these with the strong political ideals found in academic literature on new or social media, yet they are not wholly at a remove from them. There is a sense of pragmatism but also of belief.

Some responses to political terms and concepts often discussed in relation to new media (thematic category 1):
P4 – Clinical dentistry
Strongly public rather than private; a good deal more egalitarian than elitist; a good deal more civic than corporatist; strongly participative rather than deliberative; a good deal more objective than subjective; a good deal more developmental-democratic than possessive-individualist (P4; clinical dentistry)

Comments: This response typifies new media as a 'force for good' in terms of democratic participation at the same time as viewing them as objective, which is perhaps slightly contradictory although the objectivity may be seen as a result of plurality and inclusion rather than neutrality. The respondent has generally 'positive' associations with the new media constructs presented.
P1 – Art and design
Slightly more public than private, a good deal more egalitarian than elitist, equally corporate and civic; slightly more participative than deliberative, slightly more subjective than objective, as possessive-individualist as developmental-democratic.
Comments: This response typifies new media as egalitarian but otherwise balanced rather evenly between opposing ideals implicated in issues around democracy, participation and decision-making. The respondent is neutral about most of the constructs presented.
P5 – Politics
As private as public; as elitist as egalitarian; as corporatist and civic; a good deal more participative than deliberative; a good deal more subjective than objective; as possessive-individualist as developmental-democratic.
Comments: Although participative by nature, new media are in this response equally balanced between oppositional ideals implicated in issues of democratic participation. The respondent, although based in politics, views new media in largely apolitical terms.

Table 12 - Three responses to new media constructs addressing democracy and participation, with the respondents' disciplines indicated.

These initial, exploratory findings suggest that disciplinary distinctions are only somewhat visible in relation to the political, symbolic, technical and epistemological aspects of new media. So too are differences within and similarities *between* them. There are some disagreements between those in a given field about what new media are though usually this has to do with *strength* of feeling, rather than with positive or negative associations with a construct and its characteristics.

This may signify a challenge to straightforward models or narratives proposing shared understandings and "thought-styles" (Fleck, 1936, page 84) within traditionally distinct discipline groups. It resonates with Fleck's observation of conflict at moments of upheaval and with Dervin's post-structural "communicatings" (Dervin, 2003, page 107), possibly reflecting the new patterns that emerge from structural and post-structural interplay and when

both interdisciplinary perspectives and emerging models for HE cause academics to question previous assumptions or methods. Alternatively, it may indicate the differences of opinion that always exist in any particular group. Further investigation and a larger sample of data is therefore required.

Some consideration is now given to responses by participants to Likert scale items addressing discipline characteristics.

DISCIPLINE CHARACTERISTICS AND WHITLEY'S TYPOLOGY

Participants in all fields disagreed that the knowledge produced by their discipline was useful only to it, and all disagreed that there was a broad consensus in their field over both the selection of instruments and techniques and the validity and meaning of results. All agreed that interdisciplinarity was important and that the potential audience for their work was generally varied and diverse. Of course, this may be understood as a matter of relativity or scope. Heterogeneity and interdisciplinarity can be varied *within* rather than across a field, and still effectively constrained. However, the fact that in all four disciplines, no participant expressed a feeling of certainty or consensus over meanings and techniques is significant. All agreed or strongly agreed that informal collaborations both within and across disciplines was important to their processes and practises. All but one agreed that outputs were, where relevant, generally visible to both public and private sectors, with only one participant (in art and design) neutral about visibility in the private sector and one (in clinical dentistry) neutral about visibility to audiences in the public sphere.

Despite Whitley's characterisation of academic science as having high-medium levels of governance by a reputational elite (page 53), particularly in the most tightly controlled fields, there were very mixed feelings among respondents about this and to some extent they go against his characterisations. While the two participants working in a fragmented adhocracy (art and design) agreed that a reputational elite – or, in their words, "star culture" – was influential, those in the professional adhocracy (computing science) disagreed that this

was straightforwardly so. When probed, a potential distinction between types of reputational elites, and between *online* and offline reputation management emerged. Participants 7 and 8 (with KM as interviewer) commented as follows:

> Q6. My discipline is strongly influenced by what might be called a "reputational elite".
>
> KM: That's just one term for it that I've taken from a particular piece of writing, but it could also be a "star culture" and there are other terms for it. People who are seen as – whether rightly or wrongly – more worth listening to, more visionary, everything somehow flows from them.
>
> P7: I'd probably disagree with that.
>
> P8: Well I think if you look at the web there are people who might be held up as "usability experts" but I don't think we feel that what we're doing has to necessarily be strongly influenced by them.
>
> KM: Okay. You don't think the discipline overall, outwith your department, Computing Science isn't influenced by a particular core of people?
>
> P7: In terms of structured things, like the Research Assessment Exercise, obviously you know, by definition, that's the nature of the REF or the RAE as it used to be. It is all about reputation and aspiring to the elite and wanting to be published in the elite journals. So again, it's yes in some areas and no in others.

P1 (art and design) stated that although engaging as "wholeheartedly" as he could with new media, he did see "issues" around it, "in particular around intellectual property rights and copyright, where new media presents considerable difficulties." Elaborating on his own belief that as much work and data as possible should be freely shared, he commented, "I have this kind of belief, and I don't know whether it's right or not. But new media sort of shifted economies. So actually, what we now live in is a reputation-based economy.

It's not necessarily about the ideas that you generate and the validity of those ideas and the commodification and saleability of those ideas. It's about your reputation. If you generally produce interesting work, and you do have a reputation for producing work of a standard that people are interested in, there'll always be more work for you. What you're doing is enhancing your reputation. And new media is a fantastic way to develop that."

It is interesting to link this to Whitley's assertion that high reputational control corresponds to a decrease in technical and strategic task uncertainty (page 141) and that "growing technical certainty is a necessary, though not sufficient, condition for growing reputational control over [performance and competence] standards" (page 141). The use of social media is often linked to reputation management and the visibility of individual "profiles" (Madden and Smith, 2010; Kietzmann et al, 2011). It is tempting to speculate that reputational characteristics, what constitutes "technical certainty", and the relationship between these two variables is changing within academic disciplines as a result of social and new media engagement.

One participant working in the technologically integrated bureaucracy/professional adhocracy (clinical dentistry) strongly disagreed while another agreed that reputational elites were influential. Both talked about the opportunity that social media (Twitter and blogging) and networked collaborations with colleagues abroad gave them to connect with others who shared their approach to research (in this case, evidence-based practise) and who were more enthusiastic and like-minded than local departmental or faculty colleagues. Both of those working in a partitioned bureaucracy (with some elements of a fragmented adhocracy; Politics) agreed or strongly agreed that reputational elites influenced visibility and the nature of the discipline.

During other parts of the data gathering exercises attitudes and themes emerged which can be analysed qualitatively. The extraction and close-reading of comments made and phrases used by participants offers insights into disciplinary and individual relationships with new media, particularly as these intersect with the conditions and responsibilities of local work environments,

personal philosophies and personal experiences with the use of new technologies in a university ecology.

INTERVIEW EXTRACTS: COMMON THEMES AND TERMINOLOGY

Details of inter-attitudinal structures – specifically, the ways in which academics link cognitive and affective attitudes with behavioural ones were provided by discussions with and between participant pairs. Tensions around novelty, utility, and the relationship of these to scholarly imperatives were clear:

> I've got an issue with **novelty**. My issue is, it's very easy to be faddish. To be caught up in the novelty of something. The trouble with novelty is it doesn't necessarily lead to innovative […]. Keeping up to date isn't just about an ability to use that technology, but it's about understanding its **social and cultural impact**, or realising how that technology makes a process or a creative **process different** than it would have been otherwise" – Art and Design PhD practise-based research student (P1).
>
> "Keeping up to date is important. On the other hand, you don't necessarily value a technology because it's up to date. Sometimes you use technologies that are more **valuable for your particular purposes**. So it wouldn't necessarily simply be **driven by** whatever the latest thing was...I always try to make [students] aware of the temptation to use something simply because it's popular […] What a lot of academics would like is some actual **evidence** that there's a **benefit** to it – not just to be told "this is the latest thing so get behind it" – Computing science lecturer (P7).
>
> You should be trying not to be led by technology. Obviously, new media has opened up **opportunities** so you need to know it's there. But at the same time there's a **danger** that you use new technologies in order to, you know, to get **funding**? You use it because it's **a new toy** that people wanna know how to use, whereas the **mainstay of an**

> **academic discipline** is to use it when you **need** it! – Art and Design PhD practise-based-research student (P2).

Even participants who were "advocates" of new media, and who indicated that they enjoyed experimenting and keeping up to date with new technologies were cognisant of a need to determine the relevance and suitability of new media for scholarly processes – be they artistic, scientific, or administrative. Determining relevance relates not just to discipline, task, and role, but to perspective, thought style, and individual taste. The quotations above illustrate somewhat standard themes arising in general discussions about new media such as novelty and utility.

Complications and a possible fusion of traditional divisions emerge clearly around notions of "work" and "play", or between professional duties, private activities and personal space. Unstable divisions of space, place, time and purpose affect both academic staff and their students when engaging with new media and interacting in digitally-mediated environments:

Q: Do you make use of new media in your personal time?

> Yeah. To the point of **getting obsessed**. The first thing I do in the morning is log in to see what emails I've got. At half six in the morning. And if I woke up in the night I might have a quick look as well! – Teacher in research methods, clinical dentistry (P4).

> I don't really do it to be honest. I think it's partly...if you do something through your **work** you don't particularly want to do it again in your **personal life**. I spend enough **time** on computers and I'd like to cut it down. – Computing science lecturer (P8).

> Yeah! I blur between play and work. There's **no real clear delineation** between what is play and what is work. – Art and design PhD practise-based research student and advocate of new media (P1).

> [One] issue is to do with expectations of a lecturer. One colleague from material science – they do lot of communicating with their

> students through Facebook – she was up at 2 in the morning, cos she's got a 1-year old child and she's feeding him in the middle of the night and a thing came through and it was a student who'd sent her a message about an essay that was due in the next morning and she said, "I replied to him and then thought, what am I doing?!" (P4).

The traditional characteristics and boundaries of disciplines and communications media fluctuate as a result of the possibilities (negative and/or positive) presented by new media and their positioning within the academy, reflecting some of the key themes in digital humanities literature on new media. The conceptual and the practical are not entirely separate concerns – they are intertwined. These concerns are expressed in different ways, even when meaning is in many ways similar:

> Even though new media is a type of a new media of a certain type, of a certain time, I'm not certain that we are currently still engaging with new media. I think we're probably engaging with post-new media. And yeah, I use and integrate technology into all aspects of my practise. But I don't necessarily call it new media [...]. I think that's what I mean when I argue about post-new media. I think we're already starting to think about, well, we live in a digital age where the computer is central to our practise. What does that actually now mean? You know. Having engaged, embraced with it. And there is a return back to the analogue and the physical, I think. (P1, art and design).

Participant 6 (computing science) stated:

> We often get pushed on the new things, to be, you know, ahead of the curve. It's always very difficult to see where the curve is going. One example in the multimedia area at the moment is HTML 5, which again implies a progression [...]. The underlying technical facilities are actually quite old. And a lot of what we would have to teach, if we adopted that new medium, would be old stuff. It's trending and

would be identified as new technology even though it isn't [...] it's just been combined in a particular way that's being marketed or used in a particular way.

Although the participants from art and design were more conversant with aspects of computing than many in their field, they used a discursive mode distinct from that of the computer scientists when considering the question of what "new media" means. For them, the temporal and semantic complications of defining "newness" allows for the exploration of creative positions. For the computer scientists, it seems that these same complications give reason to be sceptical, or guarded, particularly about the effects of "misguided" institutional agendas, particularly as these affect teaching. Aware of a lack of certainty around new media this was perhaps more problematic than inspiring for them, notable in a certain territorialism about protecting previous (apparently more "evidential") ways of making decisions.

At the same time, responses to attitudinal constructs on the semantic differential derived from literature addressing these concerns did not in the main elicit stronger reactions than any others, suggesting some discrepancy between actual belief or attitude and stated attitude; this may be due to the difference in the instruments used for data collection – the intimacy and space for reflection provided in a conversational interview, alongside a colleague, may allow the divulgence of (or indeed bring about) deeper preoccupations with new media than are admitted to when faced with a minimalistic document embedding a practical task or exercise more reminiscent of the workplace.

CLUSTERED TERMS AND DISCIPLINE CHARACTERISTICS

Terms chosen by participants when asked to freely write down words they associated with "new media" and "old media" are presented below:

Art and design	Most closely resembles a fragmented adhocracy; to some extent unstable
P1	

New	Interactive, Feedback, Procedural, Social, Multimedia, Virtual, Synthetic, Digital Content, Programmed, Coded, Cheap
Old	Printed, Filmed etc. Analogue, Passive, Authoritative, Elitist Content, Expensive
P2	
New	WWW, Hyperlink, Internet, Many-to-many, Narrowcast, Single accessed collection, Virtual, Ephemeral, Fluid, Mediated, Human Computer Interaction
Old	Print, Broadcast, One-to-many, Physical, Tactile, Numerous, Accessed Individually, Fixed, Mediated, Human to Human/Object Interaction
Clinical dentistry	Most closely resembles a technologically integrated bureaucracy; elements of a professional adhocracy
P3	
New	User friendly, Social, Accessible, Collaborative, Computerized
Old	Paper, less portable, not dynamic
P4	
New	Quick, Accessible, Innovative, Interactive, Isolating, Eco-friendly
Old	Slow, friendly, familiar
Politics	Combines elements of a fragmented adhocracy and a polycentric oligarchy
P5	
New	Computers, Twitter, Internet, Wiki, Email, Blackberry
Old	Books, journals, pamphlets, newspapers, radio, CD
P6	
New	Online, digital, interactive, flexible, instant, superficial
Old	Print, old fashioned, one way, paper based, more depth
Computing science	Most closely resembles a professional adhocracy
P7	
New	Mobile devices, screencasts, Skype (VOIP), social networking, VLEs, email
Old	OHP, landline telephone, chalkboard, TV
P8	
New	Web 2, Diverse, Interactive, Multi-media, Mobile-enabled, Social networking, Everyone can publish
Old	Static web, non-mobile, pre CSS3/HTML support, TV, specialist developers

Table 13 - Terms chosen freely by participants to describe old and new media

Art researchers explore and conceive of new media while using it, choosing a wider and more conceptually descriptive range of terms than those working in other fields. Participants from computing science chose terms more reflective of technical specifications and factual accounts. For instance, compare "interactive, social, synthetic, mediated" with "OHP, non-mobile, and pre CSS/HTML support". This is a generalisation – a few descriptive terms were used by the computing scientists ("diverse, interactive") and a few more technical ones ("WWW, broadcast") by the art and design researchers – however terms can be seen to map to the wider discussion had with participants about how and why they use new media within their work environments. Those working in clinical dentistry used digital media largely as collaboration, outreach and dissemination tools, or to interact with students. They chose a variety of terms reflecting the perceived societal/individual benefits (or disadvantages) of engaging with new media – "social, accessible, eco-friendly", "isolating".

Political scientists discussed how, as well as using new media (largely social media) within their undergraduate teaching provision, that media is itself becoming integral to the way that certain aspects of the political process are conducted – for instance, election campaigning through social media or government publications being made available electronically. The terms they chose are less clearly categorical. One participant lists *instances* of "new" and "old" media while the other focuses on perceived qualities (Blackberry, pamphlets; superficial, more depth). This reflects the tone of a discussion wherein considerations of how new and social media could aid teaching gave way to a wider exploration of the nature and potential of new media to connect with communities (whether students or electorates). These seem to reflect the combination of high and low certainty levels that characterise a partitioned bureaucracy as it produces both analytical, specific knowledge and ambiguous, empirical knowledge.

CONCLUSIONS

The purpose of phase one was to extract through qualitative analytical methods, those terms, concepts and attitudes stated or suggested by interview participants that can be related to discipline characteristics, as well as to explore methods. Via Whitley's typology (Whitley, 2000) these are analysed further and refined in relation to new media as positioned within current academic ecologies. The dataset examined was a small one but in it we find some evidence of the bridging/constructive effects of new media within the academy, even as tensions and uncertainties around implementation and definition were brought to light. It appears that using new media within their work gives academics a chance to engage with a greater diversity of concepts and theories than would traditionally be associated with their specific field.

For instance, a computer scientist is most likely aware of philosophical and political concerns about the medium, while designers and artists become more au fait with web technologies and programming languages. Interdisciplinary skills, techniques and methods are learned and developed alongside analytical and critical perspectives. This was reflected in many of the discussions with participants and was also observable in semantic differential data.

This does not mean however that the role of discipline is minor or defunct; rather, it is subtle and must be drawn out in ways less easy to represent numerically or through diagrams. When required to discuss and come up with their own terms and descriptions of new media and old media, distinctions emerged which, when analysed, link to particular disciplinary conventions, thought styles, and tasks (both intellectual and administrative) than to understandings about *general* new media properties. Here, the disciplinary lens and the organisational characteristics identified by Whitley are valuable structural and analytical aids. For instance, it seems likely that there remains a strong connection between working in a discipline exhibiting the

characteristics of a "fragmented adhocracy" (e.g. low levels of impersonality and formality of control procedures, high audience variety and high audience equivalence) and being allowed more room for experimentation with new media for research, even when using it tactically.

Academics across disciplines often focus on characteristics such as novelty and utility when assessing the role of new media in their work, rather than directly on disciplinary imperatives, yet these are implicitly related. A computer scientist may be more sceptical or 'rational' about new and digital media primarily because he or she is tasked with teaching students about more 'enduring' fundamentals. An artist teaching or training colleagues in tools and reputational management can focus his or her energies on the development of "positive" skills in ways that support reflective practise. A political scientist working in an area which is itself increasingly influenced by the use of new media (e.g. online political campaigns and links between social networks/grassroots approaches) means that s/he necessarily has to analyse how it works; both its advantages and its disadvantages, at the same time as using it for teaching. However, academics in the same discipline will always be entirely in agreement with one another about meaning and utility.

Whitley's typology appears to be a useful analytical tool for studying the attitudes of academics toward new media and comparing across disciplines. However, instances are so complex and reside within such a complex ecology that disciplinary characteristics cannot be used alone. Categories are usefully enriched by the incorporation of concepts and terms from contemporary literature and research on new media, HE and discipline. Whitley's typology is thus usefully extended and challenged by a consideration of new media and interdisciplinarity within a flexible multi-modal methodological framework.

The strength of opinion on and around interdisciplinarity, novelty and reputational elites suggests that the boundaries and characteristics of disciplines are shifting within the four disciplines considered. The relationship between reputational characteristics and what constitutes "technical certainty" is changing within academic disciplines as a result of social and new

media engagement. This may be key to interpreting and understanding attitudes toward new media. A much larger dataset is required to conclude further and to make generalisations about the in-scope academic population, entailing adjustments of method and further explorations.

MOVING THE METHODOLOGY FORWARD

Data gathered via phase one provided insights allowing the aims of the thesis to be refined, contextualised and better informed. While qualitative data suggested an engagement with some of the concepts and terms prevalent in academic literature dealing with new media, a greater amount of emphasis was placed on practical and work-related aspects than on conceptual or theoretical ones. At the same time, politicised and changing aspects of disciplinary cultures and the role of digital media within these were keenly felt by some participants, with scepticism as evident as enthusiasm during discussions of how new media technologies might informing teaching and research practises. There was more homogeneity of tone than was initially expected from engaging with theoretical and critical writing on disciplinary cultures, although participants from art and design seemed more distinctive in their views.

Rather than expecting a clear one-to-one mapping of respondents, grouped by discipline, to terms important in literature from their field, the analysis would assume less while considering more. An appreciation of the strong disciplinary perspectives identified in academic literature would be enriched by closer reading of work dealing directly with the overall management of digital technologies (particularly social media) in HE and the increasing importance of interdisciplinarity research. A richer and differently oriented literature review would better help with the interpretation of further quantitative data. In particular, more was read on the nature of disciplines and the changing managerial models affecting all academics.

Phase one further provided a means by which to assess the instruments used for gathering quantitative data, leading to some modifications and

improvements. The twenty questions asked about discipline characteristics were reduced to just ten. It was felt that the original set covered too many aspects of academia – for instance, visibility in the private sector – with some elements of repetition and a loss of focus from questions that could more clearly be related to the main aims of the thesis. Further, it was felt that participants might be less engaged and less likely to respond than they would be if faced with a shorter list. Questions removed were as follows:

#	Question
3	In general, the knowledge produced by my discipline is primarily useful only to it
4	In my discipline, there are strong hierarchies governing its organisation and the priorities of its academics
5	The general goals of myself and peers in my discipline are well understood and broadly aligned
11	When appropriate, work carried out in my discipline is generally visible to the public
12	In my view, work carried out in my discipline should be more visible to the public, when appropriate
13	When appropriate, work carried out in my discipline is generally visible to the private sector
14	In my view, work carried out in my discipline should be more visible to the private sector, when appropriate
15	In my discipline, it is generally easy to get work recognised by one's immediate peer group (e.g. by departmental colleagues and your university)
16	In my discipline, it is generally easy to get work recognised by a wider peer group
17	A variety of views and understandings from outside my discipline is useful to my process and practises.

Table 14 - Questions about discipline removed from the final questionnaire

The adjective pairs used in the semantic differentials were substantially revised, with only 10 of the original 30 remaining and 8 added based *directly* on terms used by several participants either directly in the writing exercise or during discussion. The pairs which were added are listed below.

- Faddish-Grounded
- Procedural-Exploratory
- Deep-Shallow
- Passive-Active

- Social-Isolating
- Work-biased-Play-biased
- Reliable-Unreliable
- Tactile-Virtual

Those which were removed were felt to be too complex, required too much explanation or did not resonate with participants for various reasons – for instance, "high-definition" and "low-definition", terms used by McLuhan to describe media, were confusing for those not familiar with his work. Similarly, "push" and "pull" and "Top-down" and "Bottom-up" were too particular to computer science vocabulary and were not always readily translatable. Concepts like "corporatist" and "civic" were, on reflection, not directly relevant or in line with the aims of the research. Pairs removed were as follows:

- Corporatist-Civic
- Possessive-individualist-Developmental-democratic
- Practical-Abstract
- Normative-Atypical
- Empowering-Enforcing
- Symbolic-Literal
- Facilitative-Interpretive
- Deterministic-Undetermined
- Informative-Performative
- Centralised-Decentralised
- Top-down-Bottom-up
- One-way-Two-way
- Push-Pull
- Agile-Rigid
- Open-Closed
- Free-Commercial
- High definition-Low definition

- Mental processes-Socio-cultural processes
- Neutral-Partial
- Restrictive-Transformative

CHAPTER SIX: QUANTITATIVE DATA AND ANALYSIS

In this chapter, statistical analyses of the 209 questionnaire responses obtained are presented. The self-administered questionnaire (created and managed using online survey software) contained three distinct parts. The first captured basic demographic information such as age group, gender and extent of expertise in new media. In the second, a series of Likert items were presented to respondents through which they described characteristics of the discipline to which their field of enquiry belongs. Finally, responses to a diverse set of new media terms and concepts were sought via a semantic differential chart (described above in Chapter Five) comprised of 18 adjective pairs. The aim was to gather an original sample of data from which to assess the relationship of discipline to attitudes toward new media and, concomitantly, the relevance of a disciplinary lens and its utility for the analysis of academic attitude.

Respondent demographics and details of the sample and response rate are provided below. Methods of analysis, although previously described, are referred to in more detail where necessary. Descriptive and inferential statistics are presented, including the results of factor analysis (a multivariate method of analysis). These are discussed and located within the contexts of relevant literature and research into new media, Higher Education and disciplinary organisation, including Whitley's *Organization of the Sciences* (Whitley, 2000) which was the basis of the sampling frame used to select particular fields (representative of disciplines) for empirical data gathering activities.

The research design combines deductive and inductive approaches, supporting an assessment of traditional disciplinary value systems and methods while recognising that these exist within an evolving information ecology. The extent to which there is agreement between respondents about the characteristics of their fields, and the results of semantic differential

exercises are analysed both statistically and in relation to theories and models of discipline and interdisciplinarity. As well as ascertaining the extent to which disciplinary communities in UK HE remain distinct regarding their communication practises, responses are considered in relation to the priorities encoded in current teaching and research agendas and the underlying dimensions *across* or common to disciplines. Some evidence for the persistence of discipline-based differences in attitude and hence the relevance of a disciplinary lens is found, with some evidence also of change. Unexpected correspondences and factors suggest the emergence of new structures shaping academics' attitudes, which must be considered alongside existing ones.

Inferential tests suggest no significant relationship between variations in attitude and the variables age, gender and career length. These statistics are not analysed further as the thesis is insufficiently grounded in research concerned with these aspects to support informed, meaningful interpretation. Further, there was not enough variation in age ranges to support a robust analysis, with most respondents being in one category (nearly 64 percent of the sample were between 41-65, with only 2.4 percent being in the under 25 category). Addressing these variables in relation to new media and the university ecosystem could be usefully considered in further research.

POPULATION AND SAMPLE

One hundred and twelve universities out of the 164 operating in the UK at the time the research was conducted (HESA, 2013c) were considered in-scope. Those excluded were generally specialist institutions focused on particular fields not included in the sampling frame[9]. The varying sizes of university populations (for instance, the number of academic staff in a particular department) could not be accounted for in calculations relevant to inferential

[9] The list of institutions included in the study is provided in Appendix II.

statistics as such information is generally not publicly available. Figures used to estimate the population size are approximations. Some figures provided by the Higher Education Statistics Agency (HESA) were useful for this purpose. The total number of academics employed in the UK was (at the time) 181, 385, excluding atypical cases (HESA, 2013). The *approximate* size of the relevant population for this study and thus the approximate confidence we can have in the sample as indicative of the wider population was calculated from this. Other figures used are also estimates; for instance, the average number of academic departments in a university is given as 20, but this was based on a sample of the websites visited when gathering contact details for mailing lists.

The number of academics working in the UK in art and design, computer science, health science and politics and international relations departments combined is approximated, for the purposes of the research, at 24,640 (the total number of full-time academics divided by the average number of departments in a UK univeristy and multiplied by 4). To be statistically significant at the 95 percent confidence level with a 5 percent confidence interval (CI), 379 responses to the questionnaire would be required. If it is assumed that the distribution of values in the underlying population is not normal (i.e. does not demonstrate a Gaussian distribution), 15 percent (57 respondents) would need to be added to this. To achieve confidence at the *90 percent level* (with a 5 percent CI) a sample of 267 (or 307) academics would therefore be required.

Mailing lists were constructed manually from addresses collected by visiting relevant faculty webpages on the websites of all 112 universities. An invitation to respond to the online questionnaire was distributed to 953 individuals (240 from art and design, 270 from health sciences, 188 from politics and international relations and 255 from computing science). These were generally heads of department, heads of research and departmental administrators who were asked to forward the email request to relevant colleagues thus cascading it throughout the disciplinary communities of each institution.

A response rate of approximately 22 percent (209 responses) was achieved. This sample falls short of the desired confidence measures but still permits a 90 percent confidence interval with a 5.7 percent margin of error (6.1 if we adjust for a non-parametric underlying distribution). In other words, 90 percent of the time population parameters (such as numeric responses to questions selected by respondents) will fall within +/- 6.1 percent of those which would be found the wider population (the 'true' population).

In the case of nonparametric data, it is not possible to achieve the same level of certainty about an underlying population as is possible with parametric data; by definition, its parameters cannot be readily assumed. However, because the sample is relatively large and the distributions are not highly unusual (as confirmed in the analysis described below) the 15 percent addition is acceptable for most nonparametric tests to be valid (Lehman, 1998, pp.76-81, cited in Graphpad Statistics Guide, 2015).

SAMPLE CHARACTERISTICS

Demographic information about questionnaire respondents is summarised below. Variables including discipline, gender and age are considered before the normality of response distributions (and hence, of the sample) is determined using standard statistical procedures.

DEMOGRAPHIC VARIABLES

Respondents can be broken down by discipline or field as follows:

Field	Percentage
Art and design	26.8
Computing science	36.4
Healthcare sciences	24.9
Dentistry	4.3
Medicine	1.9
Health Science	18.7
Politics and International Relations	12.0

Table 15 – The academic fields of the 209 questionnaire respondents, as percentages of the sample.

Variable	Category Percentage						
Gender	Female	Male					
Percentage	34.9	65.1					
Age	25 or less	26-40	41-65				
Percentage	2.4	34	63.6				
Length in field (years)	0-1	2-5	6-10	11-20	21-30	31-40	40+
Percentage	4.8	18.2	17.7	33.5	16.8	7.7	1.4
Frequency of new media use (work)	Daily	Weekly	Monthly	Rarely	Never		
Percentage	49.3	19.1	9.6	15.8	6.2		
Frequency of new media use (non-work)	Daily	Weekly	Monthly	Rarely	Never		
Percentage	67.0	16.3	1.9	9.6	5.3		

Table 16 – Gender, career length and frequency of new media use by respondents, as percentages of the whole sample.

The typical respondent to the questionnaire is male, aged between 41 and 65 years old, and has been working in his field for between 11 and 20 years. This reflects the *overall* population of UK academics, where most employees are male and middle-aged (Higher Education Statistics Agency, 2013b). The typical respondent is a frequent user of new media for both work and non-work purposes. This pattern largely held true for each of the discipline groups considered, as can be seen in the frequency tables by discipline provided in Appendix VII. In the case of Health Science, the majority (53.8 percent) of respondents were female and the most common career length of respondents to date was 2-5 years (25 percent).

DISCIPLINE CHARACTERISTICS

Using ten Likert items with responses scored along the common agreement/disagreement dimension (1=Strongly Agree; 2=Agree; 3=Neutral 4=Disagree and 5=Strongly Disagree), statements on perceived discipline characteristics were as follows:

1. Keeping up to date with digital technology is generally important in my discipline.
2. In my view, keeping up to date with digital technology should be considered more important in my discipline.
3. In my discipline, there is usually a broad consensus about methods and techniques.
4. Interdisciplinary work is generally important to my discipline.
5. The audience that my discipline shares its work with is generally varied and diverse.
6. It is important to take part in online social networks with academics working in the same discipline as myself.
7. It is important to take part in online social networks with academics from other disciplines.
8. In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs.

9. In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged.
10. My discipline is strongly influenced by what might be called a "reputational elite".

Each addresses some aspect or characteristic by which disciplines can be relatively positioned; either using measures directly identified by Whitley (Questions 3, 5, 8, 9 and 10) or ones which refer directly to the central concerns of this research – in particular, technology, participation and interdisciplinarity (Q 1, 2, 4, 6, 7). The extent to which participants within and across fields (representative of distinct disciplines) agree about the characteristics of their fields, and the extent to which those perceived characteristics differed from traditional discipline models was assessed through statistical analysis and an interpretation of them and the source data in relation to Whitley's typology.

This data was analysed prior to semantic differential data in order to ascertain whether there was sufficient reason to believe that the disciplinary lens was a meaningful one with some explanatory power – i.e. did the hypothesis of variance among disciplines hold true and if so to what extent? Because of the simpler nature of the rating scales used in Likert items, analysis is more straightforward than it is for the semantic differentials, where the assignation of positive and negative values to attitudinal statements is more difficult and open to interpretation; for instance, is "objective" negative and "subjective" positive, or vice versa? Inspecting the statements of agreement/disagreement on the Likert scale regarding discipline gives a clearer sense of how the variable discipline compares to other variables, before analysis of the semantic differentials is attempted.

DISTRIBUTION OF SUBJECTIVE RESPONSES TO LIKERT ITEMS ON DISCIPLINE CHARACTERISTICS, ACROSS DISCIPLINES

Response distributions were assessed for normality, which was considered unlikely as the violation of standard assumptions about population

distributions is common in social science research (Pallant, 2010, page 111), particularly when using fixed scales to measure subjective constructs. In any case, "non-normally distributed user opinion scores in nominal or ordinal responses should not be analysed using parametric statistics" (Mu, Mauthe, Tyson and Cerqueira, 2012, page 6) and some commonly presented statistics, for instance "representing users' opinions by their arithmetic mean [are] "statistically incorrect" (page 4). First, patterns in the whole dataset were examined, without any division by the variable discipline.

Histograms showing the response distributions for each question and skewness and kurtosis values, indicate a moderately non-normal distribution of responses. This is exacerbated by the presence of many 'extreme' values (outliers) at the 1 and 5 positions on the Likert scale. A Kolmogorov-Smirnoff test produced significance values of less than .05 (.000) for all questions, as did a Shapiro-Wilk test, further confirming the data's unsuitability for parametric modelling. Medians, with 95% confidence intervals (CIs), interquartile ranges (IQR) and skewness and kurtosis values are reported in Table 14 below. Data transformation was not employed as this is complex and can compromise the accuracy of analysis. Instead, suitable and generally robust nonparametric techniques were used to explore variations between and within groups.

Although there is considerable debate about whether or not Likert and other scales designed to measure subjective opinions can be considered to be interval scales rather than ordinal ones (Sheshkin, 2003, page 3; Mu, Mauthe, Tyson and Cerqueria, 2012; Kostoulos, 2013), these issues are largely set aside here. Responses gathered from both the Likert items and the semantic differentials are treated as interval data when necessary to allow particular types of statistic to be generated, although care has been taken not to go beyond reasonable limits. First, responses *across* disciplines are considered, with the properties of the whole dataset identified. Next, response distributions by the grouping variable 'discipline' are explored. Descriptive statistics not presented here are provided as appendices.

DESCRIPTIVE STATISTICS FROM RESPONSES TO LIKERT ITEMS ABOUT DISCIPLINE CHARACTERISTICS, ACROSS DISCIPLINES

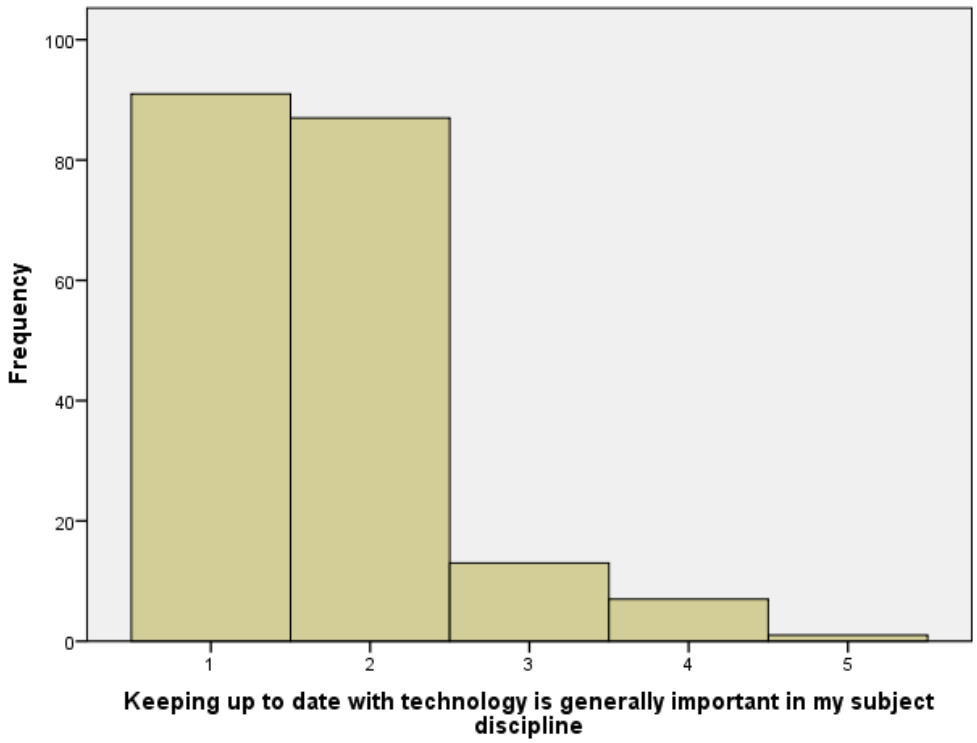
Question			Statistic
1. Keeping up to date with technology is generally important in my discipline	Median		2.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	1.00	2.00	96.2%
	Interquartile Range		1
	Skewness		1.320
	Kurtosis		2.204
2. In my view, keeping up to date with technology should be considered more important in my discipline	Median		3.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	2.00	3.00	96.2
	Interquartile Range		1
	Skewness		.274
	Kurtosis		0.49
3. In my discipline, there is usually a broad consensus about methods and techniques	Median		3.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	3.00	3.00	96.2
	Interquartile Range		2
	Skewness		.017
	Kurtosis		-.746
4. Interdisciplinary work is generally important to my discipline	Median		2.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	2.00	2.00	96.2
	Interquartile Range		1
	Skewness		1.203
	Kurtosis		2.492
5. The audience that my discipline shares its work with is generally varied and diverse	Median		2.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	2.00	2.00	96.2
	Interquartile Range		1
	Skewness		.943
	Kurtosis		1.052
6. It is important to take part in online social networks with academics working in the same discipline as myself	Median		3.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	3.00	3.00	96.2
	Interquartile Range		1

	Skewness		.125
	Kurtosis		-.510
7. It is important to take part in online social networks with academics from other disciplines	Median		3.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	3.00	3.00	96.2
	Interquartile Range		2
	Skewness		.225
	Kurtosis		-.217
8. In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Median		3.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	3.00	3.00	96.2
	Interquartile Range		2
	Skewness		.333
	Kurtosis		-.558
9. In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Median		2.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	2.00	2.00	96.2
	Interquartile Range		1
	Skewness		.964
	Kurtosis		1.291
10. My discipline is strongly influenced by what might be called a "reputational elite"	Median		2.00
	95% Confidence Interval Median		
	Lower bound	Upper bound	Actual coverage (%)
	2.00	3.00	96.2
	Interquartile Range		1
	Skewness		.964
	Kurtosis		1.291

Table 17 - Descriptive statistics for questions about discipline characteristics, across all discipline groups.

*Confidence intervals are calculated without any assumptions about distribution. As indicated, actual coverage may be greater than the stated 95 % level.

HISTOGRAMS SHOWING RESPONSE FREQUENCIES TO LIKERT ITEMS ABOUT DISCIPLINE CHARACTERISTICS, ACROSS DISCIPLINES



Here, numbers correspond to attitudinal statements as follows:

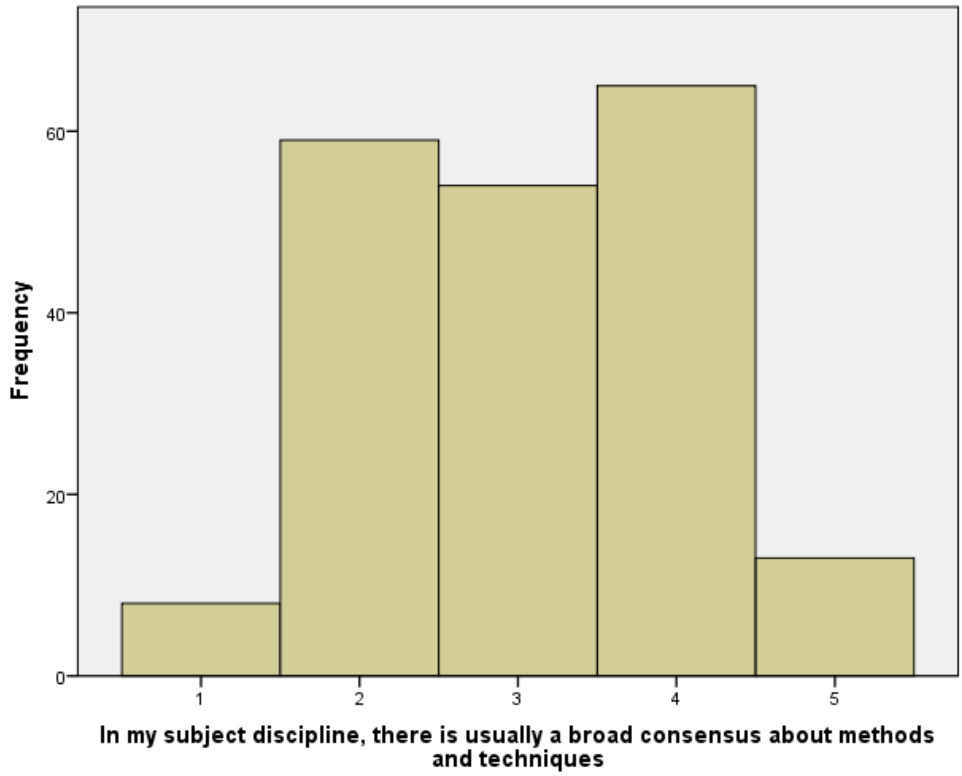
1 = Strongly Agree

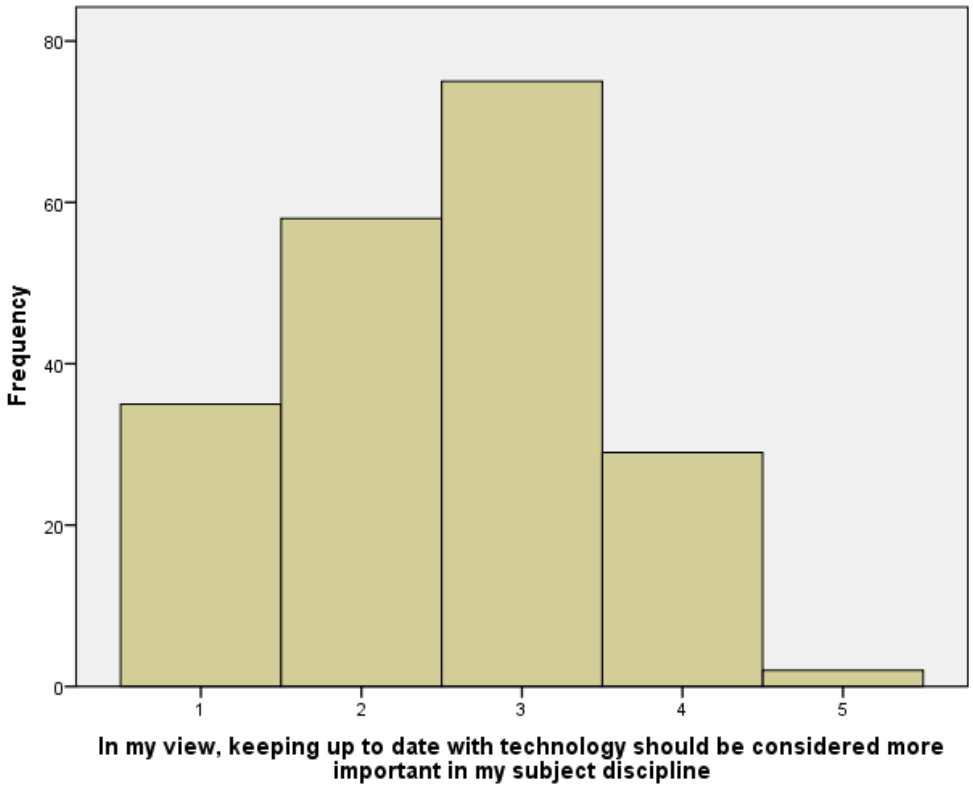
2 = Agree

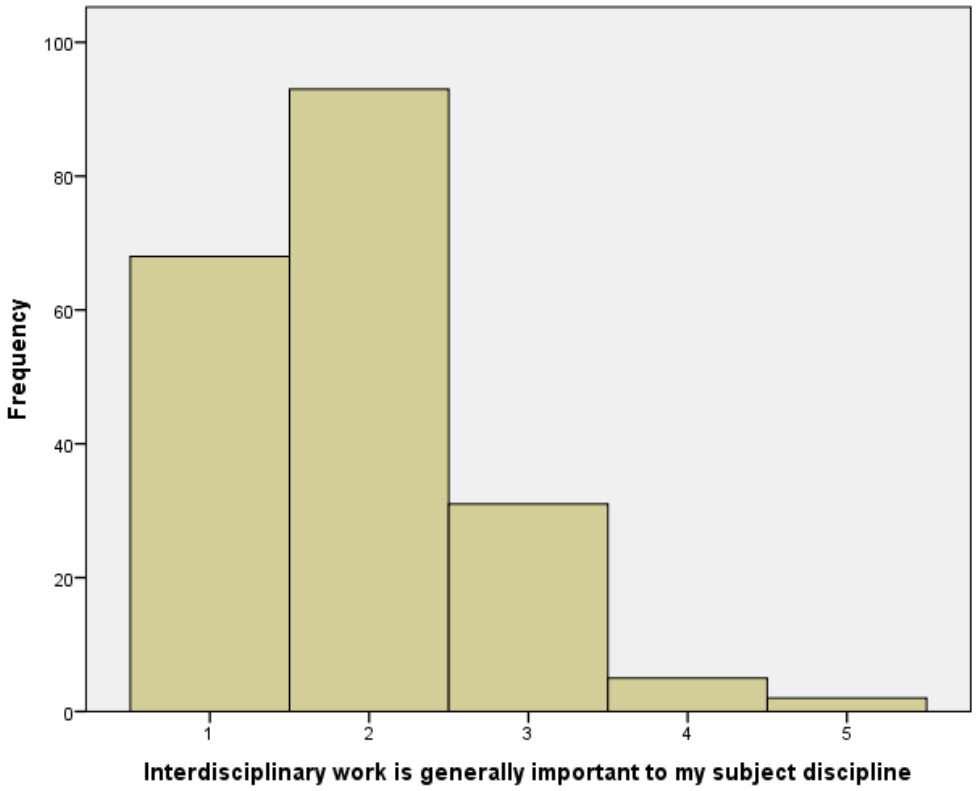
3 = Neutral

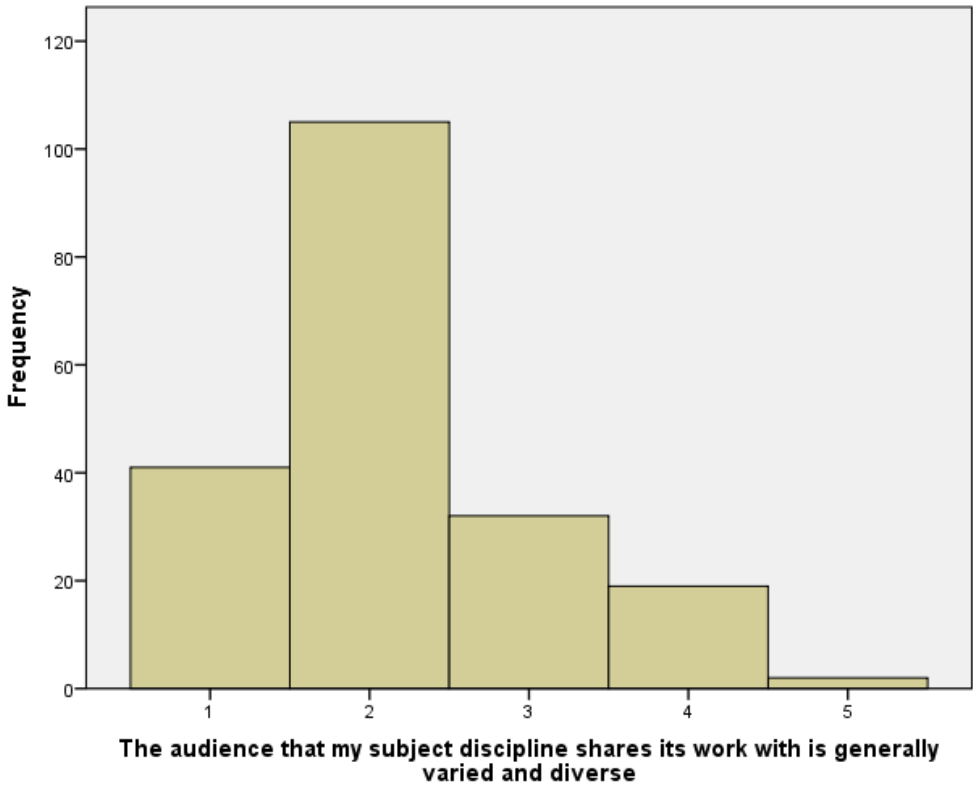
4 = Disagree

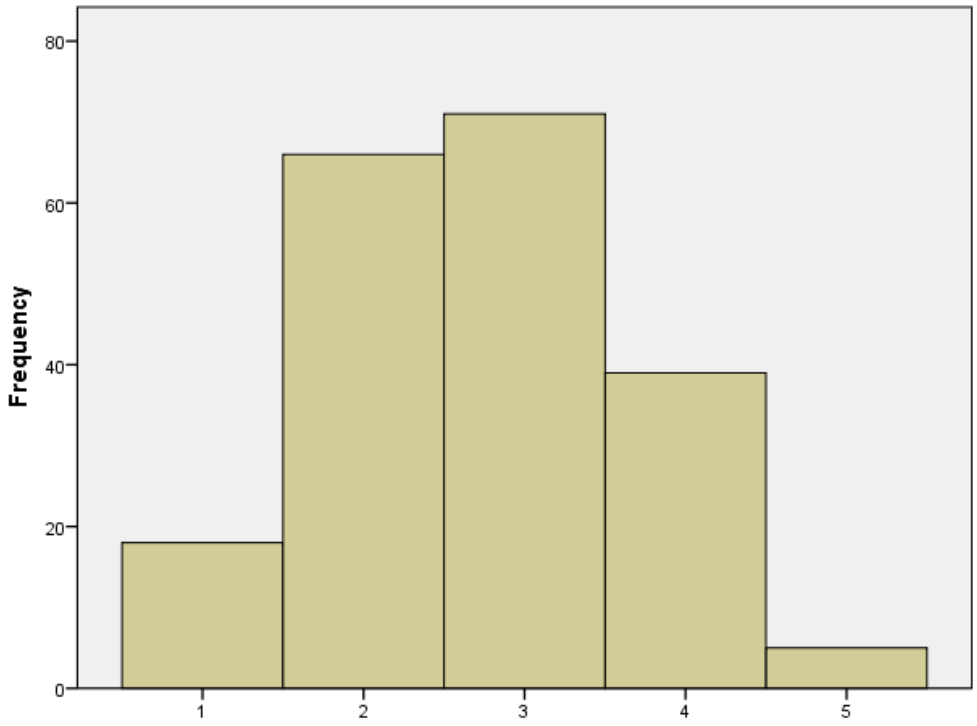
5 = Strongly Disagree

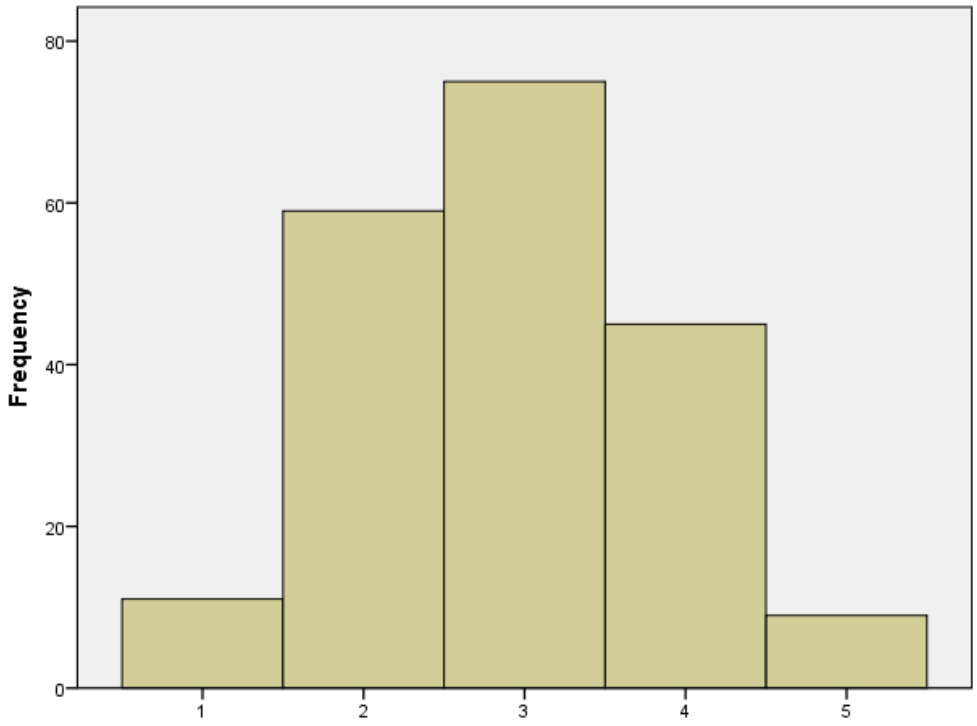

Frequency
60
40
20
0
1
2
3
4
5
In my subject discipline, there is usually a broad consensus about methods and techniques

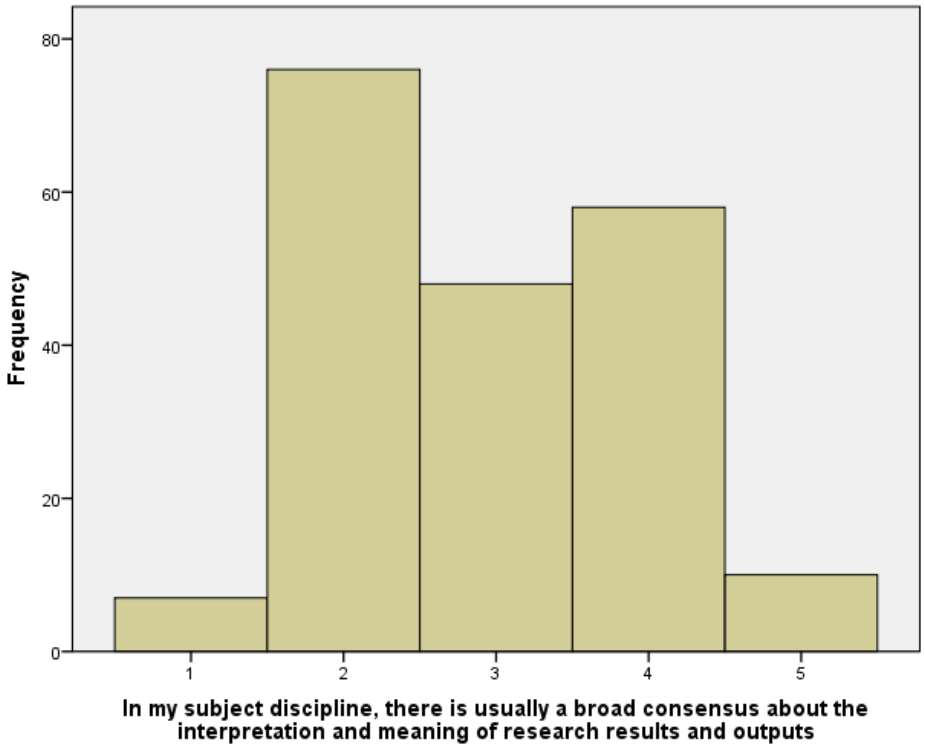

Frequency
80
60
40
20
0
1
2
3
4
5
In my view, keeping up to date with technology should be considered more important in my subject discipline

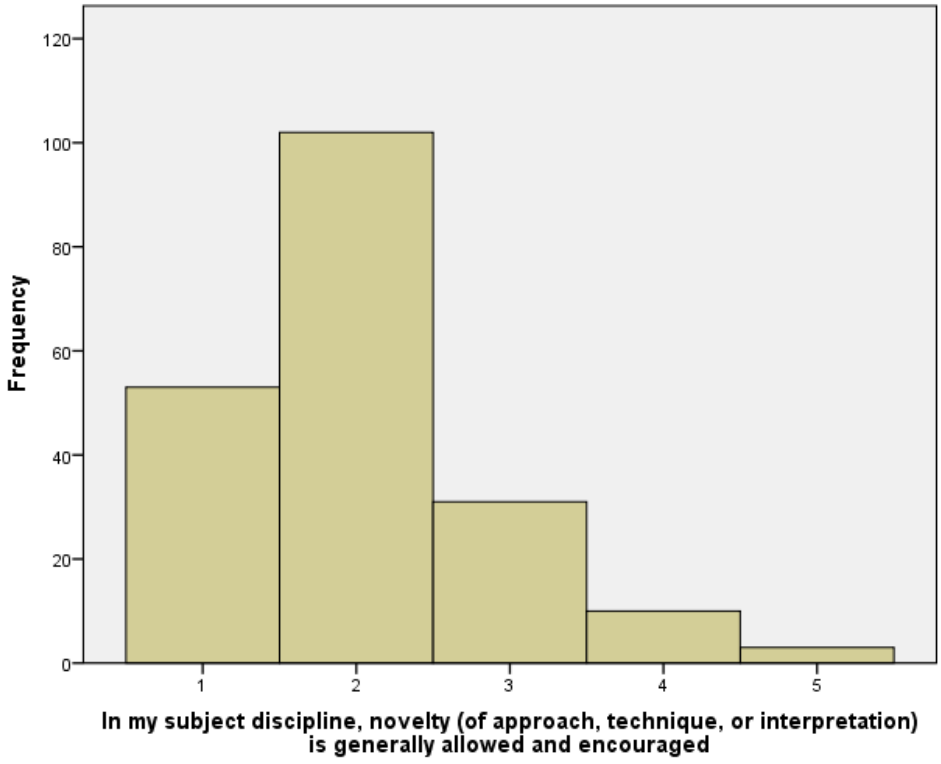

Frequency
100
80
60
40
20
0
1
2
3
4
5
Interdisciplinary work is generally important to my subject discipline

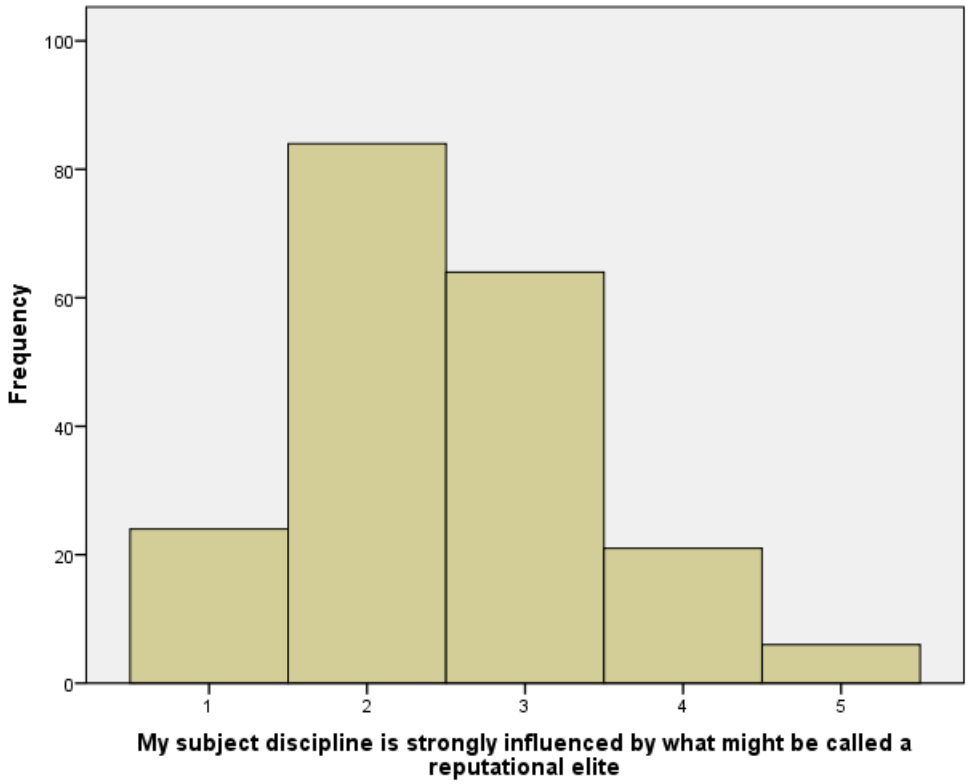

Frequency
120
100
80
60
40
20
0
1
2
3
4
5
The audience that my subject discipline shares its work with is generally varied and diverse


Frequency
80
60
40
20
0
1
2
3
4
5
It is important to take part in online social networks with academics working in the same subject discipline as myself


Frequency
80
60
40
20
0
1
2
3
4
5
It is important to take part in online social networks with academics from other subject disciplines


Frequency
80
60
40
20
0
1
2
3
4
5
In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs


Frequency
120
100
80
60
40
20
0
1
2
3
4
5
In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged



Moderate positive skews are evident in all questions to varying extents. This means that for all questions asked about discipline, responses cluster more closely around the lower values (1 and 2), which correspond to statements of agreement, than they do higher ones (4 and 5; disagreement). Question 1 is the most skewed at 1.3. Kurtosis is evident in all questions. Questions 2, 3, 6, 7 and 8 display negative (platykurtic) kurtosis, with a flatter than normal distributions and a wider, less pronounced peak. Values are spread more widely around the centre and there are less 'extreme' values. Questions 1, 2, 4, 5, 9 and 10 display positive (leptokurtic) kurtosis; responses are spread more evenly around the centre and there are higher densities of values at the extreme ends of the probability curve. However, in all cases, kurtosis values are small with most being near to the '0' of a normal distribution.

Notably, the relatively small IQRs are an indication of consensus rather than polarisation; questions 3, 7 and 8 have IQRs of 2 while the rest have an IQR of only 1. Questions 1, 4, 5, 9 and 10 have median values of 2; questions 2, 3, 6, 7 and 8 have median values of 3 (neutral). Overall, responses toward questions about discipline characteristics are centred by those which suggest general

agreement or neutrality, rather than *strongly* negative or positive feelings. Questions 1, 4, 9 and 10 are the most visibly skewed in one direction (negative skews; strong agreement). These are:

1. Keeping up to date with technology is generally important in my discipline
4. Interdisciplinary work is generally important to my discipline
9. In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged
10. My discipline is strongly influenced by what might be called a "reputational elite".

Each of these can be related to concerns identified in literature on both new media and changing structures of knowledge in academia. Before considering responses by discipline group, it is worth returning to the typology which informed both the sampling frame and the Likert items. Although Whitley (2000) does not necessarily "account well for contemporary multidisciplinary or transdisciplinary alliances" between research fields in contemporary HE (Fry and Talja, 2007, page 17) he does provide useful variables which can supplement research that *does* take account of them. The first of the areas listed above – technology - is not a particular focus of Whitley's typology although he states clearly that the increasingly technical nature of many subjects in both the sciences and humanities is changing the nature of HE (Whitley, 2000, page 53). The second, interdisciplinarity, is one which his work allows us to assess to some extent by considering, for instance, rigidity of control over the problems in a field, permitted contributors and audience variety.

The third and fourth (novelty and elitist control) are areas which the typology considers in detail but which, at the same time, much scholarship on technology and new media supposes to have altered significantly in recent years both in education and in society more generally. Writing on new media hypothesises or problematises a supposed 'democratisation' of knowledge and the breaking down of elitist hierarchies because of online and digital

technology. Likewise, digital and interdisciplinary projects are often said to encourage experimentation and novelty, although political agendas may limit these effects. It is worth exploring those items which generated strong responses from participants across disciplines in light of this.

COMPARATIVE DISTRIBUTION OF RESPONSES TO SELECTED LIKERT ITEMS ON DISCIPLINE CHARACTERISTICS, BETWEEN DISCIPLINES

These four items provide a good basis for comparison and a means by which we can assess whether the characteristics typical of particular academic fields have altered markedly in recent decades in comparison with Whitley's typology and, if so, whether the relative positions of disciplines have remained similar when considering the levels of difference between them on these measures.

Novelty (Likert item 9; Table 17 below) should be less in fields with higher levels of elitist control (Likert item 10; Table 18 below). According then to the interpretation of Whitley used in this research, academics in health science and computing science should assign a higher number of positive values to the importance of technology (Likert item 1; Table 15 below) than those in politics and in art and design. When we consider the importance placed on interdisciplinarity methods (Likert item 4; Table 16 below), those working in politics and international relations and in art and design should assign a larger number of high values than those in the other two fields, with health sciences tending most strongly toward lower values and art and design the highest number of positive values due to the space the field allows for meaningful contributions by amateurs and the less tightly controlled nature of the field in general.

Health science should also have a lower number of positive values in response to item 9 and a higher number of positive values for item 10. Art and design should demonstrate the reverse, being skewed toward agreement on the question of novelty and disagreement with regards to elitist control.

Computing science and politics would be somewhere in between although politics would be closer to art and design than to the health sciences.

The same descriptive statistical procedures described above were used for these four questions, this time, grouped by the variable discipline. Values obtained are shown below:

Likert item 1: The importance of technology in a field				
Field	Skewness	Kurtosis	IQR	Median
Art and Design	-.834	.665	1	4
Health Science	-1.477	-1.477	1	4
Computing science	-.947	-1.133	1	5
Politics and International relations	-.491	-.691	1	4

Table 18 - Selected statistics for Likert item 1, by discipline

Likert item 4: The importance of interdisciplinary work in a field				
Field	Skewness	Kurtosis	IQR	Median
Art and Design	-1.627	3.319	1	4
Health Science	-.670	.383	1	4
Computing science	-.593	-.072	1	4
Politics and International relations	-.046	-.499	1	4

Table 19 - Selected statistics for Likert item 4, by discipline

Likert item 9: Novelty of approach, technique and interpretation allowed in a field				
Field	Skewness	Kurtosis	IQR	Median
Art and Design	-1.441	2.535	1	4
Health Science	-.552	.254	1	4
Computing science	-1.258	3.379	1	4
Politics and International relations	-.476	-.443	1	4

Table 20 – Selected statistics for Likert item 9, by discipline

Likert item 10: Extent of influence of a reputational elite in a field				
Field	Skewness	Kurtosis	IQR	Median
Art and Design	-.378	-.586	1	4
Health Science	-.687	.507	1	3
Computing science	-.342	.373	1	3
Politics and International relations	-.991	.472	0	4

Table 21 - Selected statistics for Likert item 10, by discipline

Two findings are evident here – first, the small IQRs indicate that there is strong agreement between respondents in each particular field about these aspects of their discipline. This is most evident in question 10 for those working in politics. Skewness and kurtosis values indicate similar response

distributions across fields. Notably, all skews are negative, to varying degrees, indicating a tendency toward statements of agreement in *all* disciplines and in response to all items. In the case of politics, in response to item 9, there is a clearer difference, with kurtosis being negative, indicating that values are more widely spread than in a normal distribution, with less clustering around the centre.

An inspection of distribution tables for response frequencies shows that the relative positions of disciplines suggested by Whitley are reflected in these measures but not as firmly and clearly as would be supposed.

Keeping up to date with technology is generally important in my discipline				
Field	Response	Frequency	Percent	Valid percent
Health Science	Strongly Agree	17	32.7	32.7
	Agree	29	55.8	55.8
	Neutral	4	7.7	7.7
	Disagree	1	1.9	1.9
	Strongly Disagree	1	1.9	1.9
	Total	52	100.0	100.0
Computing science	Strongly Agree	54	71.1	71.1
	Agree	22	28.9	28.9
	Total	76	100.0	100.0
Art and design	Strongly Agree	24	43.6	43.6
	Agree	25	45.5	45.5
	Neutral	5	9.1	9.1
	Disagree	1	1.8	1.8
	Total	55	100.0	100.0
Politics and International relations	Strongly Agree	3	11.5	11.5
	Agree	14	53.8	53.8
	Neutral	4	15.4	15.4
	Disagree	5	19.2	19.2
	Total	26	100.0	100.0

Table 22 - Frequency of responses to Likert item 1 by discipline variable

In response to item 1, the majority of those working in computer science strongly agreed (32.7 percent) or agreed (55.8 percent) that keeping up to date with technology is important in their field. No respondents disagreed or were neutral. Less predictably, those in art and design were almost as much in agreement, with only 10.9 percent of respondents disagreeing or remaining neutral. More in line with Whitley's classification (or the interpretation used

here), there were higher amounts of disagreement in politics and international relations, at 19.2 percent. This is more than the total for all other disciplines combined.

On the question of whether interdisciplinary work is important, there was slightly more neutrality in politics than might be supposed (34.6 percent), and notably, more agreement in computing (80.3 percent), although this makes sense given that Whitley's work largely pre-dates the development of this discipline in the university ecology. Those in health science agreed almost as much as did those in art in design about the importance of interdisciplinary work (86.5 percent for strongly agree and agree, as opposed to 85.4 percent), which perhaps signals an interesting development. However, as noted by Fry and Talja (2007) the health sciences, although in many ways unified around common goals, are extremely varied and have "diverse research orientations" (page 7). Their own interdisciplinary nature may mean that they are generally less easy to model, particularly when fields are grouped together as here.

Interdisciplinary work is generally important to my discipline				
Field	Response	Frequency	Percent	Valid Percent
Health Science	Strongly Agree	19	36.5	36.5
	Agree	26	50.0	50.0
	Neutral	6	11.5	11.5
	Disagree	1	1.9	1.9
	Total	52	100.0	100.0
Computing science	Strongly Agree	26	34.2	34.7
	Agree	35	46.1	46.7
	Neutral	12	15.8	16.0
	Disagree	2	2.6	2.7
	Total	75	98.7	100.0
Art and design	Strongly Agree	23	41.8	41.8
	Agree	24	43.6	43.6
	Neutral	5	9.1	9.1
	Disagree	1	1.8	1.8
	Strongly Disagree	2	3.6	3.6
	Total	55	100.0	100.0
Politics and International Relations	Strongly Agree	5	19.2	19.2
	Agree	10	38.5	38.5
	Neutral	9	34.6	34.6

	Disagree	2	7.7	7.7
	Total	26	100.0	100.0

Table 23 - Frequency of responses to Likert item 4, by discipline variable

More variation was evident in the item which asked about novelty of approach, technique and interpretation. Here, strong agreement was less common than for other items, with most respondents in each group *agreeing* that novelty was encouraged (57.7 percent in health science, 53.9 percent in computing science, 41.8 percent in art and design and 50 percent in politics). There was more neutrality in health science and politics than in art and design and computer science, which is explicable when considering these latter disciplines as more creative enterprises wherein the type of "experiment" described by Adema (2012) is more common and where methodologies and methods are less rule-bound or scientific.

In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged				
Field	Response	Frequency	Percent	Valid Percent
Health science	Strongly Agree	5	9.6	9.6
	Agree	30	57.7	57.7
	Neutral	13	25.0	25.0
	Disagree	4	7.7	7.7
	Total	52	100.0	100.0
Computing science	Strongly Agree	26	34.2	34.2
	Agree	41	53.9	53.9
	Neutral	7	9.2	9.2
	Disagree	1	1.3	1.3
	Strongly Disagree	1	1.3	1.3
	Total	76	100.0	100.0
Art and design	Strongly Agree	22	40.0	40.0
	Agree	23	41.8	41.8
	Neutral	7	12.7	12.7
	Disagree	1	1.8	1.8
	Strongly Disagree	2	3.6	3.6
	Total	55	100.0	100.0
Politics and International relations	Strongly Agree	3	11.5	11.5
	Agree	13	50.0	50.0
	Neutral	6	23.1	23.1
	Disagree	4	15.4	15.4
	Total	26	100.0	100.0

Table 24 - Frequency of responses to Likert item 9, by discipline variable

In three of the four disciplines sampled, most academics agreed that reputational elites were a strong influence on their field. According to Whitley, who links lower reputational autonomy with tightly controlled fields, this would be expected in the health sciences, but certainly not in art and design or in politics, where there were considerably higher levels of agreement than elsewhere with 76.9 percent agreeing or strongly agreeing. In computing science there was most neutrality (46.1 percent) and less strong agreement (5.3 percent) on this point. This fits well with Whitley's description of "artificial intelligence" (i.e. computing science) as an emerging domain with "a diversity of audiences and goals" despite a strong "core of technical expertise and skills" (page 191) making it somewhat unique when compared to more established fields that are reliant on standardised symbols and notation (page 109) while being more prone to elitist governance.

Politics is an interesting and somewhat contradictory case because Whitley (2000) describes it as being relatively open in terms of reputational control but also subject to "temporary and unstable" control by "dominant coalitions and "charismatic reputational leaders" (page 159). There was no strong disagreement between participants in politics *or* art and design about the influence of a reputational elite, contrary to what might have been expected. Fourteen point five percent agreed and 43.6 percent strongly agree on this point in art and design, with only 12.7 percent disagreeing. In politics and international relations, only 7.7 percent disagreed, with 15.4 percent strongly agreeing and 61.5 percent agreeing. Again, this may highlight the some of the ways in which Whitley's typology does not sufficiently explain disciplines in the modern university, particularly those outwith the sciences.

This brings back to mind some comments made by interviewees during phase one of empirical data gathering about the notion of "star cultures" and of people being "held up as experts" online who may not be respected sufficiently in the academy. These comments indicated that understandings of reputational elites are distinct from the elites described by Whitley; he refers

to respected academics within a discipline rather than those operating outside it who take on an influential status. The fact that such elites may form in less tightly controlled fields does however suggest that his analysis of the 'fragmented adhocracy" is correct. It also suggests that computing science is an interesting and atypical case, not quite fitting any of his descriptive categories.

My discipline is strongly influenced by what might be called a reputational elite					
Fields combined			Frequency	Percent	Valid Percent
Health Science	Valid	Strongly Agree	8	15.4	15.4
		Agree	21	40.4	40.4
		Neutral	17	32.7	32.7
		Disagree		5.8	5.8
		Strongly Disagree	3	5.8	5.8
		Total	52	100.0	100.0
Computing science	Valid	Strongly Agree	4	5.3	5.3
		Agree	24	31.6	32.0
		Neutral	35	46.1	46.7
		Disagree	9	11.8	12.0
		Strongly Disagree	3	3.9	4.0
		Total	75	98.7	100.0
	Missing	System	1	1.3	
	Total		76	100.0	
Art and design	Valid	Strongly Agree	8	14.5	15.7
		Agree	24	43.6	47.1
		Neutral	12	21.8	23.5
		Disagree	7	12.7	13.7
		Total	51	92.7	100.0
	Missing	System	4	7.3	
	Total		55	100.0	
Politics	Valid	Strongly Agree	4	15.4	16.0
		Agree	16	61.5	64.0
		Neutral	3	11.5	12.0
		Disagree	2	7.7	8.0
		Total	25	96.2	100.0
	Missing	System	1	3.8	
	Total		26	100.0	

Table 25 - Frequency of responses to Likert item 10, by discipline variable

The statistics explored here provide some useful initial insights into characteristics of the samples achieved and the extent to which attitudes toward discipline characteristics appear to diverge within and across groups. There are indications of variance in the dataset according to discipline, and particularly strong responses to four Likert items in particular. Those responses suggest that the relative position of disciplines has changed in some important ways. The homogeneity of responses on certain key points echoes some of the insights gained during analysis of the first empirical data gathering exercise. The similarity of computing science and art and design on some measures is notable when we consider the development and increasing relevance of the digital humanities and digital art practises. The greater perceived allowance for novelty of those working in the health sciences is notable also.

More complicated tests are required to support regression analysis and an assessment of the significance or otherwise of homogeneities and differences – i.e. to analyse the data more closely in relation to both discipline and other variables. Choosing which tests to use is complicated by disagreements about which are most suitable for non-parametric and heteroscedastic data (where sub-populations have different distributions). This can be a particular problem when sample sizes are unequal as is the case here (cf. McDonald, 2014, page 138, page 157). The Kruskal-Wallis test is generally robust in such cases and was used to further explore the significance of differences by discipline.

VARIANCE IN RESPONSES TO LIKERT ITEMS ON DISCIPLINE CHARACTERISTICS, BETWEEN DISCIPLINES

A Kruskal-Wallis test allowed us to reject the null hypothesis – that the mean ranks of the groups are the same – for 8 out of 10 questions, as shown in Table 13 below. Eight questions had p values of less than .05.

Question	Chi Square	df	Asymp. Sig.
Keeping up to date with technology is generally important in my discipline	43.231	3	.000

In my view, keeping up to date with technology should be considered more important in my discipline	22.662	3	.000
In my discipline, there is usually a broad consensus about methods and techniques	8.776	3	.032
Interdisciplinary work is generally important to my discipline	10.523	3	.015
The audience that my discipline shares its work with is generally varied and diverse	4.724	3	.193
It is important to take part in online social networks with academics working in the same discipline as myself	4.901	3	.179
It is important to take part in online social networks with academics working in different disciplines from myself	9.677	3	.022
In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	15.970	3	.001
The audience that my discipline shares its work with is generally varied and diverse	23.871	3	.000
My discipline is strongly influenced by what might be called a "reputational elite"	13.433	3	.004

Table 26 - Results from a Kruskal-Wallis test assessing variance in mean ranks by grouping variable: discipline

This indicates that responses are significantly different between sub-populations (discipline groups) in response to these eight questions, with variance between disciplines not simply due to chance or the sampling procedure used.[10] Generally, the mean ranks for politics were lower than for the other three groups (this is true for 80 percent of questions) with responses generally tending to disagreement and only in one was it distinctly higher than any of the rest (question 10, on reputational elites, as discussed above). The relative positions of mean ranks in art and design, computer science and health science were unpredictable, with each switching between first and second positon about equally. Traditional distinctions may remain intact more

[10] The full list of mean ranks is provided in Appendix XI, allowing closer assessment of which disciplines in particular vary, as do further tests described below on page 196.

clearly in some disciplines and on some measures than they do in others, meaning the typology has less explanatory power than in the past.

For instance, responses from those working in politics were most clearly distinct from those in other disciplines on an inspection of ranks, and had a clearer pattern or profile (e.g. more disagreement than agreement on many measures alongside one of the strongest responses, to item 10). This discipline community seems then more distinct according to the measures used in Whitley's typology, yet it is not positioned on those measures in the same way as he describes. Analysing the responses given to the online questionnaire, attitudes toward politics as a discipline might be summarised as follows:

Politics and International Relations	
Characteristic	Attitudes
Technology	Not as much need or desire to keep up to date with technology as in other disciplines
This fits somewhat with Whitley's depiction of the field.	
Social networks	More important to take part in networks with those in the same field rather than those in others. This was felt to be less important than in other disciplines.
This is not made clear in Whitley's typology although interdisciplinary networks might be expected to be more important using some of his other measures e.g. audience variety is high. It could be that because a field is less well defined, less tightly controlled and more fluid, describing and identifying opportunities to contribute to the aims of those in possibly more controlled disciplines is complicated, hence a focus on building networks *within* the field would be more important for the accomplishment of key activities.	
Interdisciplinarity	Again, this was not felt to be as important as it was to those in other disciplines.
This is not made clear in Whitley's typology although it might be expected to be more important using some of his indicative measures.	
Consensus	Not as much consensus about methods or the interpretation of results as in other fields.
This fits with Whitley's depiction of the field.	
Audience	Not as varied as in other disciplines
This somewhat contradicts Whitley's depiction of the field.	
Novelty	Not encouraged as much as in other disciplines
This somewhat contradicts Whitley's description of the field.	
Reputational Elite	The influence of a reputational elite was felt more strongly than in other disciplines

Table 27 – A summary of the most common attitudes in politics and international relations to discipline characteristics, extrapolated from an analysis of mean ranks.

According to the interpretation of Whitley's typology used in this research (see pp.39-46), politics combines elements of the partitioned bureaucracy with elements of the fragmented adhocracy, where he positions it. With low to medium functional and strategic dependence, task uncertainty is moderate at both the strategic and functional levels. At times political scientists produce analytical, specific knowledge and at others ambiguous, empirical knowledge. In the periphery, problem formulations and descriptions are rather looser than they are in the core control procedures are generally impersonal and formal. The characteristics of the field as seen by those working in it, fits well with this inclusion of the partitioned bureaucracy, suggesting a greater presence of hierarchies and control over access to critical resources. This may reflect changing funding models and methods in the social sciences. Audience variety should however be higher than it is perceived to be by respondents, in both the fragmented adhocracy and the partitioned bureaucracy.

The other disciplines assessed have evidently shifted such that they have become more similar on many measures than in the past, at least, in the views of those working in them.

Further post-hoc analysis of the statistics generated by the Kruskal-Wallis test was required to ascertain which disciplines varied in a way which was statistically significant, with each pair of disciplines compared in turn.

SIGNIFICANT DIFFERENCES IN RESPONSES TO LIKERT ITEMS ABOUT DISCIPLINE CHARACTERISTICS, BETWEEN DISCIPLINES

A series of Mann Whitney U-tests (the Bonferonni adjustment made to avoid Type 1 errors gave us a p value of .08) showed distribution differences to be

at a statistically significant level between pairs for 46.7 percent of all questions (28 out of 60 combinations)[11]. A breakdown by paired disciplines is a follows:

Disciplines paired	Number of significantly different questions (variance in mean ranks of responses)	Questions
Computing science and politics	7	1,2,3,4,8,10
Health science and politics	5	1,2,3,4,8
Art and design and politics	5	1,2,4,7,9
Art and design and computing	5	1,6,7,8, 10
Health science and computing	3	1,2,9
Art and design and health sciences	3	7,8,9

Table 28 - Significant differences in responses to Likert items on discipline, between discipline pairs

Likert item 1 – Keeping up to date with technology is generally important in my discipline – exhibited the most variance, with statistically significant differences in all possible pairs with the exception of art and design and the health sciences. Responses to item 2 – In my view, keeping up to date with technology should be considered more important in my discipline – varied significantly in 4 out of 6 possible pairs. Responses to item 3 – in my discipline there is generally a consensus about methods and techniques – varied significantly between only 2 and for item 4 – Interdisciplinary work is generally important in my discipline –between 3. Responses to item 6 – It is important to take part in social networks with academics in the same discipline as myself – varied significantly between only 1 pair. For item 7 – it is important to take part in online social networks with academics in other disciplines – responses between 3 pairs varied significantly as they did for item 8 – in my discipline, there is generally a broad consensus about the meaning and interpretation of research results and outputs. Responses to item 9 – in my discipline, novelty

[11] The full set of statistics resulting from the Mann-Whitney test is provided as an appendix.

of approach, technique or interpretation is generally encouraged – varied significantly between 3 pairs. Responses to item 10 – my discipline is strongly influenced by a reputational elite - varied significantly only between 2. This is summarised in the table below, from highest to lowest.

Likert item (question)	Number of discipline pairs wherein statistically significant variance in responses to this item was evident
1	5
2	4
4	3
8	3
9	3
3	2
7	2
10	2
6	1
5	0

Table 29 - Significant variance between pairs to Likert items about perceived discipline characteristics.

Proceeding on the assumption of differences between disciplines is clearly valid, with Whitley's typology providing useful measures of difference. As in previous analyses, it appears that politics and international relations are notably distinct from other disciplines and in less agreement with them; responses there varied far more in comparison with other disciplines than did those of any other single group. Again, questions about whether keeping up to date with technology was important in a discipline provoked the most disagreement (or variance) between pairs, which is significant for explorations of new media. These were closely followed by questions about interdisciplinary work, consensus formation over the interpretation of results, and the extent to which novelty was permitted in a discipline.

Nonetheless, interpreting these variances using Whitley's model is not straightforward; that response patterns and differences are unclear and unpredictable. In some cases, disciplines traditionally more distinct move

closer together on some measures and further apart on others. Every possible combination of discipline pairs converges at one moment, and then diverges at another, to varying extents and at times in unexpected directions. It seems likely that this relates to the increased centrality of debates about interdisciplinary work, technology and novelty which have accompanied substantial changes in HE – as evident in policy changes, changes in disciplinary cultures and a wider set of both agendas and methods.

To explore the new media terms and concepts encoded in the semantic differential charts, employing techniques not predicated only on the variable discipline and the use of a disciplinary lens would be beneficial, potentially allowing further insights and more detailed contextualisation of these findings.

Insignificant Differences in responses to Likert items on discipline characteristics, between Disciplines

It is notable that the two questions with the greatest similarity of responses across fields pertain to key current issues around information sharing, audiences and networks. The questions showing *insignificant difference* when all disciplines are considered (items 5 and 6, with values of .193 and .179 respectively) directly address two major modern aspects of academia which have become more pronounced in the years since Whitley constructed his typology:

- The audience that my discipline shares its work with is generally varied and diverse
- It is important to take part in online social networks with academics working in the same discipline as myself

The statistical homogeneity on these points lets us interpret the data from an interesting perspective – that of cultural convergence. Currently common to all disciplines is the expectation of an increased visibility both within disciplinary communities, and beyond them (Nowotny et al., 2002; Whitley, Gläser and Engwall, 2010). Overall, 73.2 percent of respondents agree (51.2)

or strongly agree (22.0) that the audiences they share their work with are varied and diverse. Even in disciplines where a varied audience has not traditionally been an aim (e.g. Health Science), responses are largely positive (71 percent). This may be seen to reflect an increased focus on 'knowledge transfer', wider dissemination, and the engagement of non-traditional audiences. There is now an expectation that audiences for academic work in *all* disciplines be more diverse, and it appears that most academics feel this is being achieved in their fields. There is also a strong emphasis at present on social networking.

The audience that my discipline shares its work with is generally varied and diverse					
Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	46	22.0	22.1	22.1
	Agree	107	51.2	51.4	73.6
	Neutral	33	15.8	15.9	89.4
	Disagree	20	9.6	9.6	99.0
	Strongly Disagree	2	1.0	1.0	100.0
	Total	208	99.5	100.0	
Missing	System	1	.5		
Total		209	100.0		

Table 30 - Response frequencies to Likert item 5, across disciplines

It is important to take part in online social networks with academics working in the same discipline as myself					
Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	19	9.1	9.1	9.1
	Agree	69	33.0	33.0	42.1
	Neutral	74	35.4	35.4	77.5
	Disagree	41	19.6	19.6	97.1
	Strongly Disagree	6	2.9	2.9	100.0
	Total	209	100.0	100.0	

Table 31 - Response frequencies to Likert item 6, across disciplines

When asked however if taking part in online social networks with others in their field is important, only 33 percent agreed, with 9.1 percent agreeing strongly and 35 percent remaining neutral. Twenty-two and a half percent disagreed or strongly disagreed. Internet-based channels for academic interactions have been popularised through both external and internal strategies for research and teaching yet convictions about the validity of these approaches are less strong among academics in all four disciplines sampled. Interestingly, while the median values in response to Q4 ("Interdisciplinary work is generally important to my discipline") were generally positive (4.00 for all groups), those for Q3 – about online social networks and interdisciplinarity – were lower (a neutral 3.00 value for all groups). This may suggest a stronger concern among academics toward the fundamental characteristics and purposes of their disciplines (whether traditional or otherwise) than with the tools and technologies currently being promoted to support them.

SEMANTIC DIFFERENTIALS: SCALE RELIABILITY

The 12 pairs of semantic differentials, selected following analysis of results obtained during phase one of empirical data gathering and reliability testing of the scale, are described below.

In my view, new media are, in nature…

Private	3	2	1	0	1	2	3	Public
Elitist	3	2	1	0	1	2	3	Egalitarian
Deliberative	3	2	1	0	1	2	3	Participative
Fixed	3	2	1	0	1	2	3	Fluid
Emergent	3	2	1	0	1	2	3	Pre-defined
Inclusive	3	2	1	0	1	2	3	Exclusive
Objective	3	2	1	0	1	2	3	Subjective
Faddish	3	2	1	0	1	2	3	Grounded
Deep	3	2	1	0	1	2	3	Shallow
Passive	3	2	1	0	1	2	3	Active
Social	3	2	1	0	1	2	3	Isolating
Reliable	3	2	1	0	1	2	3	Unreliable

Table 32 – The semantic differential pairs used for data gathering

Key terms and concepts from particular genres or discourses of new media were identified through a wide-ranging literature review that included texts from multiple fields (primarily in the Humanities and Social Sciences) which consider new media. For reasons previously stated, the generic category of "new media" was selected as the stimulus that would be rated in relation to these. In order to encourage a diversity, and in an attempt not to steer or limit interpretation, questionnaire respondents were instructed that although they might usefully structure their thoughts by thinking about particular instances of new media such as Facebook, Twitter or digital art installations, they should keep an open mind and respond to the stimuli of new media more generally. This was important because discussions during the first data gathering phase suggested a synonymy for most academics of new media and social media.

Many Semantic Differential scales use adjective pairs which can be simplistically understood as 'negative' or positive' (such as 'good-bad' or 'clean-dirty'). This makes it easier to conduct statistical analyses and to assess

scale reliability; i.e. to find a correlation between responses to items that suggest the same underlying construct is being measured. To do this, terms positioned in reverse to avoid response bias must first be 'corrected'. Naturally, terms and constructs cannot always be so clearly divided, and this may be problematic.

To proceed with analysis, terms which in the context of new media are generally considered negative (for instance, "elitist" and "faddish") were reversed. Missing values were replaced using linear interpolation, a procedure which estimates what the value would have been, using the last valid value before the missing value and the first valid value after the missing value for the interpolation.

The Cronbach alpha values obtained for scale reliability were acceptable but rather low (.719). This is likely attributable to the complexity of the stimulus and constructs (scale items) used. Six pairs using rather more complex terminology were removed entirely as their corrected item total correlation values were too low (less than .3), compromising the scale's utility. These are shown in Table 19 below.

Immaterial	3	2	1	0	1	2	3	Material
Time-biased	3	2	1	0	1	2	3	Space-biased
Procedural	3	2	1	0	1	2	3	Exploratory
Work-biased	3	2	1	0	1	2	3	Play-biased
Tactile	3	2	1	0	1	2	3	Virtual
Socially-constructed knowledge	3	2	1	0	1	2	3	Individually-constructed knowledge

Table 33 – Complex terms removed to improve scale reliability

DISTRIBUTION OF SUBJECTIVE RESPONSES TO SEMANTIC DIFFERENTIAL CONSTRUCTS, ACROSS DISCIPLINES

The same non-parametric properties evident in responses to Likert items were evident the interval data gathered from the semantic differentials – i.e. the scores on the dependent variable of attitudinal strength. Skewness and kurtosis were in evidence in responses to all 12 semantic differential constructs (i.e. adjective pairs). Rather than summing the semantic differential

scales, responses to each pair were considered separately, for each discipline groups. Appropriate non-parametric tests were used for analysis, as is described further below.

DIFFERENCE IN RESPONSES TO SEMANTIC DIFFERENTIAL CONSTRUCTS, BY DISCIPLINE

A Kruskal-Wallis test found no statistically significant difference in the majority of semantic differential item scores grouped by discipline. This is shown in Table 34 below.

Construct	Private Public	Elitist Egalitarian	Fixed Fluid	Deliberative Participative	Faddish Grounded	Passive Active
Asymp. Sig.	.338	.849	.315	.310	**.030**	.549
Construct	Inclusive Exclusive	Objective Subjective	Social Isolating	Emergent Predefined	Reliable Unreliable	Deep Shallow
Asymp. Sig.	.258	**.013**	**.026**	.185	.684	.398

Table 34 - Selected output from a Kruskal-Wallis test for variance by discipline

The three which did vary by discipline were Social-Isolating (.026), Objective-Subjective (.013) and Faddish-Grounded (.030). Representing just 16.6 percent of the total number of semantic differential constructs, it appears that discipline is not the best or simplest means through which stated academic attitudes to media can be assessed. Discipline does not straightforwardly dictate what they believe the meanings and characteristics of new media to be; at least, when responding to the constructs and concepts presented to them as part of this research, which were identified from an extensive literature review.

Academics working in traditionally distinct fields exhibit more variance when assessing the organisational and cultural aspects of their discipline, as discussed above. So too, do they reveal more variance in published works on the topic of new media, where they are able to critique them in depth and for an audience.

DIFFERENCE IN RESPONSES TO SEMANTIC DIFFERENTIAL CONSTRUCTS BY OTHER VARIABLES

A Kruskal-Wallis test showed the absence of significant difference in scores for any semantic differential items when grouping by expertise (i.e. whether or not a respondent was particularly knowledgeable about new media and/or digital technologies). There *were* significant differences in the scores of males and females for three semantic differential items. These are:

Faddish-grounded (.015); Deep-Shallow (.031) and Reliable-Unreliable (.030).

An inspection of the mean ranks (these are provided in Appendix XIII) shows that compared to men, women find new media somewhat more grounded, deeper and reliable, being possibly less sceptical. Inspecting histograms and skewness and kurtosis values suggests that differences are slight.

As previously stated, any differences according to these variables would need further research and is not in keeping with the aims of this thesis.

FACTOR ANALYSIS OF SEMANTIC DIFFERENTIAL RESPONSES

Having ascertained a lack of strong variance by discipline, factor analysis – a method of analysis *not* reliant on discipline grouping, and which treats the dataset as a whole to identify patterns and correspondences – was utilised. This allows us to determine "the smallest number of factors that can be used to best represent the interrelationships among the set of variables" (Pallant, 2010, p.183). The non-parametric distributions of responses to individual pairs of terms are not a problem here because the dataset is being treated as a whole and overall it shows a fairly normal distribution. A Kaiser-Meyer-Olkin test confirmed the adequacy of the sample size for this analysis, with values greater than .6 reported by SPSS; Bartlett's test of sphericity also demonstrated statistical significance with p values of less than .05.

Although 4 factors could be identified, only 2 of these featured pairs that loaded highly (above .3), hence a 2 factor solution – with 7 pairs loading highly on one and 4 on a second – was obtained using a principal axis factoring

method, and with coefficients smaller than .3 excluded, meaning that only values loading highly on identified factors were displayed. Using the MonteCarlo technique, a 2-factor solution was further confirmed as the most valid and justifiable, based on the data. Assuming that factors might be related (as is usual when dealing with psychological constructs (ref, Field, 2013)) an oblique (Varimax) rotation[12] with Kaiser Normalization was used. This rotation was converged in 9 iterations.

Items loading highly and similarly on each factor can be grouped together to represent an underlying dimension of attitudes to new media. The first factor (or component) identified deals with the flexibility and activity supported by the structures of participation, form and meaning underlying new media. To what extent does change and plurality supplant stability? This might be termed "Inclusiveness". The second factor deals with traditional measures of trustworthiness and reliability and might be labelled "Fitness for Scholarly Purposes". On this second factor there are negative loadings. These are just as strong as positive ones but suggest that low 'levels' of the variable correlate to high levels of the factor. In other words, respondents tended to consider new media as being more shallow, subjective, unreliable and faddish than they did deep, objective, reliable and grounded and they did so in ways which suggested a relationship between those perceptions and constructs.

[12] As Walker and Maddan (2012) note, "Early in the development of factor analysis, oblique rotation was considered unsound as it was a common perception that the factors should be uncorrelated with each other. Thurstone began to change this perception in his 1947 work, in which he argued that it is unlikely that factors as complicated as human behavior and in a world of interrelationships such as our society could truly be unrelated such that orthogonal rotations alone are required. It has since become more accepted to use oblique rotations under some circumstances" (page 472).

Pattern Matrix		
	Factor	
	1	2
EmergentPredefined	.604	
InclusiveExclusive	.507	
ActivePassive	.454	
FluidFixed	.535	
ParticipativeDeliberative	.543	
PublicPrivate		
SocialIsolating	.465	
EgalitarianElitist	.494	
DeepShallow		-.739
ObjectiveSubjective		-.673
ReliableUnreliable		-.735
GroundedFaddish		-.518

Table 35 – The pattern matrix obtained through factor analysis

These two factors suggest a rather practical, logical and generic interpretation by academics of what it is important to consider when assessing new media, particularly in educational settings. Positive and negative attitudinal associations or value judgements are apparent and are represented by each one. For instance, researchers, teachers and their students are generally expected to be active, inclusive, and to participate; these are promoted as positive values for the institution, and also as positive aspects of new media (see Chapter 2: Part I of this thesis, pp.30-37; Chapter 2: Part II of this thesis, pp.45-96; Nowotny, Scott and Gibbons, 2001 and Eijkman, 2008, for examples). New media are thus largely perceived in this way, across disciplines. It is also likely that many respondents are those "savvy strategists" described by Woolger and Coopmans (2006, page 19), officially acquiescing with dominant information society rhetoric" (Karim, 2001, page 113) while retaining an innate caution typical of the scholarly mind (page 20).

At the same time, it is fundamental (to most disciplines) that reliability and objectivity are privileged above uncertainty and subjectivity; traits which (rightly or wrongly) are commonly attributed to the content of many new or social media sites and services. Such solid dimensional underpinnings may explain the lack of variance by discipline described earlier, particularly in the

context of *workplace* (as distinct from both personal spaces and the spaces provided in academic communicative fora).

The only pair of terms which cannot convincingly be associated with a factor is private-public; hence these might be retained as a separate pair, representing a distinct dimension in future instruments measuring attitudes to new media. It is worth noting that it less straightforward to assign negative implications to one or the other term in this instance than it is with others used in the differential charts – for instance, public could imply loss of privacy and an undesired visibility of content, or it could imply participation and positive visibility in the public sphere. This suggests, as noted previously, that more complex constructs and ideas which are less easy to classify as 'good' or 'bad' are not best suited to the semantic differential or to statistical methods of analysis. More complex and nuanced terms (e.g. materiality, space, time and the nature of knowledge constructs) had to be excluded from the instrument, quite possibly as these do not elicit a quick and well-rehearsed response, and cannot be so simply coded.

CHAPTER SEVEN: CONCLUSIONS

This research has allowed many interesting conclusions to be drawn about how UK academics understand both the characteristics of their fields (those fields being representative of distinct disciplines), of new media, and of how and when those understandings inter-relate. Several findings result from the analysis of original, quantitative data gathered via an online questionnaire and semantic differential exercises. Others are informed (where relevant) by the analysis of interview transcripts and activity sheets gathered during phase one of empirical data gathering. All are informed by qualitative analyses of a diverse body of literature on higher education, digital technologies and new or social media. Each of these enriches the other. The thesis also allows an exploration of and conclusions on the mixed methodology employed, with assessments of which methods were most useful and how these might be used in future research.

The original contribution of the thesis is thus an enriched understanding of what new media mean to academics both symbolically and practically at a time of immense technological and organisational change, and of the methods that have helped us reach that understanding.

An analysis of commonalities and differences in emerging and conventional disciplinary structures suggests a stronger influence of the practical rather than symbolic influences of discipline on academics' attitudes toward new media. A homogenisation of attitudes is found across not only disciplines, but genders, age groups, and experience levels.

At the same time, while these findings echo those of other research, strong conceptual and methodological differences remain evident in debates about new media in much scholarly literature, primarily that drawn along disciplinary lines, or for a specialist audience. This suggests two equally important positions from which academics assess new media; those rooted in disciplinary modes, and those common to multiple practitioners and audiences in the

academic 'workspace'. This can be seen as symptomatic of the new managerial models for research, teaching and assessment currently prevalent within HE.

In this chapter, key findings are discussed and related to the aims and objectives set forth previously. First, findings from primarily quantitative data on attitudes to new media are presented. Attitudes toward discipline characteristics (again, from primarily quantitative data) are then described before the sampling frame and the theory underpinning it are assessed. Literature reviews undertaken for the thesis are shown to supplement and better explain the statistics, enriching analysis. Finally, key findings about the suitability of the mixed methodology employed are presented.

All of this must be qualified by an acknowledgement that the sample achieved for empirical data gathering was modest. At the same time, findings are enhanced and strengthened by insights derived from the complex and multi-disciplinary literature reviews of the thesis.

THE ATTITUDES OF UK ACADEMICS TO NEW MEDIA AND DISCIPLINE

AIM

1. To measure the attitudes of academics in UK HE to new media by identifying the conceptual and practical terminology that they associate with them.

OBJECTIVE

1. Gather and analyse original empirical data on the attitudes of UK academics toward both their discipline communities and new media technologies and concepts across four traditionally distinct disciplines, sampled strategically.

KEY FINDINGS ON ATTITUDES TO NEW MEDIA

It appears that using and learning about new media gives academics a chance to engage with a greater diversity of concepts and techniques than would traditionally be associated with their specific field or its communication

technologies, so caught up are they in interdisciplinary debates. Respondents from across disciplines demonstrated a clear willingness to engage with both practical and abstract aspects of new media, using terms drawn from multiple fields; at least, insofar as they completed an online questionnaire without confusion. It was only in 3 percent of cases that 'no response' was recorded when they were asked to assess new media in relation to diverse adjective pairs. These terms derived from a wide range of literature in information science, politics, philosophy, organisational studies, business studies, media and cultural studies thus representing a variety of disciplinary, epistemic and socio-cultural perspectives.

At the same time, the strength of feeling or association demonstrated in that literature was not apparent in responses to the semantic differentials. The generally neutral response to conceptual constructs across disciplines did not reflect the critical (and often polemical) discourses evident when new media is a topic of academic *research*. Further, some such terms, when included, compromised scale reliability. In this light, attitudes toward new media appear not to be anchored by distinct epistemological boundaries or points of differentiation.

The strongest finding from quantitative data analysis was that academics appear to assess new media in relation to two generic and practical factors – *Flexibility* and *Fitness for Scholarly Purposes*. This conclusion derives from a factor analysis performed on the semantic differential data across fields and without consideration of the discipline variable, following findings from the Likert item analysis on the relationship of discipline and technology.

The first of these factors relates to the types of activity and the participatory structures enabled or supported by new media. Their perceived flexibility in terms of inclusiveness and individual agency is seen here as positive. The second factor relates to traditional measures of trustworthiness and reliability. Here, new media are more problematic, with academics appearing to find in them a lack of objectivity and a certain 'faddish' quality. New media are regarded as instruments or tools. Their 'fitness for purpose' is of more

importance than questions of essence and they are assessed primarily in terms of how suitable they are for the tasks, duties and professionalised imperatives of an academic workplace.

These findings correspond with those of Rogers (2000) who proposed three cycles of technology adoption within HE, each representing a different level of innovation or "vision" (page 50). It was found that most faculty members and institutions of higher education operate (i.e. perceive and adopt technology) almost entirely within the first two proposed cycles, which are less innovative and more familiar; researchers and teachers view new digital technologies as "personal productivity aids" or "enrichment add-ins" rather than as parts of a paradigm shift involving bottom-up redesign, although some institutions [and individuals] are more visionary than others (page 54). When assessing how business faculty members might be encouraged to integrate laptops into their teaching processes, Hall and Elliott (2003) found the same (page 305).

Surprisingly, in the data gathered for this thesis, there were few to no observable differences in attitude by gender, age or career length. This somewhat counter-intuitive finding is also in keeping with recent research. A study conducted by the University of Tennessee and CIBER Research Ltd. (2013) to "examine how emerging digital behaviours are challenging and, perhaps, changing long-held concepts of trust and authority in the world of scholarly research" (page 2) reached similar conclusions. Reporting on the analysis of both qualitative and quantitative data it found that although there were some differences,

> In general, for the focus groups and interviews, there was a surprising uniformity about the views, perceptions and behaviour of researchers in respect to trust issues, irrespective of differences in subject, country, age/experience and institutional background. If anything, scholarly communication appears to [be] becoming standardized and commoditised (University of Tennessee and CIBER Research Ltd., 2013, page 14).

Although viewed as extremely beneficial for informal collaboration with colleagues and to reach a wider public, social media were not seen as particularly trustworthy or desirable channels for publication and were not likely to be seen as the most credible sources for citation (page 57). Likewise, while "Researchers from developing countries and young researchers were most supportive of open access initiatives", their levels of trust in them, and their preference for traditional publication routes were similar to those in older age groups (page 58).

New media have become parts of the academic toolkit; a common assessment of their nature and utility seems to have emerged in UK HE across disciplines that remain distinct by many measures. This is likely to be both a consequence of top-down, increasingly centralised and 'one size fits all' strategies concerning the use of new media for research and teaching, and the persistence of traditions located and entrenched at academia's 'core'. Whether such normative pressures are positive or negative is a matter of considerable critical debate, with a smaller number of academics hoping for greater experimentation, flexibility and deviation. The research described here contributes to these debates.

There is some reason to believe from the quantitative data that politics remains quite distinct from other fields; more sceptical attitudes were in evidence in that field than were evident in others. Art and design is also somewhat distinct in terms of its relationship to new media. Further research in these fields would be worthwhile. Overall the uniformity of response obtained hints at a flattening out of the critical engagement found in literature on new media and higher education.

KEY FINDINGS ON ATTITUDES TOWARD DISCIPLINE CHARACTERISTICS

The analysis of data from questions about the nature of disciplines reveals statistically significant differences between the four sampled fields using 8 out of 10 measures (Likert scale items). Eight questions posed about discipline characteristics had p values of less than .05. Below a list of the questions

showing significant differences is provided, with question numbers as indicated. Actual statistics (the results of the Kruskal-Wallis test) are presented in Table 26 above, on page 195.

1. Keeping up to date with technology is generally important in my discipline
2. In my view, keeping up to date with technology should be considered more important in my discipline
3. In my discipline, there is usually a broad consensus about methods and techniques
4. Interdisciplinary work is generally important to my discipline
7. It is important to take part in online social networks with academics working in different disciplines from myself
8. In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs
9. The audience that my discipline shares its work with is generally varied and diverse
10. My discipline is strongly influenced by what might be called a "reputational elite"

This indicates that responses are significantly different between sub-populations (discipline groups) in response to these eight questions, with variance between disciplines not simply due to chance or the sampling procedure used.[13] Generally, the mean ranks for politics were lower than for the other three groups (this is true for 80 percent of questions) with responses generally tending to disagreement and only in one was it distinctly higher than any of the rest (question 10, on reputational elites, as discussed above). The relative positions of mean ranks in art and design, computer science and health science were unpredictable, with each switching between first and

[13] The full list of mean ranks is provided in Appendix XI, allowing closer assessment of which disciplines in particular vary, as do further tests described below on page 196.

second positon about equally, and not always in accordance with the positions assumed by the interpretation of Whitley used herein. Traditional distinctions may remain intact more clearly in some disciplines and on some measures than they do in others, meaning his typology has less explanatory power than in the past.

At the same time, the small interquartile ranges of responses to all Likert items, grouped by discipline, demonstrate a strong amount of agreement between those in particular fields about its characteristics on all measures. Overall, responses toward questions about discipline characteristics are centred more closely around those which suggest general agreement or neutrality, rather than *strongly* negative or positive feelings, as was the case with the attitudes to new media described above. Those items which attracted stronger expressions of agreement were common to all fields:

1. Keeping up to date with technology is generally important in my discipline
4. Interdisciplinary work is generally important to my discipline
10. In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged
11. My discipline is strongly influenced by what might be called a "reputational elite".

Variance between fields was found with regard to these issues of novelty, reputation, hierarchy and consensus, yet again, they did not clearly follow the arrangement suggested in Whitley. Each one strongly relates to concerns identified in literature on both new media and changing structures of knowledge in academia. The statistical findings could be seen to challenge narratives of fundamental epistemological distinctions, reflecting the novel and challenging interplays brought about by interdisciplinarity, "Mode 2" academia (Nowotny, Scott and Gibbons, 2001), and post-structural "communicatings" (Dervin, 2003), including altered priorities and models for research and teaching.

Politics is interesting because Whitley describes it as being both relatively open in terms of reputational control, but also subject to "temporary and unstable" control by "dominant coalitions and "charismatic reputational leaders" (page 159). There was no strong disagreement between respondents in politics *or* art and design about the influence of a reputational elite, contrary to what might have been expected. Again, this may highlight the some of the ways in which Whitley's typology does not sufficiently explain disciplines in the modern university ecosystem.

RELATIONSHIP TO EXISTING AND EMERGING MODELS OF ACADEMIC KNOWLEDGE CREATION

AIM

2. To relate these understandings to existing and emerging models of academic knowledge creation and exchange, and the role of digital technology, within and across distinct disciplines.

OBJECTIVES

1. Position and analyse data within a discussion of the pronounced organisational, technological, cultural and policy changes taking place in academia, supported by a broad but appropriately focused multi-disciplinary literature review.
2. Identify through quantitative and qualitative analyses of the above, the key themes or factors that can be used to describe academic concerns around new technologies and concepts, showing how these relate to the current contexts of UK HE within and across disciplines.

KEY FINDINGS

As well as suggesting convergence and interdisciplinary styles, attitudinal similitude and conformity may be encouraged by recent policies and agendas focused on multidisciplinary research and teaching practises, bringing academic perspectives and attitudes into closer alignment on issues related to technology.

For instance, the restructuring inspired by New Management (NM) and New Public Management (NPM) have long-term consequences for both academic communities (Deem, Hillyard and Reed, 2007, page 26) as academics become "knowledge workers" expected to possess certain generic or "transferrable" information skills (Garnham, 2002, page, 266). As much as specialisation does not disappear, this creates new practises and ways of working that become common to groups who would previously have been more distinct in their methods and processes. Intersecting with material and socio-economic factors, attitudes are not innate responses to an attitude object but are learned value judgements which "cannot be separated from [their] socio-cultural context" (Ornek 2011, page 241).

The tendency toward neutrality when asked about new media concepts that elsewhere (in academia) elicit strong and ideological views should be viewed as symptomatic of the conflicting forces currently acting on academics – on the one hand, they are encouraged to collaborate, to experiment, to innovate and to share their work with more diverse audiences, as in a 'fragmented adhocracy' (Whitley, 2000, page 13 and page 119) while on the other, they are expected to compete every more fiercely for limited resources while justifying the utility of their research 'outputs', within a controlled and "integrated framework". Ranking "the importance of sub-units on the basis of their relative contributions to the school's goals" they approach the status of 'technologically integrated' or 'conceptually integrated' bureaucracy, something which academics more used to freedom are inclined to resist (page 172).

This "schizophrenic" (Weller, 2011, page 11) or "machinic" movement between extremes (Galloway, 2004, page 64) may, when averaged, result in almost everyone being in the middle with the rest deemed statistical outliers. Academics are aware of these contradictions however and many – while not always visibly – resist them intellectually, something which is clear in much of the literature on new media, most notably that which originates in the humanities and the social sciences. The intentions in doing so are not however

straightforward or predictable, even when clearly following disciplinary conventions. It is likely that many academics are the "savvy strategists" described by Woolger and Coopmans (2006, page 19), officially acquiescing with dominant information society rhetoric" (Karim, 2001, page 113) while retaining an innate caution typical of the scholarly mind (page 20).

LITERATURE REVIEWS

As a way to understand both the technical characteristics of new media and the concepts with which they are associated, the terms "social media" and "Web 2.0" remain useful and can be used as structural aids not only by web designers but by theorists or researchers studying digital technologies. However, more is required than technical, simplified classifications. Matheas (2005) contends that "procedural literacy, of which programming is a part, is critically important for new media scholars and practitioners [and] its opposite, procedural illiteracy, leaves one fundamentally unable to grapple with the essence of computational media" (page 101). To discern attitudes to those media, it is necessary to add to this procedural literacy an interdisciplinary critical literacy. The debates and complexities unearthed when examining new media technologies emphasise why the specific discourses and value-systems of disciplinary communities (both traditional and in transition) must be borne in mind.

The literature reviewed in thesis was taken from a number of disciplines and sub-fields, revealing many different academic (and other) perspectives on new media and digital technologies. For instance, scholars of information science tend to be more 'technologically determinist' and positive in their stances toward technology than those in other fields; even apparently neutral studies are often underpinned by assumptions about the entrenchment of new media in HE – primarily, that this is a positive or inevitable development. The same is largely true in education studies and management studies, although some more objective and empirical research does exist, particularly that which is concerned with the instrumentation of policies as they relate to the organisation and management of ICTs and universities.

Academics in political science and social science are more uncertain than authors from other fields, often challenging views of a technocentrism that they see as advancing a neo-liberal and Capitalist social order although –at the same time - many are far more positive about social media than media and technology in general because they see these as useful tool for revolutionary activities. Similarly, new media are often discussed in relation to democracy and potentially altered boundaries between the public and private spheres. In Arts subjects – such as literary studies and media studies - there is often a focus on abstract, conceptual aspects of new media, and on what are felt to be their essential properties, as well as their semiotics. Common discussions include how they change processes of creation, cognition, knowledge construction and learning.

Accordingly, a wide range of theorists, theories and concepts are engaged with in the literature, which vary from discipline to discipline. Grand theories such as Marxism or the critical writings of philosophers and sociologists like Foucault, Bourdieu and Castells are prominent in politics, social science and media studies, where the ideas of McLuhan are also often referenced. In information science and education studies, models derived from the behavioural and social sciences (for instance the Technology Acceptance Model or the Task Technology Fit Model) are applied. Many theories and models are applied to the same new media services and ecosystems, illuminating aspects of them in ways which are distinctly rooted in disciplinary epistemologies.

Technologies are conceived of and studied in accordance with existing assumptions and preferred theories about how society, knowledge creation and various types of object intersect. The same holds for methodologies and modes of analysis. Radical alterations to the ontologies of art, media and social interaction as a result of new media may be partly justifiable; nonetheless much of such terminology gains currency in the service of particular agendas, generating social and financial capital for researchers allied with particular groups. This includes the digital humanities as well as eScience.

The politics of new media production can be useful for academics seeking to defend as well as define their territories. Likewise, strategists and policy makers may respond to both defensive and subversive attitudes and practises in ways which accommodate them or which position them as reactionary. New alliances (even multidisciplinary ones) are formed for strategic reasons; "political doctrines" will "graft themselves on to" new forms of communication (Guédon, 1996, page 347).

The non-physical properties and the effects of technology, media and usage are clearly problematic when writers attempt to enumerate them; it can be hard to draw dividing lines in support of an analytical framework. Meaning and value are inevitably subject to multiple interpretations; not least because as users, we participate in the consequences of technology and in the altered arrangements of space and time which they bring about (McLuhan, 1964, page 5), as well as creating them. In many disciplines, the most respected new media scholars problematise and explore medium and message in context, interpreting them in relation to the present electronic age.

Disciplinary literatures remain a value source of insight into academic *critical* attitudes, encoding a range of perspectives on new media not always immediately apparent in the face of official and other rhetoric. Close reading, and reading across disciplinary groups, allows scrutiny of *why* authors adopt particular points of view. While academics in all disciplines have learned (or are learning) how to use new media as instrumentalised 'knowledge management tools', given the space and time to critically engage academics interpret new media in bold and distinctive ways. This is often in response to the needs of their own disciplines and in keeping with its genres, reward systems and styles. Others begin to construct new ones through the use of experimental communication channels including open access publishing.

At the same time, the value of interdisciplinary research must be highlighted. While many theories or approaches are *fundamentally* domain-specific, they may still be influential upon, or be referenced by interdisciplinary research from other domains – for example, the application of ideas from critical theory

in information science, of economics in media studies, the adaptation of models from psychology and sociology to study user behaviours, and the development of genre itself as a multidisciplinary concept useful for studying personal and social media, with the "analytical potential to "clarify relationships between text and media, as well as between texts and society" (Rasmussen, 2010, page 948).

THE METHODOLOGY ITSELF

AIM

3. To propose useful methodological approaches and methods for the study of academic attitudes toward new media, in light of the above.

OBJECTIVE

1. Assess and compare the utility of both the quantitative and qualitative methods used in the thesis in relation to its aims, its findings, and relevant discussions around new media and methods.

KEY FINDINGS

Key findings are subdivided here in accordance with the main elements of the methodology described in Chapter Three above.

ATTITUDINAL STUDY AND SEMANTIC DIFFERENTIALS

Using *attitude* as a way to measure and assess academic views on new media and discipline characteristics is clearly useful and this approach proved successful overall, helping anchor key points that at times get lost in intellectually challenging, inter-disciplinary discourses. It helps us perceive the post-structural "communicatings" that Dervin (2003) proposes replace processes of "homogenizing and differencing" (page 107) while retaining the utility of structure that is vital to academic organisations. However, treating attitude as something substantial was made difficult by the complicated and multi-faceted nature of both new media and the communities under examination. So too was it complicated by the assumptions of statistical

methods. This was made most clear when encoding what are often highly subjective value judgements or statements as numbers and scale positions. Semantic differentials provide a neat and interesting way to do this, supporting quantitative analysis and the generation of statistics. Nevertheless, those statistics can be hard to interpret and many complicated patterns emerge, not least with data that is likely to be non-parametric.

To clarify: many semantic differential scales use adjective pairs which can be simplistically understood as 'negative' or positive' (such as 'good-bad' or 'clean-dirty'). This makes it easier to conduct statistical analyses and to assess scale reliability; i.e. to find a correlation between responses to items that suggest the same underlying construct is being measured. To do this, terms positioned in reverse to avoid response bias must first be 'corrected'. Naturally, terms and constructs cannot always be so clearly divided.

Several pairs initially used in data gathering were removed as they were too complex, required too much explanation or did not resonate with participants for various reasons – for instance, "high-definition" and "low-definition", terms used by McLuhan to describe media, were confusing for those not familiar with his work and they compromised scale reliability. Using more obvious terms allows us to ascertain attitudes toward them more definitively but it does not allow us to incorporate the full nuanced complexity of the topics or constructs under consideration, necessitating the inclusion of other, supporting methods of analysis.

MIXED METHODS AND INTERISCIPLINARY LITERATURE REVIEWS

That the literature reveals as much about academic attitudes to new media as does empirical data, demonstrates well the appropriateness of a holistic and triangulated approach to data gathering and interpretation. Academics as knowledge workers within a client-service model of academia based on private sector business models are encouraged to view new media as profitable parts of a toolkit in service of particular aims. This, and elements of tradition such as academic objectivity, lead to their assessment in terms of

reliability and fitness for purpose alongside social aspects such as inclusiveness and the space they allow for participation.

Understanding key new media terms and concepts from generic discourses in fields *beyond* information science, is necessary for a full and meaningful analysis of attitudes in the academic information ecology, regardless that the thesis is itself located in that field. Multidisciplinary perspectives allow a contextualisation of the research questions, informing and supporting a robust methodology. Some methods which were used for initial empirical data gathering activities, but which were not subsequently employed in wider data gathering, could have been usefully retained. With more resources available, further paired interviews and discussions with academics working in particular disciplines would further enrich and expand analysis of the findings presented here.

Fittingly perhaps, when asked to assess new media using methods derived from the logic of mathematics – an online questionnaire with fixed numeric scales – a more balanced and dispassionate response is elicited. When given the less limited and more specialised space of a journal, a book chapter or a discussion, academics reveal stronger, more passionate views, sometimes with strategic as well as intellectual motivations. The research and the findings of this thesis thus demonstrate that a range of meanings and terms and a combination of both statistical and qualitative methods is essential. Deciding on qualified, relative definitions may be best for critical *and* practical projects involving new media, with meaning dependent upon the purpose of the research, the audience for whom it is intended, and the particular type of new media being considered.

WHITLEY'S TYPOLOGY AS THEORETICAL FRAME

As a principal element in the structuring of universities (both organisationally and culturally), discipline remains a valuable analytical lens for studying academic communities and academic attitudes. The way it allows us to do this is somewhat different, however, to that which was expected – particularly

when dealing with empirical data rather than theoretical or literary positions, where distinctions in perspective often seem clearer. This is because, although discipline does allow us to identify differences between practitioners in distinct fields, similarities between them – or convergence over time – appear just as common. This makes 'discipline' a less clear classification mark when discriminating between academics than much previous work on the role of discipline assumes. At the same time, it lends credence to writing on the fundamental shifts occurring in higher education as a result of various factors including political or politicised imperatives, interdisciplinarity, and new, disruptive technologies.

Accordingly, Whitley's typology of the sciences remains a useful framework for studying the attitudes of academics toward new media and comparing across disciplines. However, instances are so complex and reside within such a complex ecology that disciplinary characteristics can't be used alone. The strength of opinion on and around interdisciplinarity, novelty and reputational elites suggests that the boundaries and characteristics of disciplines are shifting. The relationship between reputational characteristics and what constitutes "technical certainty" is changing, partly as a result of social and new media engagement. Accordingly, an understanding of the significant changes currently affecting UK (and other) universities provides an equally powerful interpretative lens.

Rather than distinct organisations with their own traditions and value systems, universities are predominantly now conceived of (by government and industry) as a "knowledge base" which "underpin[s] private sector-led growth" (Department for Business, Innovation and Skills, 2011b). At the same time, "taxpayer-funded research" should be made "accessible and free of charge" (Department for Business, Innovation and Skills, 2011b, page 76). Open access, open data and network technology are essential facilitators of this vision (Auer and Thürmann, 2008; Neilsen, 2011; Maude, 2012). Innovation and scholarship are not considered free-form but processes that can be monitored and managed in the furtherance of organisational agendas.

Krull (2000) reminds us that the funding of higher education is increasingly treated as a "strategic investment" but that with limited finances available to support that investment, a focus on "public-private partnerships" and interdisciplinarity are almost inevitable (page 260). At the same time, "market populism" and "consumer democracy" have become "ideological lodestones against which all new policies must be evaluated". (Deem, Hillyard and Reed, 2007, page 5).

Whitley's writing on the links between technical and strategic uncertainty and audience diversity is relevant to such a discussion. Of audience diversity, he writes that,

> Just as a high degree of audience diversity reduces the degree of mutual dependence in a scientific field, so too it reduces the need to develop common, standardized methods of working and communicating task outcomes. Where researchers can legitimately address their results to a number of different groups for reputations they will be encouraged to produce knowledge claims which fit the particular interests and procedures of these separate groups and so become less likely to standardize languages and objects throughout fields. [...] In general then, the more diverse and rapidly changing are possible audiences for scientists' work the greater the level of task uncertainty in a scientific field. This is exemplified by many of the human sciences, especially when they appealed to general cultural elites (Whitley, 2000, page 146).

Further, he states that "where scientists are able to publish their results in a number of journals addressed to distinct audiences they will obviously have greater latitude in formulating research strategies than if they had to focus their work on one particular group or if the prestige of reputations in one area was much more than those of other groups" (page 147). This evokes some of the proposed benefits (or at least, effects) of open access publishing and other online forms of academic communication; for instance, the lessening of elitism and the exposure of fringe and marginal topics and methods:

> "The more control over access to journal space, jobs, apparatus and funds is concentrated among a relatively small group of researchers who are fairly cohesive, the more they will dominate the reputational system and the greater the degree of both functional and strategic dependence" (page 109). If jobs and resources are more widely distributed, researchers gain more autonomy and independence with regard to which strategies they devise and which research aims they pursue (Whitley, 2000, page 109).

Reputational control and elitism is however perceived to have *increased* by academics, most notably in fields such as art and design and politics where it was traditionally low. It may (arguably) be that "concentration of control over the means of intellectual production and dissemination" (Whitley 2000, page 143) decreases when the World Wide Web and new media become readily accessible machinery. However, the "central co-ordination and formalization of the reporting system" that should also (theoretically) decrease is in fact strengthened, expanded and promoted by the policies of those who orchestrate the positioning of "professionalized" (page 56) academic knowledge workers; for example, through strategic funding initiatives, performance-linked management reporting activities and research assessment exercises such as the Research Excellence Framework.

Regardless of the positions assigned on his typological map, Whitley makes it clear that the role and influence of reputational elites is complex, changing in relation to various organisational and cultural factors over time. A greater engagement with technology than is traditional may be shifting reputational power structures within politics and art and design more directly than in health science partly *because* of its relative novelty there, making it more visible and thus eliciting stronger attitudinal responses.

Indeed, Whitley notes that the "increase in extra-local control of research obviously requires an efficient and extensive communication system for reporting results, co-ordinating task outcomes and integrating strategies" leading to the development of formalised and "seemingly objective" symbol

systems, in turn "encouraging research that can be communicated" in those forms and through such a system (page 99). What he describes, in evidence of this, as the "increasingly technical nature" of many humanities fields, may well describe the expansion of computational logic and systems theory.

Traditionally, it is in fields where the diversity of permissible theories and methods is restricted, that reputational rewards are more normative, hierarchical and predictable and hence, where elites have been historically more visible and influential. New *types* of academic elite may be forming as a direct consequence of both new policies and new media in the academic information ecology, with implementation and usage determined by centres of power *outside* as well as within the university's own internal bureaucratic structure.

CHAPTER EIGHT: RECOMMENDATIONS FOR FURTHER RESEARCH

As a result of this research, five areas of particular interest have been identified for further exploration and analysis. These are listed below. They address: disciplines or fields for possible case study, reputational elites, control and publishing, specific instances of new media and demographic variables other than discipline as these relate to attitude and/or use. Some indication of the approach and methods that could be used, in keeping with the overall methodology of this thesis, are suggested although this would naturally need to be decided upon by those taking the research forward.

Disciplines or fields for case studies

There is some reason to believe from the quantitative data (in particular, the mean ranks resulting from a Kruskal-Wallis test applied to responses to Likert scale items) that politics is quite distinct from other fields in terms of academic attitudes toward their discipline. There is less convergence of feeling with those working in the other disciplines considered. Attitudes are at times more sceptical and less importance is apparently placed on social networks, interdisciplinarity and novelty, with stronger reputational elites than might be expected. This partly fits with Whitley's depiction but partly contradicts it. The attitudes of those in politics and international relations toward discipline characteristics *and* new media would be worth exploring as a case study, particularly given the political or politicised tone of much literature which addresses new media and higher education.

Art and design is also somewhat distinct in terms of its relationship to new media; for instance, its prioritisation of the conceptual and the at once abstract and mathematically precise practises of much digital art. In relation to qualitative attitudinal data, those working in art and design agreed far more strongly than might be supposed about the importance of keeping up with new technologies. Further research in fields within art and design would be useful, particularly as Whitley's typology does not directly consider the humanities, hence it may not be the best frame to render attitudes there

explicable. In particular, the greater than expected similarity between the attitudes of those in computing science and those in art and design would be worthwhile exploring, not least given the important bridge that new media or digital technologies can offer between these traditionally separate areas of enquiry.

REPUTATIONAL ELITES

In three of the four disciplines studied, most academics agreed that reputational elites were a strong influence on their field. This was to be expected in health science, in accordance with Whitley's descriptions of reputational autonomy in more tightly controlled fields, but certainly not in art and design or in politics, where there were considerably higher levels of agreement than elsewhere. Further research might consider the nature of those elites, their composition, the reasons for their emergence (or perceived emergence) and whether or not there are links between these and online communities. Computing science is an interesting example of a field that is highly technical and relies on symbolic notation but which is equally creative and diverse. Here, participants were far more neutral about the issue of reputational elitism, and it is not clear why this is the case. It would be interesting to examine whether conditions and characteristics relating to reputation and control are indeed markedly different in computing science and in which ways.

Politics is also an interesting and somewhat contradictory case because Whitley (2000) describes it as being relatively open in terms of reputational control but also subject to "temporary and unstable" control by "dominant coalitions and "charismatic reputational leaders" (page 159). There was no strong disagreement between participants in politics about the influence of a reputational elite, contrary to what might have been expected. Only 7.7 percent disagreed, with 15.4 percent strongly agreeing and 61.5 percent agreeing. Again, this may highlight the some of the ways in which Whitley's typology does not sufficiently explain disciplines in the modern university, particularly those outwith the sciences.

It also brings back to mind some comments made by interviewees during phase one of empirical data gathering about the notion of "star cultures" and of people being "held up as experts" online who may not be respected sufficiently in the academy. These comments indicated that understandings of reputational elites are distinct from the elites described by Whitley; he refers to respected academics within a discipline rather than those operating outside it who take on an influential status. The fact that such elites may form in less tightly controlled fields does however suggest that his analysis of the 'fragmented adhocracy" is correct. It also suggests that computing science is an interesting and atypical case, not quite fitting any of his descriptive categories.

ELITES, CONTROL AND PUBLISHING

Linking elites in academia and the findings described above to new models or methods of publishing – in particular, open access – and peer review would appear fruitful, being a strong and relevant example of how new media are implicated in shifts of both practise and opinion. This is particularly clear when taking into account literature on the importance of existing networks and established standards or codes when changing (or attempting to change) the conventions of scholarly communication and the power dynamics within them. For instance, Thompson Klein (1996) refers such models as being "caught at the epistemological crux of a dichotomy that pits innovation and openness against rigour and legitimacy" (page 27). Considering the opposing adjective pairs of semantic differential charts, these could be retained as a very relevant instrument for such an investigation, in combination with field work and interviews.

SPECIFIC INSTANCES OF NEW MEDIA

In much of the literature on technology and new media rooted in business, organisational or educational studies, and which promotes their adoption in higher education, authors conflate 'new media' with its most prominent subset, social media. This also became evident during discussions and

interviews with participants in phase one of empirical data gathering. For practical reasons, respondents were asked in phase two (the online questionnaire) only to consider new media as a generic concept, rather than to consider specific instances, and naturally there was no room for discussion or the unpicking of responses in person. On reflection, this is a weakness of the thesis in relation to its aims. Further research using more granular instruments, both qualitative and quantitative, are needed to redress this. Ethnographic case studies or interviews with a larger number of academics than were involved in the first phase of data gathering would let us assess whether there are attitudinal differences toward particular *types* or instances of new media, and how these relate to the specifics of a field. Specialised types of new media rather than those common to all disciplines, could be identified and analysed although the differing uses of and attitudes toward *common* types would allow for more valuable comparisons using the *disciplinary* lens.

DEMOGRAPHIC VARIABLES OTHER THAN DISCIPLINE

In the data gathered for this thesis, there were few to no observable differences in academics' attitudes toward new media by the variables gender, age or career length. This is worth further examination. Although at least one other study previously cited has made similar claims (University of Tennessee and CIBER Research Ltd., 2013) the thesis did not focus on these particular variables hence the instruments used to capture information about participants was not necessarily suitable for a meaningful assessment of them. Interviews, discussions and questionnaires designed specifially around important aspects of the constructs age, gender and career level in relation to new media and academic culture/s would be a very useful supplement to this thesis, perhaps employing some similar methodological techniques – in particular, those used in the first phase of data gathering work, such as paired interviews and brainstorming exercises using adjectives.

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APPENDICES

APPENDIX I: NOTABLE SOURCES OF SOME KEY TERMS INFORMING EMPIRICAL DATA GATHERING EXERCISES

OVERVIEW

The data gathering instruments and the theoretical frame of this thesis are in part indebted to the work of several authors who explicitly tabulated or listed terms and concepts useful to the study of new media terminologies and genres. Although not all of them directly discuss either digital technologies or new media, all can be mapped against areas of new media scholarship and associated debates. For instance, while the categories suggested by Hand (2008) refer directly to technology, those of Wolfe (1988) originate in an analysis of political democratic theories, written in 1988.

These lists include some terms not used directly in data gathering instruments. Similarly, many are not shown here as the final semantic differential exercises were decided upon following close readings and interpretation and in response to the first phase of empirical data gathering described above.

TECHNOLOGIES

Schematic Model of Modern and Postmodern Technologies (from Hand, 2008, page 53)	
Modern	Postmodern
Material	Discursive
Continuous	Discrete
Objects	Spaces
Determined	Underdetermined
Neutral (Instrumental)	Cultural
Actual	Virtual
Centred	Decentred
Fixed	Mobile
Governable	Un-governable
Effects	Performances

Table 36 - Terms identified by Hand (2008) that distinguish between modern and post-modern technologies

METATHEORIES

Metatheories – isms in Information Science (derived from Taija, Tuominen, and Savolainen. 2005)				
Metatheory	Constructivisim (Cognitive Constructivism)		Collectivism (Social Constructivism)	Constructionism
Origin of knowledge	Individual creation of knowledge structures and mental models through experience and observation.	Individual creation of knowledge structures and mental models. Influenced by history and social relationships.	Knowledge is social in origin; the individual lives in a world that is physically, socially and subjectively constructed; mutual constitution of the individuals' knowledge structures and the socio-cultural environment	Production of knowledge in ongoing conversations; knowledge and identities are constructed in discourses that categorise the world and bring phenomena into sight.
Thematic focus	Individual searchers' interaction with IR systems; situational relevance		Information practices and relevance assessments in organisational, professional and disciplinary communities	Formation of knowledge and classifications in discourses; knowledge production practices and epistemic disputes in knowledge domains
View of language	Representational-referential		Pragmatic-instrumental	Rhetorical-responsive
	Language is a neutral vehicle for reporting observations and a (more or less clear) window to the speaker's mind		Language is an instrument serving in the creation, organisations and sharing of knowledge and thought-collectives	Language is constitutive for the construction of selves and the formation of meanings

Major applications in IS	IR interaction; info search behaviour; task-related searching. User requirements elicitation aiming and improving interfaces and interaction. Personalised design of libraries and IM systems.	Integrated study of info practices in knowledge organisation in specific domains. Studies on terminology, document structures and genres in domains. Domain-specific classification and indexing.	Info seeking focused on accounts of information practices. Analysis of professional and scientific discourses of IS and info tech. Design of DLs, visualisation systems for mapping lits, perspectives and debates. Collaborative knowledge filtering and synthesis systems.

Table 37- Metatheoretical understandings informing the Semantic Differentials

POLITICAL DEMOCRATIC THEORIES

Professor Joel D. Wolfe proposes a typology of, or system of classification for, contemporary empirical democratic theories, pointing out "politics by definition involves participation" (Wolfe, 1988, page 17):

> A defensible theory of participatory democracy requires a more systematic analysis of the sources and types of interests that motivate participation in collective action of participatory control of officeholders. This, in turn, requires examining how the environment fosters values and how values shape different responses" (page 17) and that "given the emergent institutional complexity of representative systems, the need is to escape from analyses that identify a power relation as fixed or that make power relations dependent on a particular institution or process such as an election – page 3.

This typology allows underlying theories of democracy to be more readily identified and compared when reading texts on (or listening to discussions about) democracy and participation. Each element is based upon a close reading of established bodies of literature from political science and political philosophy, meaning that these terms are rooted in a socio-historical context rather than being convenient simply for the author's primary purpose (here, the exercise of a book review). The table is reproduced below, with slight modifications to layout.

Patterns of power in democratic theory (from Wolf, 1988)	
Modes of Control	
Representation	*Policy Specific Exchange*
Developmental (E)*	Syndicalist (E)
Commune (I)	Delegate (I)
Corporatist (E2)	Consensus (E2)
Pluralist (I2)	Individualist (I2)

Table 38 – Types of political participation

***Bases of Collective Action**
E = Substantive – external source
I = Substantive – internal source
E2 = Instrumental - external source
I2 = Instrumental - Internal source

This allows us to address, amidst a great diversity of viewpoints, "whether it [Participatory Democratic theory] is reformist of fundamentally transformative of liberal democratic practise" (page 2). Further, he makes it clear that "Developmental Democracy identifies a power relation in which ultimate ends like participation, personal self-realization, and equality shape collective action and patterns of representation. Institutions and the elites who dominate them are thus held together and guided by these ultimate ends. Overall, the promotion of ultimate interests presupposes a benevolent elitism and is unlikely to be able to resist the tendency of formal organization to foster oligarchy" (page 8). This can also be related to the organisational theories of

Whitley, wherein the structures and patterns of academic disciplines are outlined (2000) and shown to change in relation to external (then internalised) political influences (2011) as well as to the work of Nowotny et al. on supposed Mode Characteristics. The ways in which Public Sector Science (PSS) and scholarship across all fields is arranged and executed – and the attitudes and working practises of individuals and groups – are inevitably acted upon by "Modes of Control" akin to those given by Wolf, even if they are not overtly associated with any particular political theory.

STRUCTURAL POWER RELATIONS: SOCIALLY COMPOSED AND TECHNICALLY CONTROLLED

Other terms		
Technical: business and IT	Top-down	Bottom-up
	One-way	Two-way
	Push	Pull
	Open	Closed
Types of consciousness×	Practical	Discursive
Structural dimensions terminology×	Facilitative	Interpretative
	Normative	Atypical
	Signifying	Stating
	Dominating	Subjugating
	Powerful	Powerless
	Initiative	Reaction
Public sphere*	Private	Public
	Civil society	State
	Internal private space	Rule-governed public space
	Private and political	Public and political
	Private and cultural	Public and cultural

Table 39 – Various terms derived from literature in indacted fields, with theorists noted as appropriate.

×These terms are derived from the work of Giddens (1984; 1997).

*These terms are derived from the work of Habermas (1991).

APPENDIX II: LIST OF 112 UNIVERSITIES IN SCOPE FOR THE PRIMARY DATA GATHERING ACTIVITIES OF THE THESIS

1. University of Aberdeen
2. University of Abertay Dundee
3. Aberystwyth University
4. Anglia Ruskin University, Cambridge and Chelmsford
5. The Arts University Bournemouth
6. University of the Arts London
7. Aston University, Birmingham
8. Bangor University
9. University of Bath
10. University of Bath
11. Bath Spa University
12. University of Bedfordshire, Luton and Bedford
13. University of Birmingham
14. Birmingham City University
15. Bishop Grosseteste University
16. University of Bolton
17. Bournemouth University
18. University of Bradford
19. University of Brighton
20. University of Bristol
21. Brunel University
22. University of Buckingham
23. Buckinghamshire New University, High Wycombe
24. University of Cambridge
25. Canterbury Christ Church University
26. Cardiff University
27. Cardiff University School of Nursing and Midwifery Studies
28. Cardiff Metropolitan University (UWIC)
29. University of Chichester
30. City University, London
31. Coventry University

32. Cranfield University
33. Cranfield University
34. University for the Creative Arts
35. University of Cumbria, Carlisle
36. De Montfort University, Leicester
37. University of Derby
38. University of Dundee
39. University of Durham
40. University of East Anglia
41. University of East London
42. Edge Hill University
43. University of Edinburgh
44. Edinburgh Napier University
45. University of Essex
46. University of Exeter
47. Falmouth University
48. University of Glamorgan
49. University of Glasgow
50. Glasgow Caledonian University
51. University of Gloucestershire
52. University of Greenwich
53. Glyndŵr University
54. Heriot-Watt University
55. University of Hertfordshire
56. University of the Highlands & Islands
57. University of Huddersfield
58. University of Hull
59. Imperial College London
60. Keele University
61. University of Kent
62. Kingston University

63. Lancaster University
64. University of Leeds
65. Leeds Metropolitan University
66. Leeds Trinity University
67. University of Leicester
68. University of Lincoln
69. University of Liverpool
70. Liverpool Hope University
71. Liverpool John Moores University
72. University of London
73. Birkbeck, University of London (BBK)
74. Courtauld Institute of Art
75. Goldsmiths, University of London (GUL)
76. The London School of Economics and Political Science (LSE)
77. Queen Mary, University of London (QMUL)
78. Royal Holloway, University of London (RHUL)
79. St George's, University of London (SGUL)
80. University College London (UCL)
81. King's College London
82. London School of Economics and Political Science
83. London School of Hygiene and Tropical Medicine
84. Queen Mary, University of London
85. Royal Holloway
86. St George's
87. School of Pharmacy
88. University College London (UCL)
89. London Metropolitan University
90. London South Bank University
91. Loughborough University
92. University of Manchester
93. Manchester Metropolitan University

94. Middlesex University, London
95. Newcastle University
96. Newman University
97. University of Northampton
98. Northumbria University
99. Norwich University of the Arts
100. University of Nottingham
101. Nottingham Trent University
102. The Open University
103. University of Oxford
104. Oxford Brookes University
105. Peninsula College of Medicine and Dentistry
106. University of Plymouth
107. University of Portsmouth
108. Queen's University Belfast
109. St Mary's University College, Twickenham
110. Queen Margaret University, Edinburgh
111. University of Reading
112. The Robert Gordon University, Aberdeen

APPENDIX III: CONSENT FORMS AND DEFINITIONS GIVEN TO PARTICIPANTS IN PHASE ONE OF EMPIRICAL DATA GATHERING

Overview of this research and your involvement

Nature of exercise

This data gathering exercise is organised into three distinct but conceptually connected strands. The first is concerned with the organisational and communicative characteristics of your academic discipline, and with how you understand these. The second seeks to discern your attitudes toward - and your uses of - various types of media, with a particular focus on New Media. Here, you will be asked to do a little bit of writing or sketching. The final strand is a practical exercise, comprising a series of Semantic Differential charts. These are a technique for measuring attitudes; the purpose here is to identify the "directionality" of your attitudes toward abstract concepts and terms often associated with New Media. The whole event should take no longer than two hours. Again, I would like to thank you very much for your participation and for donating your valuable time to help with my research.

Data use and disclaimer

All participants are guaranteed complete anonymity; personal data gathered in the process of this research will be destroyed after the research is complete. Answers will be coded such that they cannot be associated with any individual - although they will be associated with discipline (and possibly institution). All data will be used only for the purposes of analysis, interpretation, and the publication and dissemination of interim and final results. Neither I, my department, Manchester Metropolitan University, or any third party will distribute or re-distribute the raw unprocessed data at any point. At any time, participants may withdraw consent for their data to be used.

Consent and anonymity

To ensure both the anonymity of your answers *and* my ability to code and identify your specific answers for analysis, please provide a "pen name". Please don't provide a name that is too outlandish, or that you use elsewhere (e.g. an online username or ID). Your signature indicates that you have understood the nature of this research, are happy to have an audio recording

made for the purposes of transcription, and have given consent for data to be used as outlined herein.

NAME:

.....

PEN-NAME:

.....

SIGNATURE:

.....

DATE:

.....

Definitions of New Media

Naturally, definitions and classifications of "New Media" vary depending on a number of contextual and organisational factors - for instance, the discipline within which these media are being studied, the purpose(s) to which they are being put, and the particular time and location at which definitions are constructed. Other than to say that they are more current and therefore distinct from media types that appeared previously, there is no commonly agreed generic definition. For the purposes of this research, the term "New Media" encompasses all possibilities. Some of the descriptions below can be helpful in clarifying what might be implied. These are intended to give a flavour of research context and range and are not prescriptive (although we may revisit them later). Please take some time to read the definitions below. It is expected that you may disagree with them or have ideas and definitions of your own; there are no "right" or "wrong" answers.

- Artworks that use multimedia, computers, or communication technologies in creative expression.
- A general term covering non-traditional ways of delivering advertising or promotion messages, anything from text messaging to the Internet.
- A generic term for the many different forms of electronic communication that are made possible through the use of computer technology. The term is in relation to "old" media forms, such as print newspapers and magazines, which are static representations of text and graphics.
- Technologies, such as the Internet, that blur the line between media sources and create new opportunities for the dissemination of news and other information.
- Some combination of universal access to simple publishing tools (meaning anyone can ‘publish’ content), and powerful social bookmarking and aggregation services.

- A new communication medium that, like the sky in relation to prior transportation media (water and ground), bridges the mutually incompatible characteristics of prior communications media.

APPENDIX IV: QUESTIONS PRESENTED TO PARTICIPANTS IN PHASE ONE OF EMPIRICAL DATA GATHERING: DISCIPLINE CHARACTERISTICS AND SEMANTIC DIFFERENTIALS

QUESTIONS ABOUT YOUR ROLE AND DUTIES

Please circle or tick the answers that apply to you

To which academic discipline do you belong?	Politics Computing Science Dentistry Art and Design
To which department/research group do you belong?	
What is your job title or position within the University?	
To which age group do you belong?	11-20 21-30 31-40 41-50 51-60 61-70
What is your gender?	Female Male
How long (years) have you held your current position?	0-1 2-5 6-10 11-20 21-30 31-40
How long (years) have you worked in academia or in a role with functions closely related to your current ones?	0-1 2-5 6-10 11-20 21-30 31-40
Does your role involve the use of social media, new media, digital media, or online technologies?	Yes No To some extent
Are you for any other reason particularly knowledgeable about new media, digital media, or online technologies (other than as a general user)?	Yes No To some extent
If you answered yes or to some extent to the previous question, please state briefly why.	
Does your role involve specialised use of non-digital media types (e.g. paper publishing, film photography)?	Yes No To some extent
Are you for any other reason particularly knowledgeable about non-digital media	Yes No To some extent

types (e.g. paper publishing, film photography)?	
If you answered yes or to some extent to the previous question, please state briefly why.	
As far as you are aware, are there any policies or guidelines governing your use of new media, digital media, or online technologies, within your department or institution?	Yes - University wide Yes - department specific No
If you answered yes to the question above, please state whether these policies were determined through consultation or collaboration with yourself, your department, or representatives thereof.	Yes, I was involved Yes, department was involved Yes, representatives of my department were involved No Not as far as I am aware

FEATURES OF YOUR DISCIPLINE

Please circle the term that best matches your level of agreement with the following statements. Answer from the point of view of your discipline; but if relevant, feel free to offer a comparison or commentary on your particular sub-field or specialism in relation to the questions.

Participant pairs are encouraged to discuss these questions and raise any issues around them with the researcher as they go along.

1. Keeping up to date with technology is generally important in my discipline

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

2. In my view, keeping up to date with technology should be considered more important in my discipline

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

3. In general, the knowledge produced by my discipline is primarily useful only to it

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

4. In my discipline, there are strong hierarchies governing its organisation and the priorities of its academics

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

5. The general goals of myself and peers in my discipline are well understood and broadly aligned

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

6. My discipline is strongly influenced by what might be called a "reputational elite"

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

7. In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

8. In my discipline, there is usually a broad consensus about methods and techniques

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

9. Interdisciplinary work is generally important to my discipline

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

10. The audience that my discipline shares its work with is generally varied and diverse

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

11. When appropriate, work carried out in my discipline is generally visible to the public

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

12. In my view, work carried out in my discipline **should be** more visible to the public, when appropriate

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

13. When appropriate, work carried out in my discipline is generally visible to the private sector

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

14. In my view, work carried out in my discipline **should be** more visible to the private sector, when appropriate

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

15. In my discipline, it is generally easy to get work recognised by one's **immediate** peer group (e.g. by departmental colleagues and your university)

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

16. In my discipline, it is generally easy to get work recognised by a **wider peer** group

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

17. A variety of views and understandings from outside my discipline is useful to **my** process and practises

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

18. I feel it is important to take part in informal collaborations and activities with academics from **within** my discipline

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

19. I feel it is important to take part in informal collaborations and activities with academics from **other** disciplines

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

20. In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

SEMANTIC DIFFERENTIALS

By circling a number on the scale, please indicate the directionality of your attitude towards the **general concept** of new media. It might be useful to think back to some of the definitions provided to your prior to this exercise, as well as to draw on what we have discussed so far. Please respond to **your idea** of new media as a concept or phenomenon, rather than to a specific instance (although these may help you structure your thoughts). **0 indicates a neutral midway point. If the terms mean nothing to you, please leave blank and do not select 0.**

In my view, new media are...

Private	3 2 1 0 1 2 3	Public
Elitist	3 2 1 0 1 2 3	Egalitarian
Corporatist	3 2 1 0 1 2 3	Civic
Deliberative	3 2 1 0 1 2 3	Participative
Subjective	3 2 1 0 1 2 3	Objective
Possessive-individualist	3 2 1 0 1 2 3	Developmental-democratic
Practical	3 2 1 0 1 2 3	Abstract
Normative	3 2 1 0 1 2 3	Atypical
Empowering	3 2 1 0 1 2 3	Enforcing
Symbolic	3 2 1 0 1 2 3	Literal
Inclusive	3 2 1 0 1 2 3	Exclusive
Facilitative	3 2 1 0 1 2 3	Interpretive
Material	3 2 1 0 1 2 3	Immaterial
Fixed	3 2 1 0 1 2 3	Fluid
Time-biased	3 2 1 0 1 2 3	Space-biased
Deterministic	3 2 1 0 1 2 3	Undetermined
Informative	3 2 1 0 1 2 3	Performative
Centralised	3 2 1 0 1 2 3	Decentralised
Top-down	3 2 1 0 1 2 3	Bottom-up
One-way	3 2 1 0 1 2 3	Two-way
Push	3 2 1 0 1 2 3	Pull
Agile	3 2 1 0 1 2 3	Rigid
Open	3 2 1 0 1 2 3	Closed
Free	3 2 1 0 1 2 3	Commercial
High definition	3 2 1 0 1 2 3	Low definition
Individually constructed knowledge	3 2 1 0 1 2 3	Socially constructed knowledge
Mental processes	3 2 1 0 1 2 3	Socio-cultural processes
Neutral	3 2 1 0 1 2 3	Partial
Emergent	3 2 1 0 1 2 3	Pre-defined
Restrictive	3 2 1 0 1 2 3	Transformative

APPENDIX V: SEMI STRUCTURED INTERVIEW SCHEDULE USED TO INTERVIEW PARTICIPANTS IN PRIMARY DATA GATHERING EXERCISE

PERSONAL PERSPECTIVES ON NEW MEDIA: ACTIVITIES AND LADDERED DISCUSSION

1. Referring back to these definitions [place on table definitions sent previously], can you identify some specific examples of New Media with which you are familiar?
    a. Why have you identified these examples in particular? [e.g. visibility, frequent use]
    b. Can you give some examples of "Old Media" that you use on a fairly regular basis? [this is to make sure they have distinctions in their mind]
2. On two separate sheets, and using **adjectives and verbs**, please list some words that you associate with New Media and Old Media. [Here we will ask them to write on two sheet of paper (one headed Old Media and one New Media), each using a different coloured pen. They may group or classify in relation to type or instance of media if they wish; they should have a discussion as the activity happens]

[An interesting part here will be to see which adjectives and verbs are the same for both groups. We can then ask them to consider how these differ. For instance, a print journal AND a wiki might both be used for researching, but how do these activities change in relation to the media type and the context?].

3. Can you describe an instance of when you have used New Media in a professional capacity? Any example, however trivial (or unsuccessful), is relevant. [If yes] When and why? [If no professional example, skip to Q5]
    a. How did you feel about using New Media?
    b. Were you pleased with the outcome?
    c. Can you talk about your reaction to using New Media for professional purposes? For instance, did it problematise or enhance your usual approaches and practises?
    d. Did your share the outcome of this work with colleagues? [If yes] What were their reactions?

e. Did your share the outcome of this work with students? [If yes] What were their reactions?
f. Do you feel that New Media is more useful to certain communities or groups than to others?
g. [If yes] Why?
h. Are there kinds of New Media which are more useful to *your* subject community than are others?

4. Why have you not used New Media in relation to your professional activities?
    a. Do you think you will consider using it in future?
    b. How do you think it compares to traditional media, tools and approaches?
5. [If not clear already] Do you use New Media within your teaching?
    a. [If yes] What do you feel it adds to your classes?
    b. Do you feel a distinction can be made between New Media in relation to teaching and New Media in relation to research?
    c. [If yes] Why? [If no] Why not?
6. Do you feel any pressure to use New Media in your work (whether research, practise, teaching)?
    a. [If yes] Where do those pressures come from?
7. Do you feel any pressure to conform to more established techniques and tools?
    a. [If yes] Where do those pressures come from?
8. Do you make use of New Media in your personal time (i.e. for non-work related activities)?
    a. What New Media do you make use of?
    b. How does your view of New Media for personal use compare with your view of it for professional activities?

Do you have any comments to make on this exercise? Anything you would like to elaborate on or add? Thoughts about something important not covered here?

APPENDIX VI: QUESTIONS PRESENTED TO PARTICIPANTS IN AN ONLINE QUESTIONNAIRE HOSTED ON THE SURVEY GIZMO WEBSITE

DEMOGRAPHIC PROFILE

Part 1 of 3

1) To which academic discipline do you belong?

( ) Dentistry

( ) Medicine

( ) Health Sciences

( ) Computing Science

( ) Art and design

( ) Politics

( ) International Relations

2) What is the name of your department/research group?

_____

3) To which age group do you belong?*

( ) 25 years or younger

( ) 26-40 years old

( ) 41 - 65 years old

4) Which gender are you?*

( ) Female

( ) Male

( ) Other

5) How long have you worked in your current field of study within academia?*

( ) 0-1 years

( ) 2-5 years

( ) 6-10 years

( ) 11-20 years

( ) 21-30 years

( ) 31-40 years

( ) Over 40 years

6) How often do you use social media, digital media or new media for official work purposes?*

( ) Daily

( ) Weekly

( ) Monthly

( ) Rarely

( ) Never

7) How often do you use social media, digital media or new media for non-work purposes?*

( ) Daily

( ) Weekly

( ) Monthly

( ) Rarely

( ) Never

8) Are you for any other reason particularly knowledgeable about new media, digital media, or online technologies (other than as a general user)?*

If you answer yes or to some extent, please use the comments box provided to explain briefly why.

( ) Yes

( ) No

( ) To some extent

Comments:

9) Does your role involve specialised use of non-digital media types (e.g. paper publishing, film photography)?*

( ) Yes

( ) No

( ) To some extent

FEATURES OF YOUR DISCIPLINE

Part 2 of 3

Please select the term that best matches your level of agreement with the following statements as they relate to your discipline.

1. Keeping up to date with technology is generally important in my discipline

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

2. In my view, keeping up to date with technology should be considered more important in my discipline

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

3. In my discipline, there is usually a broad consensus about methods and techniques

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

4. Interdisciplinary work is generally important to my discipline

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	N/A

5. The audience that my discipline shares its work with is generally varied and diverse

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

6. It is important to take part in online social networks with academics working in the same discipline as myself

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

7. It is important to take part in online social networks with academics from **other** disciplines

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

8. In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

9. In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

10. My discipline is strongly influenced by what might be called a "reputational elite"

Strongly agree | Agree | Neutral | Disagree | Strongly disagree | N/A

SEMANTIC DIFFERENTIALS

Part 3 of 3

By selecting a number on the scales provided below, you indicate the direction and strength of your attitude toward terms and concepts that are often associated with new media. For example, are new media more exciting than they are dull? If you feel strongly that new media are exciting NOT dull, select the 3 closest to the label "exciting" and farthest from the label "dull".

The 0 on the scale indicates a midway point but does not necessarily imply neutrality. You may feel strongly that new media can be equally dull and exciting. If so, use the 0 to show that this is your attitude. If a particular pair of terms means nothing to you or you do not know how to answer, simply leave it blank.

If you think about particular instances of new media - Facebook, Twitter, a digital artwork - this may help structure your thoughts, although here we want you to respond to new media more generally. Please select your answers in relation to the following statement:

In my view, New Media are in general…

Private	3 2 1 0 1 2 3	Public
Elitist	3 2 1 0 1 2 3	Egalitarian
Fixed	3 2 1 0 1 2 3	Fluid
Deliberative	3 2 1 0 1 2 3	Participative
Socially constructed knowledge	3 2 1 0 1 2 3	Individually constructed knowledge
Emergent	3 2 1 0 1 2 3	Pre-defined
Immaterial	3 2 1 0 1 2 3	Material
Time-biased	3 2 1 0 1 2 3	Space-biased
Inclusive	3 2 1 0 1 2 3	Exclusive

Objective	3 2 1 0 1 2 3	Subjective
Faddish	3 2 1 0 1 2 3	Grounded
Procedural	3 2 1 0 1 2 3	Exploratory
Deep	3 2 1 0 1 2 3	Shallow
Passive	3 2 1 0 1 2 3	Active
Social	3 2 1 0 1 2 3	Isolating
Work-biased	3 2 1 0 1 2 3	Play-biased
Reliable	3 2 1 0 1 2 3	Unreliable
Tactile	3 2 1 0 1 2 3	Virtual

APPENDIX VII: FREQUENCY TABLES SHOWING THE DEMOGRAPHIC VARIABLES OF RESPONDENTS BY DISCIPLINE

FREQUENCIES IN ART AND DESIGN

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 21-30	2	3.6	3.6	3.6
	3 41-50	17	30.4	30.4	33.9
	4 51-60	37	66.1	66.1	100.0
	Total	56	100.0	100.0	

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Female	23	41.1	41.1	41.1
	2 Male	33	58.9	58.9	100.0
	Total	56	100.0	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 0-1 years	1	1.8	1.8	1.8
	2 2-5 years	10	17.9	17.9	19.6
	3 6-10 years	13	23.2	23.2	42.9
	4 11-20 years	19	33.9	33.9	76.8
	5 21-30 years	9	16.1	16.1	92.9
	6 31-40 years	4	7.1	7.1	100.0
	Total	56	100.0	100.0	

Social media use (work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	33	58.9	58.9	58.9
	2 Weekly	15	26.8	26.8	85.7
	3 Monthly	2	3.6	3.6	89.3
	4 Rarely	6	10.7	10.7	100.0
	Total	56	100.0	100.0	

Social media use (non-work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	46	82.1	82.1	82.1
	2 Weekly	5	8.9	8.9	91.1
	4 Rarely	3	5.4	5.4	96.4
	5 Never	2	3.6	3.6	100.0
	Total	56	100.0	100.0	

Specialist

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	22	39.3	39.3	39.3
	2 No	26	46.4	46.4	85.7
	3 To some extent	8	14.3	14.3	100.0
	Total	56	100.0	100.0	

FREQUENCIES IN COMPUTING SCIENCE

Frequency Table

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 21-30	1	1.3	1.3	1.3
	3 41-50	26	34.2	34.2	35.5
	4 51-60	49	64.5	64.5	100.0
	Total	76	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Female	17	22.4	22.4	22.4
	2 Male	59	77.6	77.6	100.0
	Total	76	100.0	100.0	

Career length

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 0-1 years	4	5.3	5.3	5.3
	2 2-5 years	10	13.2	13.2	18.4
	3 6-10 years	12	15.8	15.8	34.2
	4 11-20 years	31	40.8	40.8	75.0
	5 21-30 years	15	19.7	19.7	94.7
	6 31-40 years	2	2.6	2.6	97.4
	7 40+ years	2	2.6	2.6	100.0
	Total	76	100.0	100.0	

Social media use (work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	37	48.7	48.7	48.7
	2 Weekly	12	15.8	15.8	64.5
	3 Monthly	9	11.8	11.8	76.3
	4 Rarely	13	17.1	17.1	93.4
	5 Never	5	6.6	6.6	100.0
	Total	76	100.0	100.0	

Social media use (non-work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	48	63.2	63.2	63.2
	2 Weekly	14	18.4	18.4	81.6
	3 Monthly	2	2.6	2.6	84.2
	4 Rarely	9	11.8	11.8	96.1
	5 Never	3	3.9	3.9	100.0
	Total	76	100.0	100.0	

Specialist

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	34	44.7	44.7	44.7
	2 No	29	38.2	38.2	82.9
	3 To some extent	13	17.1	17.1	100.0
	Total	76	100.0	100.0	

FREQUENCIES IN HEALTH SCIENCES

Frequency Table

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 21-30	1	1.9	1.9	1.9
	3 41-50	14	26.9	26.9	28.8
	4 51-60	37	71.2	71.2	100.0
	Total	52	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Female	28	53.8	53.8	53.8
	2 Male	24	46.2	46.2	100.0
	Total	52	100.0	100.0	

Career length

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 0-1 years	2	3.8	3.8	3.8
	2 2-5 years	13	25.0	25.0	28.8
	3 6-10 years	10	19.2	19.2	48.1
	4 11-20 years	9	17.3	17.3	65.4
	5 21-30 years	9	17.3	17.3	82.7
	6 31-40 years	8	15.4	15.4	98.1
	7 40+ years	1	1.9	1.9	100.0
	Total	52	100.0	100.0	

Social media use (work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	22	42.3	42.3	42.3
	2 Weekly	8	15.4	15.4	57.7
	3 Monthly	8	15.4	15.4	73.1
	4 Rarely	11	21.2	21.2	94.2
	5 Never	3	5.8	5.8	100.0
	Total	52	100.0	100.0	

Social media use (non-work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	31	59.6	59.6	59.6
	2 Weekly	10	19.2	19.2	78.8
	3 Monthly	1	1.9	1.9	80.8
	4 Rarely	6	11.5	11.5	92.3
	5 Never	4	7.7	7.7	100.0
	Total	52	100.0	100.0	

Specialist

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	5	9.6	9.8	9.8
	2 No	44	84.6	86.3	96.1
	3	2	3.8	3.9	100.0
	Total	51	98.1	100.0	
Missing	System	1	1.9		
Total		52	100.0		

FREQUENCIES IN POLITICS AND INTERNATIONAL RELATIONS

Frequency Table

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 21-30	1	4.0	4.0	4.0
	3 41-50	14	56.0	56.0	60.0
	4 51-60	10	40.0	40.0	100.0
	Total	25	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Female	5	20.0	20.0	20.0
	2 Male	20	80.0	80.0	100.0
	Total	25	100.0	100.0	

Career length

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 0-1 years	3	12.0	12.0	12.0
	2 2-5 years	5	20.0	20.0	32.0
	3 6-10 years	2	8.0	8.0	40.0
	4 11-20 years	11	44.0	44.0	84.0
	5 21-30 years	2	8.0	8.0	92.0
	6 31-40 years	2	8.0	8.0	100.0
	Total	25	100.0	100.0	

Social media use (work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	11	44.0	44.0	44.0
	2 Weekly	5	20.0	20.0	64.0
	3 Monthly	1	4.0	4.0	68.0
	4 Rarely	3	12.0	12.0	80.0
	5 Never	5	20.0	20.0	100.0
	Total	25	100.0	100.0	

Social media use (non-work)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Daily	15	60.0	60.0	60.0
	2 Weekly	5	20.0	20.0	80.0
	3 Monthly	1	4.0	4.0	84.0
	4 Rarely	2	8.0	8.0	92.0
	5 Never	2	8.0	8.0	100.0
	Total	25	100.0	100.0	

Specialist

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	4	16.0	16.0	16.0
	2 No	19	76.0	76.0	92.0
	3	2	8.0	8.0	100.0
	Total	25	100.0	100.0	

APPENDIX VIII: RESPONSES BY DISCIPLINE TO QUESTIONS ABOUT DISCIPLINE CHARACTERISTICS: DESCRIPTIVE STATISTICS. SELECTED OUTPUT FROM THE SPSS EXPLORE PROCEDURE.

Descriptives				
Discipline			Statistic	Std. Error
Keeping up to date with technology is generally important in my discipline	1 Art and design	Median	4.00	
		Variance	.506	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.834	.319
		Kurtosis	.665	.628
	2 Computing	Median	5.00	
		Variance	.208	
		Minimum	4	
		Maximum	5	
		Range	1	
		Interquartile Range	1	
		Skewness	-.947	.276
		Kurtosis	-1.133	.545
	3 Health Sciences	Median	4.00	
		Variance	.643	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-1.477	.330
		Kurtosis	4.096	.650
	4 Politics	Median	4.00	
		Variance	.923	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.491	.464
		Kurtosis	-.691	.902
In my view, keeping up to date with technology	1 Art and design	Median	4.00	
		Variance	.909	
		Minimum	1	
		Maximum	5	

should be considered more important in my discipline		Range	4	
		Interquartile Range	1	
		Skewness	-.314	.319
		Kurtosis	-.263	.628
	2 Computing	Median	4.00	
		Variance	.868	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	2	
		Skewness	-.131	.279
		Kurtosis	-1.022	.552
	3 Health Sciences	Median	3.00	
		Variance	.923	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	.162	.330
		Kurtosis	-.282	.650
	4 Politics	Median	3.00	.163
		Variance	.667	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	.899	.464
		Kurtosis	.651	.902
In my discipline, there is usually a broad consensus about methods and techniques	1 Art and design	Median	3.00	
		Variance	1.100	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	.233	.319
		Kurtosis	-.836	.628
	2 Computing	Median	3.00	
		Variance	1.134	
		Std. Deviation	1.065	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	-.192	.277

		Kurtosis	-.786	.548
	3 Health Sciences	Median	3.00	
		Variance	.873	
		Std. Deviation	.934	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	2	
		Skewness	.253	.330
		Kurtosis	-1.024	.650
	4 Politics	Median	2.00	
		Variance	1.007	
		Minimum	1	
		Maximum	4	
		Range	3	
		Interquartile Range	1	
		Skewness	.313	.464
		Kurtosis	-.895	.902
Interdisciplinary work is generally important to my discipline	1 Art and design	Median	4.00	
		Variance	.888	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-1.627	.319
		Kurtosis	3.319	.628
	2 Computing	Median	4.00	
		Variance	.604	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.593	.277
		Kurtosis	-.072	.548
	3 Health Sciences	Median	4.00	
		Variance	.523	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.670	.330
		Kurtosis	.383	.650
	4 Politics	Median	4.00	
		Variance	.740	

		Std. Deviation	.860	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.046	.464
		Kurtosis	-.499	.902
The audience that my discipline shares its work with is generally varied and diverse	1 Art and design	Median	4.00	
		Variance	.945	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-1.108	.319
		Kurtosis	1.003	.628
	2 Computing	Median	4.00	
		Variance	.667	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.485	.277
		Kurtosis	-.052	.548
	3 Health Sciences	Median	4.00	
		Variance	.887	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-.831	.330
		Kurtosis	.572	.650
	4 Politics	Median	4.00	
		Variance	.917	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.619	.464
		Kurtosis	-.546	.902
It is important to take part in online social networks with academics	1 Art and design	Median	3.00	
		Variance	.691	
		Minimum	2	
		Maximum	5	
		Range	3	

working in the same discipline as myself		Interquartile Range	1	
		Skewness	.059	.319
		Kurtosis	-.468	.628
	2 Computing	Median	3.00	
		Variance	1.092	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	.045	.276
		Kurtosis	-.482	.545
	3 Health Sciences	Median	3.00	
		Variance	1.072	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	-.286	.330
		Kurtosis	-.627	.650
	4 Politics	Median	3.00	
		Variance	.693	
		Minimum	2	
		Maximum	4	
		Range	2	
		Interquartile Range	2	
		Skewness	-.238	.464
		Kurtosis	-1.521	.902
It is important to take part in online social networks with academics from other disciplines	1 Art and design	Median	3.00	
		Variance	.686	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	.037	.319
		Kurtosis	-.469	.628
	2 Computing	Median	3.00	
		Variance	1.102	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	-.125	.277
		Kurtosis	-.474	.548
		Median	3.00	

	3 Health Sciences	Variance	.951	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	-.067	.330
		Kurtosis	-.566	.650
	4 Politics	Median	3.00	
		Variance	.693	
		Minimum	2	
		Maximum	4	
		Range	2	
		Interquartile Range	2	
		Skewness	.238	.464
		Kurtosis	-1.521	.902
In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	1 Art and design	Median	3.00	
		Variance	.934	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	.158	.322
		Kurtosis	-.761	.634
	2 Computing	Median	4.00	
		Variance	.972	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	2	
		Skewness	-.396	.277
		Kurtosis	-.718	.548
	3 Health Sciences	Median	3.00	
		Variance	.798	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-.442	.330
		Kurtosis	-.475	.650
	4 Politics	Median	2.00	
		Variance	1.407	
		Minimum	1	
		Maximum	5	
		Range	4	

		Interquartile Range	2	
		Skewness	.288	.464
		Kurtosis	-1.099	.902
In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	1 Art and design	Median	4.00	
		Variance	.925	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-1.441	.319
		Kurtosis	2.535	.628
	2 Computing	Median	4.00	
		Variance	.579	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-1.258	.276
		Kurtosis	3.379	.545
	3 Health Sciences	Median	4.00	
		Variance	.570	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.552	.330
		Kurtosis	.254	.650
	4 Politics	5% Trimmed Mean	3.52	
		Median	4.00	
		Variance	.760	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.476	.464
		Kurtosis	-.443	.902
My discipline is strongly influenced by what might be called a "reputational elite"	1 Art and design	Median	4.00	
		Variance	.852	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	1	
		Skewness	-.378	.330
		Kurtosis	-.586	.650

	2 Computing	Median	3.00	
		Variance	.772	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-.342	.277
		Kurtosis	.373	.548
	3 Health Sciences	Median	4.00	
		Variance	1.038	
		Minimum	1	
		Maximum	5	
		Range	4	
		Interquartile Range	1	
		Skewness	-.687	.330
		Kurtosis	.507	.650
	4 Politics	Median	4.00	
		Variance	.580	
		Minimum	2	
		Maximum	5	
		Range	3	
		Interquartile Range	0	
		Skewness	-.991	.472
		Kurtosis	1.540	.918

APPENDIX IX: MEDIANS AND CONFIDENCE INTERVALS FOR QUESTIONS ABOUT DISCIPLINE CHARACTERISTICS BY GROUPING VARIABLE 'DISCIPLINE'. SELECTED OUTPUT FROM THE SPSS RATIO STATISTICS PROCEDURE.

Confidence Intervals for questions about Discipline Characteristics

Ratio Statistics for Keeping up to date with technology is generally important in my discipline / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	2.000	2.000	2.000	96.4%
Computing science	1.000	1.000	1.000	97.1%
Art and design	2.000	1.000	2.000	97.0%
Politics	2.000	2.000	3.000	97.1%
Overall	2.000	1.000	2.000	96.2%

Ratio Statistics for In my view, keeping up to date with technology should be considered more important in my discipline / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	3.000	2.000	3.000	96.4%
Computing science	2.000	2.000	3.000	97.1%
Art and design	2.000	2.000	3.000	97.0%
Politics	3.000	3.000	4.000	97.1%
Overall	3.000	2.000	3.000	96.2%

Ratio Statistics for In my discipline, there is usually a broad consensus about methods and techniques / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	3.000	2.000	3.000	96.4%
Computing science	3.000	2.000	3.000	97.1%
Art and design	3.000	3.000	4.000	97.0%
Politics	4.000	3.000	4.000	97.1%
Overall	3.000	3.000	3.000	96.2%

Ratio Statistics for Interdisciplinary work is generally important to my discipline / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	2.000	1.000	2.000	96.4%
Computing science	2.000	2.000	2.000	97.1%
Art and design	2.000	1.000	2.000	97.0%
Politics	2.000	2.000	3.000	97.1%
Overall	2.000	2.000	2.000	96.2%

Ratio Statistics for The audience that my discipline shares its work with is generally varied and diverse / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	2.000	2.000	2.000	96.4%
Computing science	2.000	2.000	2.000	97.1%
Art and design	2.000	2.000	2.000	97.0%
Politics	2.000	2.000	3.000	97.1%
Overall	2.000	2.000	2.000	96.2%

Ratio Statistics for It is important to take part in online social networks with academics working in the same discipline as myself / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	3.000	2.000	3.000	96.4%
Computing science	3.000	3.000	3.000	97.1%
Art and design	3.000	2.000	3.000	97.0%
Politics	3.000	2.000	3.000	97.1%
Overall	3.000	3.000	3.000	96.2%

Ratio Statistics for It is important to take part in online social networks with academics from other disciplines / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	3.000	2.000	3.000	96.4%
Computing science	3.000	3.000	3.000	97.1%
Art and design	3.000	2.000	3.000	97.0%
Politics	3.000	3.000	4.000	97.1%
Overall	3.000	3.000	3.000	96.2%

Ratio Statistics for In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	3.000	2.000	3.000	96.4%
Computing science	2.000	2.000	3.000	97.1%
Art and design	3.000	3.000	4.000	97.0%
Politics	4.000	2.000	4.000	97.1%
Overall	3.000	3.000	3.000	96.2%

Ratio Statistics for In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	2.000	2.000	2.000	96.4%
Computing science	2.000	2.000	2.000	97.1%
Art and design	2.000	1.000	2.000	97.0%
Politics	2.000	2.000	3.000	97.1%
Overall	2.000	2.000	2.000	96.2%

Ratio Statistics for My discipline is strongly influenced by what might be called a reputational elite / RatioDisciplineChar

Group	Median	95% Confidence Interval for Median		
		Lower Bound	Upper Bound	Actual Coverage
Health Science	2.000	2.000	3.000	96.4%
Computing science	3.000	3.000	3.000	97.1%
Art and design	2.000	2.000	3.000	97.0%
Politics	2.000	2.000	2.000	97.1%
Overall	2.000	2.000	3.000	96.2%

*The confidence interval for the median is constructed without any distribution assumptions. The actual coverage level may be greater than the specified level.

APPENDIX X: TESTS OF NORMALITY OF RESPONSE DISTRIBUTIONS TO QUESTIONS ABOUT DISCIPLINE CHARACTERISTICS: OUTPUT OF A KOLMOGOROV-SMIRNOV AND SHAPIRO-WILK TEST USING SPSS

	Kolmogorov-Smirnov[a]			Shapiro-Wilk	
	Statistic	df	Sig.	Statistic	df
Keeping up to date with technology is generally important in my discipline	.268	199	.000	.754	199
In my view, keeping up to date with technology should be considered more important in my discipline	.220	199	.000	.892	199
In my discipline, there is usually a broad consensus about methods and techniques	.208	199	.000	.893	199
Interdisciplinary work is generally important to my discipline	.258	199	.000	.817	199
The audience that my discipline shares its work with is generally varied and diverse	.311	199	.000	.838	199
It is important to take part in online social networks with academics working in the same discipline as myself	.199	199	.000	.901	199
It is important to take part in online social networks with academics from other disciplines	.191	199	.000	.902	199
In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	.241	199	.000	.871	199
In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	.295	199	.000	.825	199
My discipline is strongly influenced by what might be called a "reputational elite"	.246	199	.000	.884	199

APPENDIX XI: RANKS OF MEANS BY GROUPING VARIABLE: DISCIPLINE. SELECTED OUTPUT FROM SPSS' KRUSKAL-WALLIS TEST FOR VARIANCE

Question	Discipline	N	Mean Rank
Keeping up to date with technology is generally important in my discipline	Art and design	56	101.09
	Computing	76	133.29
	Health Sciences	52	90.83
	Politics	25	57.24
	Total	209	
In my view, keeping up to date with technology should be considered more important in my discipline	Art and design	56	107.39
	Computing	74	122.64
	Health Sciences	52	93.59
	Politics	25	62.88
	Total	207	
In my discipline, there is usually a broad consensus about methods and techniques	Art and design	56	96.02
	Computing	75	112.05
	Health Sciences	52	114.73
	Politics	25	79.58
	Total	208	
Interdisciplinary work is generally important to my discipline	Art and design	56	113.77
	Computing	75	104.76
	Health Sciences	52	109.78
	Politics	25	71.98
	Total	208	
The audience that my discipline shares its work with is generally varied and diverse	Art and design	56	116.80
	Computing	75	102.93
	Health Sciences	52	100.25
	Politics	25	90.48
	Total	208	
It is important to take part in online social networks with academics working in the same discipline as myself	Art and design	56	117.53
	Computing	76	96.47
	Health Sciences	52	107.83

	Politics	25	97.00
	Total	209	
It is important to take part in online social networks with academics from other disciplines	Art and design	56	123.55
	Computing	75	95.18
	Health Sciences	52	104.25
	Politics	25	90.30
	Total	208	
In my discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Art and design	55	85.19
	Computing	75	117.05
	Health Sciences	52	115.87
	Politics	25	81.54
	Total	207	
In my discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Art and design	56	119.59
	Computing	76	118.94
	Health Sciences	52	83.30
	Politics	25	75.08
	Total	209	
My discipline is strongly influenced by what might be called a "reputational elite"	Art and design	52	112.74
	Computing	75	84.70
	Health Sciences	52	105.91
	Politics	24	124.31
	Total	203	

APPENDIX XII: MANN-WHITNEY TESTS FOR VARIANCE IN MEAN RANKS OF QUESTIONS ABOUT DISCIPLINE CHARACTERISTICS: OUTPUT FROM SPSS

Mann-Whitney Tests

Ranks

	Fields	N	Mean Rank	Sum of Ranks
Keeping up to date with technology is generally important in my subject discipline	Health Science	52	80.35	4178.00
	Computing science	76	53.66	4078.00
	Total	128		
In my view, keeping up to date with technology should be considered more important in my subject discipline	Health Science	52	73.91	3843.50
	Computing science	76	58.06	4412.50
	Total	128		
In my subject discipline, there is usually a broad consensus about methods and techniques	Health Science	52	63.30	3291.50
	Computing science	76	65.32	4964.50
	Total	128		
Interdisciplinary work is generally important to my subject discipline	Health Science	52	62.15	3232.00
	Computing science	76	66.11	5024.00
	Total	128		
The audience that my subject discipline shares its work with is generally varied and diverse	Health Science	52	65.00	3380.00
	Computing science	76	64.16	4876.00
	Total	128		
It is important to take part in online social networks with academics working in the same subject discipline as myself	Health Science	52	60.61	3151.50
	Computing science	76	67.16	5104.50
	Total	128		
It is important to take part in online social networks with academics from other subject disciplines	Health Science	52	60.73	3158.00
	Computing science	76	67.08	5098.00
	Total	128		
In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Health Science	52	64.77	3368.00
	Computing science	76	64.32	4888.00
	Total	128		
	Health Science	52	77.93	4052.50

In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Computing science	76	55.31	4203.50
	Total	128		
My subject discipline is strongly influenced by what might be called a reputational elite	Health Science	52	56.28	2926.50
	Computing science	76	70.13	5329.50
	Total	128		

Test Statistics[a]

	Keeping up to date with technology is generally important in my subject discipline	In my view, keeping up to date with technology should be considered more important in my subject discipline	In my subject discipline, there is usually a broad consensus about methods and techniques	Interdisciplinary work is generally important to my subject discipline
Mann-Whitney U	1152.000	1486.500	1913.500	1854.000
Wilcoxon W	4078.000	4412.500	3291.500	3232.000
Z	-4.567	-2.487	-.316	-.644
Asymp. Sig. (2-tailed)	.000	.013	.752	.520

	The audience that my subject discipline shares its work with is generally varied and diverse	It is important to take part in online social networks with academics working in the same subject discipline as myself	It is important to take part in online social networks with academics from other subject disciplines	In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs
Mann-Whitney U	1950.000	1773.500	1780.000	1962.000
Wilcoxon W	4876.000	3151.500	3158.000	4888.000

Z	-.137	-1.022	-.992	-.072
Asymp. Sig. (2-tailed)	.891	.307	.321	.942

	In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	My subject discipline is strongly influenced by what might be called a reputational elite
Mann-Whitney U	1277.500	1548.500
Wilcoxon W	4203.500	2926.500
Z	-3.762	-2.201
Asymp. Sig. (2-tailed)	.000	.028

Ranks

	Fields	N	Mean Rank	Sum of Ranks
Keeping up to date with technology is generally important in my subject discipline	Health Science	52	56.85	2956.00
	Art and design	55	51.31	2822.00
	Total	107		
In my view, keeping up to date with technology should be considered more important in my subject discipline	Health Science	52	58.01	3016.50
	Art and design	55	50.21	2761.50
	Total	107		
In my subject discipline, there is usually a broad consensus about methods and techniques	Health Science	52	49.16	2556.50
	Art and design	55	58.57	3221.50
	Total	107		
Interdisciplinary work is generally important to my subject discipline	Health Science	52	54.92	2856.00
	Art and design	55	53.13	2922.00
	Total	107		
The audience that my subject discipline shares its work with is generally varied and diverse	Health Science	52	58.02	3017.00
	Art and design	55	50.20	2761.00
	Total	107		
It is important to take part in online social	Health Science	52	56.48	2937.00
	Art and design	55	51.65	2841.00

networks with academics working in the same subject discipline as myself	Total	107		
It is important to take part in online social networks with academics from other subject disciplines	Health Science Art and design Total	52 55 107	59.21 49.07	3079.00 2699.00
In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Health Science Art and design Total	52 55 107	45.30 62.23	2355.50 3422.50
In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Health Science Art and design Total	52 55 107	63.05 45.45	3278.50 2499.50
My subject discipline is strongly influenced by what might be called a reputational elite	Health Science Art and design Total	52 55 107	53.30 54.66	2771.50 3006.50

Test Statistics[a]

	Keeping up to date with technology is generally important in my subject discipline	In my view, keeping up to date with technology should be considered more important in my subject discipline	In my subject discipline, there is usually a broad consensus about methods and techniques	Interdisciplinary work is generally important to my subject discipline
Mann-Whitney U	1282.000	1221.500	1178.500	1382.000
Wilcoxon W	2822.000	2761.500	2556.500	2922.000
Z	-1.022	-1.365	-1.640	-.327
Asymp. Sig. (2-tailed)	.307	.172	.101	.744

	The audience that my subject discipline shares its work with is generally varied and diverse	It is important to take part in online social networks with academics working in the same subject discipline as myself	It is important to take part in online social networks with academics from other subject disciplines	In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs
Mann-Whitney U	1221.000	1301.000	1159.000	977.500
Wilcoxon W	2761.000	2841.000	2699.000	2355.500
Z	-1.411	-.847	-1.781	-2.952
Asymp. Sig. (2-tailed)	.158	.397	.075	.003

	In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	My subject discipline is strongly influenced by what might be called a reputational elite
Mann-Whitney U	959.500	1393.500
Wilcoxon W	2499.500	2771.500
Z	-3.170	-.240
Asymp. Sig. (2-tailed)	.002	.811

Ranks

	Fields	N	Mean Rank	Sum of Ranks
Keeping up to date with technology is generally important in my subject discipline	Health Science	52	34.98	1819.00
	Politics	26	48.54	1262.00
	Total	78		
In my view, keeping up to date with technology should be considered more important in my subject discipline	Health Science	52	35.49	1845.50
	Politics	26	47.52	1235.50
	Total	78		
In my subject discipline, there is usually a broad consensus about methods and techniques	Health Science	52	34.81	1810.00
	Politics	26	48.88	1271.00
	Total	78		
Interdisciplinary work is generally important to my subject discipline	Health Science	52	35.14	1827.50
	Politics	26	48.21	1253.50
	Total	78		
The audience that my subject discipline shares its work with is generally varied and diverse	Health Science	52	38.73	2014.00
	Politics	26	41.04	1067.00
	Total	78		
It is important to take part in online social networks with academics working in the same subject discipline as myself	Health Science	52	38.09	1980.50
	Politics	26	42.33	1100.50
	Total	78		
It is important to take part in online social networks with academics from other subject disciplines	Health Science	52	37.81	1966.00
	Politics	26	42.88	1115.00
	Total	78		
In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Health Science	52	35.07	1823.50
	Politics	26	48.37	1257.50
	Total	78		
In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Health Science	52	38.72	2013.50
	Politics	26	41.06	1067.50
	Total	78		

My subject discipline is strongly influenced by what might be called a reputational elite	Health Science	52	41.51	2158.50
	Politics	26	35.48	922.50
	Total	78		

Test Statistics[a]

	Keeping up to date with technology is generally important in my subject discipline	In my view, keeping up to date with technology should be considered more important in my subject discipline	In my subject discipline, there is usually a broad consensus about methods and techniques	Interdisciplinary work is generally important to my subject discipline
Mann-Whitney U	441.000	467.500	432.000	449.500
Wilcoxon W	1819.000	1845.500	1810.000	1827.500
Z	-2.761	-2.354	-2.712	-2.581
Asymp. Sig. (2-tailed)	.006	.019	.007	.010

	The audience that my subject discipline shares its work with is generally varied and diverse	It is important to take part in online social networks with academics working in the same subject discipline as myself	It is important to take part in online social networks with academics from other subject disciplines	In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs
Mann-Whitney U	636.000	602.500	588.000	445.500
Wilcoxon W	2014.000	1980.500	1966.000	1823.500
Z	-.462	-.819	-.979	-2.563
Asymp. Sig. (2-tailed)	.644	.413	.327	.010

	In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	My subject discipline is strongly influenced by what might be called a reputational elite
Mann-Whitney U Wilcoxon W Z	635.500 2013.500 -.475	571.500 922.500 -1.186
Asymp. Sig. (2-tailed)	.635	.236

Ranks

	Fields combined	N	Mean Rank	Sum of Ranks
Keeping up to date with technology is generally important in my subject discipline	Computing science	76	42.46	3227.00
	Politics	26	77.92	2026.00
	Total	102		
In my view, keeping up to date with technology should be considered more important in my subject discipline	Computing science	76	44.75	3401.00
	Politics	26	71.23	1852.00
	Total	102		
In my subject discipline, there is usually a broad consensus about methods and techniques	Computing science	76	47.63	3620.00
	Politics	26	62.81	1633.00
	Total	102		
Interdisciplinary work is generally important to my subject discipline	Computing science	76	48.04	3651.00
	Politics	26	61.62	1602.00
	Total	102		
The audience that my subject discipline shares its work with is generally varied and diverse	Computing science	76	50.53	3840.50
	Politics	26	54.33	1412.50
	Total	102		
It is important to take part in online social networks with academics working in the same subject discipline as myself	Computing science	76	51.62	3923.00
	Politics	26	51.15	1330.00
	Total	102		
It is important to take part in online social	Computing science	76	51.22	3892.50

networks with academics from other subject disciplines	Politics	26	52.33	1360.50
	Total	102		
In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Computing science	76	47.34	3597.50
	Politics	26	63.67	1655.50
	Total	102		
In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Computing science	76	46.55	3537.50
	Politics	26	65.98	1715.50
	Total	102		
My subject discipline is strongly influenced by what might be called a reputational elite	Computing science	76	56.46	4291.00
	Politics	26	37.00	962.00
	Total	102		

Test Statistics[a]

	Keeping up to date with technology is generally important in my subject discipline	In my view, keeping up to date with technology should be considered more important in my subject discipline	In my subject discipline, there is usually a broad consensus about methods and techniques	Interdisciplinary work is generally important to my subject discipline
Mann-Whitney U	301.000	475.000	694.000	725.000
Wilcoxon W	3227.000	3401.000	3620.000	3651.000
Z	-5.968	-4.101	-2.342	-2.156
Asymp. Sig. (2-tailed)	.000	.000	.019	.031

	The audience that my subject discipline shares its work with is generally varied and diverse	It is important to take part in online social networks with academics working in the same subject discipline as myself	It is important to take part in online social networks with academics from other subject disciplines	In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs
Mann-Whitney U	914.500	979.000	966.500	671.500
Wilcoxon W	3840.500	1330.000	3892.500	3597.500
Z	-.614	-.072	-.172	-2.553
Asymp. Sig. (2-tailed)	.539	.942	.863	.011

Test Statistics[a]

	In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	My subject discipline is strongly influenced by what might be called a reputational elite
Mann-Whitney U	611.500	611.000
Wilcoxon W	3537.500	962.000
Z	-3.180	-3.075
Asymp. Sig. (2-tailed)	.001	.002

Ranks

	Fields combined	N	Mean Rank	Sum of Ranks
Keeping up to date with technology is generally important in my subject discipline	Art and design	55	35.35	1944.50
	Politics	26	52.94	1376.50
	Total	81		
In my view, keeping up to date with technology should be considered more important in my subject discipline	Art and design	55	35.31	1942.00
	Politics	26	53.04	1379.00
	Total	81		
In my subject discipline, there is usually a broad	Art and design	55	38.70	2128.50
	Politics	26	45.87	1192.50

consensus about methods and techniques	Total	81		
Interdisciplinary work is generally important to my subject discipline	Art and design	55	36.58	2012.00
	Politics	26	50.35	1309.00
	Total	81		
The audience that my subject discipline shares its work with is generally varied and diverse	Art and design	55	38.40	2112.00
	Politics	26	46.50	1209.00
	Total	81		
It is important to take part in online social networks with academics working in the same subject discipline as myself	Art and design	55	38.16	2099.00
	Politics	26	47.00	1222.00
	Total	81		
It is important to take part in online social networks with academics from other subject disciplines	Art and design	55	36.61	2013.50
	Politics	26	50.29	1307.50
	Total	81		
In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Art and design	55	40.05	2203.00
	Politics	26	43.00	1118.00
	Total	81		
In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Art and design	55	36.37	2000.50
	Politics	26	50.79	1320.50
	Total	81		
My subject discipline is strongly influenced by what might be called a reputational elite	Art and design	55	43.13	2372.00
	Politics	26	36.50	949.00
	Total	81		

Test Statistics[a]

	Keeping up to date with technology is generally important in my subject discipline	In my view, keeping up to date with technology should be considered more important in my subject discipline	In my subject discipline, there is usually a broad consensus about methods and techniques	Interdisciplinary work is generally important to my subject discipline
Mann-Whitney U Wilcoxon W Z	404.500 1944.500 -3.408	402.000 1942.000 -3.312	588.500 2128.500 -1.344	472.000 2012.000 -2.621
Asymp. Sig. (2-tailed)	.001	.001	.179	.009

	The audience that my subject discipline shares its work with is generally varied and diverse	It is important to take part in online social networks with academics working in the same subject discipline as myself	It is important to take part in online social networks with academics from other subject disciplines	In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs
Mann-Whitney U Wilcoxon W Z	572.000 2112.000 -1.569	559.000 2099.000 -1.679	473.500 2013.500 -2.585	663.000 2203.000 -.550
Asymp. Sig. (2-tailed)	.117	.093	.010	.582

	In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	My subject discipline is strongly influenced by what might be called a reputational elite
Mann-Whitney U Wilcoxon W Z	460.500 2000.500 -2.747	598.000 949.000 -1.270

Asymp. Sig. (2-tailed)	.006	.204

Ranks

	Fields combined	N	Mean Rank	Sum of Ranks
Keeping up to date with technology is generally important in my subject discipline	Computing science	76	57.59	4377.00
	Art and design	55	77.62	4269.00
	Total	131		
In my view, keeping up to date with technology should be considered more important in my subject discipline	Computing science	76	62.79	4772.00
	Art and design	55	70.44	3874.00
	Total	131		
In my subject discipline, there is usually a broad consensus about methods and techniques	Computing science	76	62.47	4748.00
	Art and design	55	70.87	3898.00
	Total	131		
Interdisciplinary work is generally important to my subject discipline	Computing science	76	68.47	5204.00
	Art and design	55	62.58	3442.00
	Total	131		
The audience that my subject discipline shares its work with is generally varied and diverse	Computing science	76	69.73	5299.50
	Art and design	55	60.85	3346.50
	Total	131		
It is important to take part in online social networks with academics working in the same subject discipline as myself	Computing science	76	71.75	5453.00
	Art and design	55	58.05	3193.00
	Total	131		
It is important to take part in online social networks with academics from other subject disciplines	Computing science	76	73.78	5607.00
	Art and design	55	55.25	3039.00
	Total	131		
In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs	Computing science	76	57.84	4396.00
	Art and design	55	77.27	4250.00
	Total	131		

In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	Computing science	76	66.20	5031.50
	Art and design	55	65.72	3614.50
	Total	131		
My subject discipline is strongly influenced by what might be called a reputational elite	Computing science	76	70.86	5385.50
	Art and design	55	59.28	3260.50
	Total	131		

Test Statistics[a]

	Keeping up to date with technology is generally important in my subject discipline	In my view, keeping up to date with technology should be considered more important in my subject discipline	In my subject discipline, there is usually a broad consensus about methods and techniques	Interdisciplinary work is generally important to my subject discipline
Mann-Whitney U	1451.000	1846.000	1822.000	1902.000
Wilcoxon W	4377.000	4772.000	4748.000	3442.000
Z	-3.458	-1.190	-1.298	-.949
Asymp. Sig. (2-tailed)	.001	.234	.194	.343

	The audience that my subject discipline shares its work with is generally varied and diverse	It is important to take part in online social networks with academics working in the same subject discipline as myself	It is important to take part in online social networks with academics from other subject disciplines	In my subject discipline, there is usually a broad consensus about the interpretation and meaning of research results and outputs

Mann-Whitney U	1806.500	1653.000	1499.000	1470.000
Wilcoxon W	3346.500	3193.000	3039.000	4396.000
Z	-1.431	-2.139	-2.891	-3.022
Asymp. Sig. (2-tailed)	.152	.032	.004	.003

	In my subject discipline, novelty (of approach, technique, or interpretation) is generally allowed and encouraged	My subject discipline is strongly influenced by what might be called a reputational elite
Mann-Whitney U	2074.500	1720.500
Wilcoxon W	3614.500	3260.500
Z	-.079	-1.814
Asymp. Sig. (2-tailed)	.937	.070

APPENDIX XIII: MEASURES OF VARIANCE BY GROUPING FOUR DEMOGRAPHIC VARIABLES. SELECTED OUTPUT FROM SPSS

The results of tests of variance performed using four variables other than discipline are presented below.

MANN-WHITNEY U TEST FOR VARIANCE IN SEMANTIC DIFFERENTIAL RESPONSE DISTRIBUTIONS BY GROUPING VARIABLE GENDER

	Private-Public	Elitist-Egalitarian	Fixed-Fluid	Deliberative-Participative	Emergent-Pre-defined	Inclusive-Exclusive	Objective-Subjective	Faddish-Grounded	Deep-Shallow	Passive-Active
Mann-Whitney U	4116.500	4620.000	4241.000	4419.000	4158.500	4525.500	4282.000	3466.000	3685.500	4117.000
Wilcoxon W	13027.500	13800.000	13152.000	13330.000	6436.500	7010.500	6697.000	12112.000	6100.500	13028.000
Z	-1.747	-.267	-.922	-.611	-.535	-.421	-.888	-2.171	-2.430	-1.399
Asymp. Sig. (2-tailed)	.081	.789	.357	.541	.592	.674	.374	.030	.015	.162

	Social-Isolating	Reliable-Unreliable
Mann-Whitney U	4468.500	4133.000
Wilcoxon W	13513.500	6834.000
Z	-.054	-.2.046
Asymp. Sig. (2-tailed)	.957	.041

KRUSKAL-WALLIS TEST FOR VARIANCE IN SEMANTIC DIFFERENTIAL RESPONSE DISTRIBUTIONS BY GROUPING VARIABLE CAREER LENGTH

	Private-Public	Elitist-Egalitarian	Fixed-Fluid	Deliberative-Participative	Emergent-Pre-defined	Inclusive-Exclusive	Objective-Subjective	Faddish-Grounded	Deep-Shallow	Passive-Active	Social-Isolating	Reliable-Unreliable
Chi-Square	4.710	5.531	2.653	6.567	5.127	5.892	2.199	3.202	5.766	6.957	2.160	11.513
df	6	6	6	6	6	6	6	6	6	6	6	6
Asymp. Sig.	.581	.478	.851	.363	.528	.435	.900	.783	.450	.325	.904	.074

KRUSKAL-WALLIS TEST FOR VARIANCE BY GROUPING VARIABLE SOCIAL MEDIA USE (WORK)

	Private-Public	Elitist-Egalitarian	Fixed-Fluid	Deliberative-Participative	Emergent-Pre-defined	Inclusive-Exclusive	Objective-Subjective	Faddish-Grounded	Deep-Shallow	Passive-Active	Social-Isolating	Reliable-Unreliable
Chi-Square	2.667	2.619	2.760	1.260	2.496	2.297	3.065	3.602	11.793	3.022	3.056	9.515
df	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	.615	.624	.599	.868	.645	.681	.547	.462	.019	.554	.549	.049

MANN-WHITNEY U-TEST FOR VARIANCE BY GROUPING VARIABLE SPECIALIST

	Private-Public	Elitist-Egalitarian	Fixed-Fluid	Deliberative-Participative	Emergent-Pre-defined	Inclusive-Exclusive	Objective-Subjective	Faddish-Grounded	Deep-Shallow	Passive-Active	Social-Isolating	Reliable-Unreliable
Mann-Whitney U	3590.5	3609.5	3333.0	3358.5	3317.5	3352.5	3366.5	3146.5	3267.5	3330.500	3347.5	3624.0
Wilcoxon W	10376.5	10395.5	10119.0	5438.5	5270.5	10138.5	9807.50	5162.5	5220.5	10000.5	9788.5	10294.0
Z	-.384	-.138	-1.014	-.997	-.599	-.934	-.789	-.934	-.939	-.917	-.496	-.173
Asymp. Sig. (2-tailed)	.701	.890	.310	.319	.549	.351	.430	.350	.348	.359	.620	.863

APPENDIX XIV: A LITERATURE REVIEW OF WORKS ON THE NATURE OF NEW MEDIA, INDENTIFYING KEY CONCEPTUAL THEMES

INTRODUCTION

In a supplemental literature review undertaken for this thesis, writing from various disciplines which address new media is considered. Sitting above or supplementing practical and work-related concerns, the works identified here contribute to debates about the social, political and technical affordances or impacts of new media; for instance, the extent to which they improve upon older technologies, or the contribution they might make to democratic processes. Enabling a richer understanding of how academics might understand new media, the review provides useful terminology for use in the data gathering instruments described in Chapter 4. Key concepts around new media considered by scholars and other groups – for instance, their political affordances or symbolic meanings – are identified with many authors revealing or delineating strong attitudes toward new media and their value. A range of approaches are evident, often used in accordance with a particular school of thought.

Works include writing and research from within media studies, communication studies and composition studies which consider new media in abstract, conceptual and/or theoretical terms. Adopting a combination of socio-cultural, literary and pedagogical perspectives, these are often underpinned by critical theories and concepts originating in philosophy, literary studies, linguistics or semiotics. In general, new media are treated as the revolutionary and disruptive agents of paradigm shifts. There is a sense of excitement around this, yet also deep reflections on meaning, meaning-making and adaptation. The emphasis is often (ostensibly at least) on finding abstracts to describe new media with an analytical purity, although again, they are generally considered to be beneficial.

Many of these debates go beyond the immediate scope of this thesis. The review is representative rather than exhaustive, identifying key discourses, arguments and concepts. It enriches the thesis's grounding in information science, which is requisite when considering attitudes across multiple fields.

METAPHORS, NOVELTIES AND MATERIALITY

New media refashion former media; they build upon the forms, functions and effects of what came before (Bolter and Grusin, 2000; Brighenti, 2008). Because of this, marked sociological changes brought about by new media technologies have as much to do with perception and use as with technical innovations; some are considered more original than others because they affect systems of cultural communication more deeply. This invites comparison. For instance, media are inherently social. Readers and audiences have always been co-creators of meaning, decoding – if not fully determining – the significance of received messages and responding in various, perhaps unexpected ways (Aarseth, 1997, page 17; Barthes, 1993, page 54; Harrison and Barthel, 2009; Manovich, 2001, page 56; Papacharissi, 2010). Historically, creative practises designed to be collaborative have been motivated by a range of political and existential beliefs in relation to particular ideologies and cultural policies, requiring participation from the public; for example collective art inviting audience involvement (Bishop, 2012, page 41, page 130) or focused on "collective desires" (page 12).

For Aarseth (1997), analysing narratology and rhetoric, the important differences between old and new media texts are functional rather than materialistic or structural (page 17). While novels and poems accommodate ambiguous meanings, cybertexts (i.e. hypertext novels and computer games) allow for variable expression – they offer the reader/player literal choices, always foregrounding clear alternatives (page 3). The medium thus becomes an "integral part of the literary exchange" while the reader becomes "a more integrated figure even than reader-response theorists would claim" (page 1). Similarly, for Harrison and Barthel (2009, page 156-8), although old media are demonstrably participatory, it is different motivations, gratifications and actions that typify our participation with newer ones:

From the perspective of theoretical treatments of the 'active audience', audiences or media users have created media content on a long-term and consistent historical basis for purposes related to radical and community

movements […]. However, there is also a persistent expressive and aesthetic dimension to the content construction of Web 2.0 beyond its purely instrumental force, which invites attention. […] The popularity of Web 2.0 applications demonstrates that, regardless of their levels of technical expertise, users can wield technologies in more active ways than had been apparent previously to traditional media producers and technology innovators. Users build and maintain social networks, they tag and rank information in 'folksonomies' and become deeply involved in immersive virtual web experiences. They do all these things in collaboration, pooling knowledge and constructing content that they share with each other, which is subsequently remixed, redistributed and reconsumed.

Considering both technical details and creative functions, Manovich (2001, page 44) finds many of new media's supposedly defining characteristics in the computational and cinematographic devices of the 1830s:

> New media represents a convergence of two separate historical trajectories: computing and media technologies. Both begin in the 1830s with Babbage's Analytical Engine and Daguerre's daguerreotype. The synthesis of these two histories? The translation of all existing media into numerical data accessible for computers. The result is new media: graphics, moving images, sounds, shapes, spaces and text which become computable, i.e. simply another set of computer data […]. Rather than focusing on familiar categories such as interactivity or hypermedia, I suggest a different list. This list reduces all principles of new media to five: numerical representation, modularity, automation, variability and cultural transcoding. I address other principles which are often attributed to new media. I show that these principles can already be found at work in older cultural forms and media technologies such as cinema, and therefore they are by themselves are not sufficient to distinguish new media from the old.

What he wishes to ascertain are the genuinely new features of new media. His first four principles are based upon a reading of technical properties while the fifth addresses their socio-cultural effects. Golumbia (2014) calls these "normative desiderata for new forms to come, rather than analytical descriptions of digital media as they exist today" (page 54). In other words, most new media are at present less analytically pure than in Manovich's typology; his principles are thus ideals. Discussing what new media are *not*, he scrutinises the term "interactivity", in particular the notion that computer interfaces constitute an externalisation of symbolic mental processes (page 72). Such analogies, however inaccurate, arise as a consequence of using new media and of habituation to computational logic. Nonetheless, modified terms and concepts like these serve a purpose; they give us a way to understand computers and our relationship to them.

Bermann (1989) refers to this as a "bureaucratizing of the mind" through the use of "anthropomorphic computer metaphors" (page 7). Citing Bolter (1984, page 11), he states: "computers are becoming a 'defining technology' which develops links, metaphorical or otherwise, with a culture's science, philosophy, or literature; [they are] always available to serve as metaphor, example, model or symbol". Although potentially reductive, "the most important of the computer's cultural effects is its impact on the metaphors through which we understand the human mind and intelligence" (page 7). Similarly for Manovich (2001), the "most substantial consequence of media's computerization" is "cultural re-conceptualization" (page 44):

> Since new media [are] created on computers distributed via computers, stored and archived on computers, the logic of a computer can be expected to significant influence on the traditional cultural logic of media. That is, we may expect that the computer layer will affect the cultural layer. The ways in which computer models the world, represents data and allows us to operate on it; the key operations behind all computer programs (such as search, match, sort, filter); the conventions of HCI – in short, what can be called

> computer's ontology, epistemology and pragmatics – influence the cultural layer of new media: its organization, its emerging genres, its contents […]. In summary, the computer layer and media/culture layer influence each other. To use another concept from new media, we can say that they are being composited together. The result of this composite is the new computer culture: a blend of human and computer meanings, of traditional ways human culture modeled the world and computer's own ways to represent it.

Accordingly, a new theoretical framework is needed to elucidate the "process of conceptual transfer from computer world to culture at large" (page 47), as when "a computer database becomes a new metaphor which we use to conceptualize individual and collective cultural memory [or] a collection of documents or objects" (page 191). This should include ideas already known to scholars of media studies, and those which have little precedent (i.e. "programmability"). Researchers must turn from media studies to "software theory" because "the computer may perform perfectly the role of the Jacquard loom, but underneath it is fundamentally Babbage's Analytical Engine – after all, this was its identity for one hundred and fifty years. New media may look like media, but this is only the surface" (page 65).

For McLuhan and McLuhan (1992), the often unobserved ordering principles of media are the most important cause of their cultural effects (page 128). Rather than content and aesthetic, form and functionality determine how media become embedded within "new patterns of human association" and communicative practise. The medium "is the message" (McLuhan, 1964, page 1) – or more precisely, the most significant catalyst of change. In his work on "media tetrads", he suggests that new forms of media simultaneously bring about reversals, retrievals, enhancements or the obsolescence of what came before. Gradually, they "extend" man's capabilities (McLuhan and McLuhan, 1992, page 4) – for example, the internet amplifies and speeds up the communication of thought while (arguably) making print culture obsolete.

In their view, "the etymology of all human technologies is to be found in the human body itself; they are, as it were, prosthetic devices, mutations, metaphors of the body or its parts" (McLuhan and McLuhan, 1992, page 128). Digital and "electric technology" "extends our senses and nerves in a global embrace [that] has large implications for the future of language" (1964, page 80). Thus, they bring about "implosions", "substitutions" and seemingly "mythical" transformations (McLuhan, 1964, pp.5-7).

Debates arising around the validity of such ideas provide a useful illustration of the problems and issues inherent in studying new media. Despite his considerable influence, McLuhan has been criticised for failing to supply evidence in support of his theories or to justify his methodology (Kenner, 1968, page 23; Cana, 2003) and of an overly optimistic politics that ignores the deliberate "suppression" of revolutionary potentials (Winston, 1986, page 41). For Debray, he was a "poet" or rhetorician rather than an analyst, and his differentiation between medium and message is flawed (Joscylene, 1995, page 2). Others view him as a "technological determinist" who ignored the significance of both content, socio-cultural complexity (Ricks, 1968, page 100; Williams, 1990, page 187) and other aspects of "medium" beyond channel and implementation; for instance "the usage that the messages and codes make of that technology" (Joscylene, 1995, page 2).

Contrarily, for Logan (2010) McLuhan's notions of media are very much related to the "symbolosphere" of thoughts, culture and imagery. Regardless that these were often subjugated to his exploration of the physical world, the two always interact dualistically (page 90).

MATERIALISM AND THE UNIVERSITY

Computer code and software define new media content in a way which is far more literal than the way in which ink defines a story; channel and message are inseparable, composed and represented in accordance with the rules of computer processing, encoding and decoding – for instance, the "image-interfaces" wherein "icons" represent a control panel are what allow general

users to operate a computer and use its software; in other words, to run more code (Manovich, 2001, page 41). Algorithmic rather than heuristic processes operate within computational "systems of constraint", transforming domains "generally predicated on ambiguity, subjectivity and flux" (Nowviskie, 2014, page 3) – automated operations can be executed to process and create images or narratives. At first glance then, it seems that the most significant characteristics of new media are physical, technical ones – an intangible bitstream could not exist without the infrastructure supporting it.

However, while in some ways, human beings are "removed from the creative process" (Manovich, 2001, page 53), in others they become more involved (Aarseth, 2004, page 9). As Nowviskie (2014) emphasises, algorithmic processes do not always establish definite, unambiguous "truth-value"; they produce not only new texts but multiple new readings. Computational operations can be "playful", and "even the most clinically perfect and formally unambiguous algorithms embed their designers' theoretical stances toward problems, conditions, and solutions" (page 3). Much about digital technologies is immaterial – or at least, not easily measurable.

In *The Question Concerning Technology,* Heidegger (1977, pp.4-5) points out the need to consider what he calls technology's "essence":

> The essence of technology is by no means anything technological. Thus we shall never experience our relationship to the essence of technology so long as we merely conceive and push forward the technological, put up with it, or evade it […]. The current conception of technology, according to which it is a means and a human activity, can therefore be called the instrumental and anthropological definition of technology. […]. For that reason the merely correct is not yet the true. Only the true brings us into a free relationship with that which concerns us from its essence. Accordingly, the correct instrumental definition of technology still does not show us technology's essence. In order that we may arrive at this, or at least come close to it, we must seek the true by way of the correct. We

must ask: What is the instrumental itself? Within what do such things as means and ends belong?

As Manoff (2013) observes, "our ability to grasp the implications of our current communication technologies requires knowledge of the physical properties of the systems and devices that support them" (page 276). At the same time, multiple other systems of representation and exchange combine to determine how those devices are created, perceived and used. Structures of governance, production and consumption (Castells, 1996) intersect with the enigmatic codes of language (Kress, 2004) and culture (Foucault, 1971; Kittler, 1997) to create at times subliminal worldviews which cannot readily be modelled (Heracleous and Marshak, 2004) and which are often concealed behind practical theories of cause and effect. By discussing the complicated almost spiritual notion of *essence*, Heidegger, rather than being a technophobe "dared to think [of *techne*] most fully in all its inhuman implications" (Durham Peters, 2010, page 4). For him, a "frenziedness of technology" blocks truth through excessive ordering. Inevitably, this has major implications for the organisation of science and scholarship (page 35).

"Research workers" replace scholars, operating in "the sphere characteristic of the technologist" to be effective, signifying and enacting a "modern science" "beginning to enter upon the decisive phase of its history", and which now takes "possession of its complete essence" (page 124). Consolidating and extending the "institutional character of the sciences" into the university secures a "precedence of methodology over whatever is (nature and history)" which "becomes objective in research" (page 125). The "Romanticism of scholarship and the university" will not in the main persist (page 125) because the "real system of science consists in a solidarity of procedure and attitude with respect to the objectification of whatever is a solidarity that is brought about appropriately at any given time on the basis of planning" (page 126). Similarly, Kittler (2006) writes that differences between the knowledge creation and storage processes of disciplines "progressively disappear" as "all knowledge, including cultural knowledge, is processed in computers" (2006,

page 178). Stored on and transmitted by generic, ubiquitous machines entirely detached from the cultural traditions of previous scholarship, rationalism and mathematics gain supremacy.

Objective quantitative systems with a predictive or explanatory power are required to reinforce "man" as the only valid subject of study, divorced from spiritual relations. For Heidegger, a model of "science as [the superior branch of] research" is "an absolutely necessary form of this establishing of self in the world" and "is one of the pathways upon which the modern age rages toward fulfilment of its essence, with a velocity unknown to the participants" (page 135). Here, things which are "incalculable" and unquantifiable are an "invisible shadow that is cast around all things everywhere", (page 136). Ironically, dealing with those entails creative and philosophical reflections which challenge the apparent certainties of "technological man" (page 125) whose world is only ever a particular--if inevitable – "picture of the world" (page 134). At the same time as accepting that technology is a "human activity", it must be questioned and subjected to artistic reflection.

There is not yet an indivisible academic culture organised only around the scientific method. The university as a replicator of varied epistemological cultures will not entirely disappear partly because it is vital to the very *development* of any modern essence, which can only arise amidst alternative worldviews. Here, adaptation can play a useful part in preserving points of departure. Learning how to operate computers in service of other ideals is, for example, one way to resist the imposition of technological determinism (Kittler, 2006, page 179).

Institutional change is however inevitable as culture develops around new technologies and new media. Many researchers "will still think of themselves as belonging to the reliable traditions of the nineteenth century. Just that many will find in relation to their [new, technological] objects new and richer content as well as satisfaction and will perhaps incorporate this content into their overall theory. Yet none of this disproves the procedure in which the

entire institution known as 'science' [in the broadest sense] is irrevocably caught up" (Heidegger, 1936).

Interdisciplinary approaches within disciplinary communities can suggest useful frameworks for understanding new media that combine technical and artistic "constellations of truth" (Heidegger, 1977, p. 135). For Siegert (2011, page 14), writing about media studies as a field:

> The concept of cultural techniques is not 'post-media' in the sense that it is designed to replace the concept of the media, or in the sense that in the age of digital media artworks transcend the dogma of media specificity. But it is ‘post-new-media' in the sense that it suggests we interpret Media Studies as something completely different from Internet Studies or Mass Media Studies. It attempts to turn Media Studies into ‘Medium Studies' in so far as it calls for a 'physics of media'. It is designed to set a new perspective on media or mediums: namely, to relate the concept of media/mediums historically to ontological and aesthetic operations that process distinctions (and the blurring of distinctions) which are basic to the sense production of any specific culture.

Scholars of "new materialism" examine essentialist *and* instrumentalist views of technology, assigning a non-symbolic and non-representational agency to both organic and inorganic entities (Braidotti, 2006; Ernst, 2013; Dolphijn and van der Tuin, 2012; Srinivasan, 2012), often focusing on new and digital media as exemplars of this approach. Computers and software are "not reducible to political and economic interests" (Parikka, 2013, page 24) but have a "dynamic agency" (page 26). The material conditions of technologies and media are intrinsic parts of what others might call their "essence". As much as how they are used, the physical and chemical properties of new media influence the geo-political, cultural and ecological systems which attach meanings to them. Here, in a discourse extending beyond linguistics, bodies, cognitive processes, and the earth itself become sites of inscription for the tools and techniques used to understand and communicate; meaning is negotiated through physical

interactions – something which is often overlooked in the construction of ontologies that view media as secondary artefacts awaiting definition (Kittler, 1997; Winthrop-Young, 2011). Again, there are dangers and challenges relating directly to the management of universities. Parikka (2013, pp.28-29) poses multiple questions:

We still need to ask ourselves how to avoid theory becoming a branding exercise that expresses something of the current university crisis. How can theory become more self-reflective of the position in which it speaks of non-humans? If humanism escorted the birth of the university system in Early Modern Europe, is nonhuman(ism) something that is escorting our current changes in university systems worldwide? [...]. One has to be aware of some of the discussions around theory as indexical, symptomatic of wider changes in terms of our political economy of universities […] not only [the changes in] internal structures and procedures of universities [...] but also discipline-wise, the growing centrality of management and business courses. This broadly, we do need to consider non-humanisation as an economic and management strategy" [and] "how people are pushed into both mental and physical exhaustion" in the "so-called cognitive capitalism of the developed digital economy".

To assume that technology is merely neutral and instrumental has deep implications for scholarship and for society; so too do assumptions that it has a life and essence of its own. As Carey (2005) observes, "to treat technology as something operating outside of history, outside of the political and economic moment in which it is born, is to misunderstand both the possibilities and limitations of any given technology" (page 447). Barry's description of the "technological society" (2010, page 2) is also apt:

In speaking of a technological society, I want to interrogate a quite specific contemporary political preoccupation. This is a political preoccupation with the problems technology poses, with the potential benefits it promises, and with the models of social and political order it seems to make available. We live in a technological society […] to the extent that specific technologies

dominate our sense of the kinds of problems that government and politics must address, and the solutions that we must adopt. A technological society is one which takes technical change to be the model for political invention. The concept of a technological society does not refer to a stage in history, but rather to a specific set of attitudes towards the political present which have acquired a particular contemporary intensity, salience and form".

With this understanding in mind, the most prevalent and typical contemporary attitudes toward new media can be usefully examined. This enables critical insight into the non-neutral nature of instrumentalised technologies and of views about how they should be, in various senses, 'participatory', a word commonly associated with new and social media across disciplines, domains, and the spectrum of political ideologies.

PARTICIPATORY POLITICS AND NEW MEDIA

New media are often discussed in relation to systems of social order: in particular, the structure of the public sphere and the extent to which it has been, or could be, altered by digital technologies (Boeder, 2005; Castells, 2012; Goode, 2010; Rogers; 2008, Scholz, 2006). As a "participatory medium", the internet becomes part of "the fabric of society", "adding to people's capacity" by allowing access to "a greater variety of people and to more information from a greater variety of sources" (Rainie and Wellman, 2012, page 13). In different senses, 'revolution' becomes a key concept, imbued with new meaning. The effects of new media on democratic systems (Bucy and Gregson, 2001; Khan and Kellner, 2005; Dahlberg, 2007; Rogers; 2008; Strandberg, 2013; Heemsbergen, 2014) and the use of social media for political protest (Ghareeb, 2000; Castells, 2012, pp.20-140; Khondker, 2011; Rousselin, 2014; Wojcieszak and Smith, 2011) are common topics, analysed in the context of a wider "information revolution" (Wilson, 2004; Räsänen, 2008; Rainie and Wellman, 2012; Wright, 2012) that has transformed the labour market. In 2011, politicised discourse on new media was strengthened by what Fuchs (2012) calls a "year of global crisis […] marked by revolutions, major protests, and the emergence of various social movements" (page 775).

As Porter and Hellsten (2014) note, there is no scholarly consensus on what new media actually enable or alter politically, with "significant variation in what a study might conclude about the transformation potential of social media" (page 1025):

> A body of empirical evidence suggests that, on the one hand, participatory dynamics of social media fall short of making a real difference in addressing contentious social and political issues (Fenton & Barassi, 2011; van Zoonen, Vis & Mihelj, 2011). On the other hand, emerging research shows that social media may be used to help marginalized people challenge a political elite (Vergani &

Zuev, 2011) and mobilize collective action towards addressing social problems (Meek, 2011; Rojas & Puig-i-abril, 2009).

Conclusions may be unduly influenced by a researcher's favoured stance, resulting in biased findings which undermine legitimate debate; "single determinant research tends to reduce the complexity of social media dynamics, enabling the continued polarization of the transformation debate" (page 1026). This polarisation indicates pre-determined value judgements which are themselves often politically motivated. Fuchs (2012) argues that using terms like "information age" "advances a media- and technology-centrism that ignores the multidimensionality of society, i.e. that we live in capitalist societies, information societies, hyperindustrial societies, crisis-ridden societies etc. at the same time" (page 776). Although "the way in which the general public engages in social and political issues" through social media is largely seen as "unique in nature" (Porter and Hellsten, 2014, page 1026), older conflicts of theory and method inform most accounts (Kellner, 1995); for instance, Marxist interpretations of economics in the digital environment and various models of democracy. A "multideterminant frame" which considers existing social structures and the motivations of users is required to supplement technologically determinist views (Porter and Hellsten, 2012, page 1024).

TOOLS FOR DEMOCRACY

Many writers propose that the internet and social media can be valuable mechanisms for both official and informal political activities, in particular ones which are consensus-based and participatory (Bucy and Gregson, 2001; Dahlberg, 2007; Jordan, 2007; Faris and Etling, 2008; Shirky, 2008; Fishin, 2009; Castells, 2012). Exploring radical as well as more conservative potentials, they describe the "causal links between changing technology and democratic governance" (Weare, 2002), although the nature of these links is uncertain (Dahlberg and Siapara, 2007; Best and Budd, 2009; Papacharissi, 2010). Online tools and services may widen and enhance participation by citizens in systems of governance and community organisation, "combining political equality with

deliberation" (Fishkin, 2009, page 26), yet "some regions do not enjoy a positive Internet/democracy correlation, suggesting that the Internet can be used both as a tool for democratization as well as an instrument for authoritarianism" (Wade and Best, 2009, page 255). Although ICTs can engender "better governance by devolving power from the state to individuals" and involve more people in political disccussions, "free speech and democratic action are limited by governments online as well as off", hence "activists and technologists are engaged in a never-ending game of cat and mouse with government filters and censors" (Faris and Etling, 2008, page 70).

When deployed to replicate or enhance existing democratic processes, the use of digital technologies is referred to as electronic democracy, or eDemocracy. According to the UK's Parliamentary Office of Science and Technology:

> There is no single definition for eDemocracy: it can broadly be described as the use of new Information and Communication Technologies to increase and enhance citizens' engagement in democratic processes. Early attempts involved 2-way cable television (1970s) and Teletext (1980s). However, the emergence of the World Wide Web in the 1990s led to the rise of eDemocracy in its current form. Traditionally, initiatives have been categorised as follows although the boundaries are becoming increasingly blurred:
>
> top-down: initiatives by the government, or local authorities, often with the goals of lowered costs, or increased efficiency, transparency and convenience;
>
> bottom-up: initiated by citizens and activists at the grassroots level. These generally aim to increase transparency, accountability or convenience as well as to inform, educate and campaign.
>
> In each category, activities can be either:
>
> one-way processes: such as dissemination of information from the government to citizen;

> two-way processes: such as public opinion polls, or consultation on draft bills. – The Parliamentary Office of Science and Technology, 2009, page 1.

The terms "top down" and "bottom up" position eDemocracy within a hierarchical system of representative democracy whereby opportunities to take part politically are offered *to* citizens, rather than decided by them. Bottom-up activities are generally concerned with checks and balances of power and not with fundamental reform. Although the definition above accepts porous boundaries between citizen and government, the "horizontal processes within governments and the vertical processes between citizens and governments" largely remain intact (Faris and Etling, 2008, p. 66) because control over medium and message is retained by those in charge of "the institutions where the rules of the game are written" (Wilson, 2004, page 303).

Opinion polls and consultation documents, whether electronic or not, are the instruments of a particular, traditional methodology, used to the same effect and encoding the same power relations. EDemocracy is not an alternative model; its services are offered to the electorate in order that representatives might gain more information about their views on strategies and policies, and to "improve the efficiency" of existing systems (Dahlberg, 2001, page 161).

By ensuring that only certain players take control of the infrastructure, and by integrating "e-democracy into constitutionally recognised channels" (Coleman, 2004, page 143), governments and large technology companies render significant alterations to power relations unlikely, even when policies support greater accessibility. For Wilson (2004), "when consumers can influence the rules of ICT access, they are better able to ensure for themselves sustainable access [to content, methods of production, and institutions]. At the same time, "when consumers have democratic political access, they are more likely to play by the rules" (page 303). Permanent restructuring of "the agencies that allocate scarce resources" as a result of grassroots campaigning is extremely difficult to achieve, and "old patterns and priorities" often continue (page 157). Coleman (2004) observes that "much analysis of the

relationship between the Internet and democracy has been obscured by the use of metaphors" (page 143). Variously these suggest cyborgs, networks, anarchies and utopias rather than addressing the material realities of actually existing democracies, or differences between them (page 143).

Scholarly theories about "democratic governance and modern communication systems" – both of which are "complex and multifaceted" – often lack "empirical observations on the critical dimensions of these phenomena" (Weare, 2002, p. 659). Failure to acknowledge overlaps with "non-technological spaces of interaction" (Aouragh, 2012, page 524) are also problematic; for example, information flows within offline networks that cross public and private spheres show that boundary crossing is not unique to new media technologies (page 523). Wilson's Strategic Restructuring Framework (SRS) (Wilson, 2004) offers a compelling model for analysis accounting for complex cultural contexts and conflicts. He writes that (pp.3-4):

> SRS seeks to capture the richness and variety of the information revolution while avoiding monocausal simplicities [...]. ICT is defined not as machinery but as a scarce and valuable resource that people compete for and that benefits those who can maneuver themselves to avoid its downside risks. In this respect, information technology is not just a benign application like mobile phones, distance education, or Internet telephony. Instead, ICT is like land or capital, which has differential impacts when diffused differentially across nations and social groups. […]. Because the new ICT resources have the capacity to empower certain individuals and groups (such as private entrepreneurs or activists from nongovernmental organizations) and disempower the authority of other groups (such as telecom operators and political dictators), they always receive a mixed reception wherever the spread […]. Managers and beneficiaries of large, state-owned ICT monopolies who understand that liberalized ICT diffusion will threaten their social status and power seek to block the liberal

> diffusion of these new resources and to maintain control of ICT distribution through their own reliable channels.

As Castells (2012) notes however, "the actual configuration of the state and other institutions that regulate people's lives depends on [a] constant interaction between power and counterpower", which offers "social actors" a chance to "challenge the power embedded in the institutions of society for the purpose of claiming representation for their own value and interests" (page 8). Interrogating the subversive potential of the internet and social media, a new interest in various sub-areas of politics has given rise to "a resurgence in participatory democratic theory" (Hilmer, page 14), extending Pateman's "fundamental rethinking of the theory of democracy" and her assertion that "democratic decision-making not only should apply to politics, but should be extended to economic and social life as well" (page 5). At times the focus is on "new forms of collective action reliant on certain technological aspects" (Bimber et al. 2005, page 366).

At other times, technology works in combination with the "liberal minimalist, deliberative, and agonistic alternative theories of democracy" that, during the 1990s, marginalised radicalism. As Dahlberg (2001) notes, a "liberal individualist conception stands behind many seemingly divergent electronic democracy projects", which despite their differences regarding process, emphasise "a competitive political world in which democracy is ensured when individual freedom of expression is maximised" (page 160). Rogers (2008, page 5) is emphatic that digital technologies can fundamentally alter how the public participate in decision making:

> It is imperative to foster and develop sciences and technologies that facilitate democratic participation, as well as broaden the public understanding of the nature and purposes of science and technology, to optimise democratic participation in the societal exploration of visions of a rational, egalitarian, and libertarian society, which can guide scientific and technological development by opening the rationality and meaning of scientific and technical criteria to public

> questioning and deliberation, in accordance with the public understanding of science and technology, as well as societal values, norms, ideals and goods. We need to move beyond the consideration of democracy as a particular arrangement of public institutions and, instead, examine it in terms of its ideological and existential meanings for the unfolding ontology of social being.

It is evident that here, however, many means and values have already been decided; it is scientific and technical development that the public must learn to unfold the meanings of in a libertarian society, something which may or may not engender a "shared identity and purpose" distinct from "rampant individualism, commercialization and bureaucratization" while remaining centred on "new interactive media" (Dahlberg, 2001, page 163). Hoofd (2008) characterises advocates of such technologically determined progress as a "speed elite", taking her cue "from political scientist John Armitage" who "conceptualizes viewing this interrelatedness of a politics of speed, connection, liberation and overcoming boundaries, whether pursued through business or activist endeavours, as the basis of a 'chrono(dys)topia' that increasingly disenfranchises the '(s)lower classes'."

This is promoted in the preferred theories and practises of universities, which reproduce "larger dominant societal material practices, technologies and discourses" around the internet, legitimising only certain neo-liberal understandings of "cultural net–activisms" and misinterpreting others. The often false oppositions constructed here do "not merely influence and stratify production within academia, but also affects the production of knowledge and truth outside of academia." In effect,

Under the capitalist need for the production of excess, there is a strong relationship between the forces of trade and the logic of techno–acceleration. [Authors taking this view] connect the logic of speed more specifically to the powers of war and militarization. Building on the work of Paul Virilio, they argue that all areas of trade, knowledge production, and militarization are connected, because all these forces essentially mutually enforce each other

through the usurpation and control of space (and territory) and through the compression and regulation of time.

At the same time as international industries and world markets become "increasingly interlocking" (Ghareeb, 2000, page 396), most content flows, geographically, from North to South, and not in the other direction (Wilson, 2011) being aimed primarily at English speakers. In Arabic countries, for instance, the "technical revolution […] is also an elitist one. It aims primarily at the well-to-do and the well-educated, and is accessed mainly by these groups" (Ghareeb, 2000, page 396). Further, as much as it can allow activist to bypass state-owned media channels or gain control of "information previously held by governments and large media companies" (Faris and Etling, 2008, pp.66-68), the infrastructure of participatory online networks may become the backbone of (inter)national research and development projects making use of an unpaid "talent pool" whose contributions are predicated on free-market economic – for instance, the adaptation of business models and markets to accommodate the Open Source software development (Raymond, 199, page 51).

Less factiously, Lovink (2001) remarks that "the slippery nexus between the internet's reinforcement of existing power structures and parallel - increasingly interpenetrating - worlds where control is diffused" are a part of "network society's dysfunctionalities" which we must critically address (page 3).

Although much lauded for their support of network composition – something which makes programmatic modes of analysis relatively straightforward and seemingly inevitable (Brooks et. al., 2014, page 3; Hansen, Schneiderman and Smith, 2011; Kadushin, 2012) – social and digital media have weaknesses here as well as strengths. Bennett (2005), in the context of global activism, writes that "the political implications of the Internet become less clear and consistent" when subjected to different questions and levels of analysis (page 112). For example, "a common theoretical assumption is that [online] networks are flexible, easy to join and leave, and capable of relatively fluid

reorganization following the addition or loss of organizations. Yet these same strengths of flexible networks may also reduce their ideological definition and decision-making coherence" (Castells 1996, page 113).

The activities of "hacktivists" engaged in acts of "electronic disobedience" have innovative and anti-establishment qualities, challenging neo-liberalism and addressing the inequalities of global trade; but even if "the tools produce democratization, the tools themselves are produced through necessarily expertise defined elites" (Jordan, 2007, page 75), which remains a conundrum. As Tehranian [cited in Dahlberg, 2001, page 164] asserts, "for community media to serve community interests, we need to invent structures that put the ownership, management and operation of the media in the hands of people themselves".

MARXIST PERSPECTIVES AND RADICAL POTENTIALS

In 1941, Marcuse suggested that technology in the "machine age" was "a mode of organizing and perpetuating (or changing) social relationships, a manifestation of prevalent thought and behaviour patterns, an instrument for control and domination" (1998, page 41). Systems designed to increase productivity and efficiency, and which improve society's "intellectual and material capabilities" enforce, counterintuitively, an oppression over the individual that is "immeasurably greater than ever before" (1964, page 7). He, and other academics associated with the Frankfurt School addressed technology, media and society via interdisciplinary theories combining concepts from economics, philosophy, psychology and political science. Partly this dominance is achieved by creating false needs through the media (page 15):

> Most of the prevailing needs to relax, to have fun, to behave and consume in accordance with the advertisements, to love and hate what others love and hate, belong to this category of false needs. Such needs have a societal content and function which is determined by external powers over which the individual has no control; the

> development and satisfaction of these needs is heteronomous. No matter how much such needs may have become the individual's own, reproduced and fortified by the conditions of his existence; no matter how much he identifies himself with them and finds himself in their satisfaction, they continue to be what they were from the beginning - products of a society whose dominant interest demands repression.

The systems responsible for these repressive relations are strong enough to prevent the economic, political and intellectual freedoms necessary to restore "individual thought[s] now absorbed by mass communication" (page 15). This is because "the government of advanced and advancing industrial societies can maintain and secure itself only when it succeeds in mobilizing, organizing, and exploiting the technical, scientific, and mechanical productivity available to industrial civilization" (page 14). Accordingly, technological rationalism is instrumental in promoting a status quo of behaviour, thought, and the "administering [of] communication" (page 145) that keeps the balance of power relatively unaltered. The "accomplishments of science and technology" are used to validate the system which created them hence they have not (yet) become a force for liberation supporting a "free play of the faculties" (page 23). Explorations of the metaphysical are repositioned as "statements about particular identifiable operations, performances, powers, dispositions, propensities, skills, etc." (pp.146) now most readily associated with computational logic.

As Kellner (1995) expresses it more recently, "the term technocapitalism points to a configuration of capitalist society in which technical and scientific knowledge, automation, computers, and high tech play a role in the process of production analogous to the role of human labor power, mechanization of the labor process, and machines in an earlier era of capitalism, while producing as well new modes of societal organization and forms of culture and everyday life".

Aouragh (2012) however, finds "confusion at the very core of Marxist academia" about how to conceptualise new technologies (page 518). If we

consider "knowledge production" something quite different from "labour" (page 522), then where do Marxist views on the social implications of this fit within a post-modern "internet-ecology" (page 520)? Because "the *informationalisation* of industrial production [unforeseen by Marx] is problematic", many scholars misinterpret his concept of superstructure and the conditions in which digital media are produced. Leftist critiques employ "rather far-fetching (re)definitions" of core theoretical vocabulary to support a view wherein social media are seen as entirely user-generated and somehow immaterial, rather than as highly mediated products of a neo-liberal system (page 522).

As a result, "although the [Arab] revolutions have led to a resurgence of debates about the power of new media, such arguments (or rather assertions) are echoes of earlier suggestions related to peculiar fetishisations of ICT in general and social media in particular" (page 518). In general, she finds that "Marxist theories are hardly engaged with in mainstream academia", reflecting a "widespread gap between established and new scholarship and probably an inherited prejudice regarding 'systemic' analyses" as well as a lack of ethnographic studies by those who study revolutions through "the prism of the internet" (page 518).

While she and other authors question "the oft-assumed relation between increasing democracy and internet technology" (page 519), this does not mean that new media are without revolutionary potential. The internet has "undercut some of the annoying aspects of organising" protest actions, for example. By reducing (traditional) labour time, computer networks create a space for artistic and scientific development, and social media become a radical new means of expression and resistance. New media genuinely challenge traditional paradigms of organisation, participation and collective action.

This does not however make them "magic" or detached from previous methods and systems of production (page 524). Whatever their affordances, it is important to remember that "business and the production of ideas are

interrelated" (page 518). The "producers of 'culture' (in whatever form or expression) are relatively free, yet influenced by that material reality", which mediates "normative representations of social relations" and which may flatten out and depoliticise important concepts, weakening resistance (page 524).

Scholz (2001), in an overview of similar perspectives, points out how entrenched technologies are within existing power arrangements:

> For Lazzarato network technologies are even more totalitarian than Henry Ford's assembly line. Holmes argues that distributed, casualised labour is based on the ruthless pleasure of the exploiter using the soft coercion of the laptop as portable networked instrument of control. Paolo Virno places these questions of labour, idleness and leisure at the center of the discussion about all of contemporary production. In addition, Tiziana Terranova (2004) points out that the openness of virtual space reinforces narrow group identities. It creates archipelagos of disconnected islands. This extreme form of social filtering and 'cyberbalkanisation' fosters microterritories of interest-based communities. The current interest in collaboration is surprising. Collaboration is not for everyone. Enthusiasm for participation is not the default – The Participatory Challenge, page 2.

For Wilkie (2005), particular profit-driven interpretations of internet culture and communications and network technologies obscure the reality of class relations by suggesting that individuals and social groups now reside within a fluid and dynamic arrangement of institutions quite different from those of earlier decades. For him:

> What this rhetorical deconstruction of class actually means is not more freedom for the working class which uses this technology, but their deepening unfreedom worldwide. Cyber-culture – which is premised on the use of technology to increase the surplus value

> produced in the working day by driving down the costs of labor and increasing the productivity of the worker – makes them willing, tech-savvy accomplices in their own appendage to the machine […].

It is in this context that "open-source" software, "peer-to-peer" file sharing, "modding", and other similar practices which Poster describes as "terms designating postcapitalist principles of the mystery of commodities" (50) and which form the basis of his theory of Internet capitalism as an "economy of sharing", do not represent an alternative to the capitalist mode of production, despite the dominant claims that they open the space for the emergence of spontaneous, de-regulated, and post-capitalist "cyber-communities" to emerge. On the contrary, if we follow Marx's analysis of capital, it becomes clear that they are the latest means of extending the market-share of the technology industry in a moment of economic crisis.

Adurno and Horkheimer wrote in 1944 of a "cultural industry" and a mass media machinery that created "mass delusions". By ensuring "the public is catered for with a hierarchical range of mass-produced" and "mechanically differentiated products", creativity, expression and effect are reduced to a series of formalised technical specifications; including the structure and aesthetics of cinema, painting and music. Rules and regulations are at times so subtle that they seem natural; yet even mental states are "carefully contrived and moulded" (1997, page 23). Everything becomes quantified and measurable. However, this is not inevitable. Technology is essentially neutral and "in the advanced industrial society is dominating simply because it is organized by the administrators of this society to serve their very own interests" (Ocay, 2010, page 58). As Kellner (1995) puts it:

While most of the prophets and promoters of the information society tend to be technological determinists, many of the (neo)Marxists who criticize its ideologies and practices tend to be economic determinists. Both economic and technological determinisms, however, often neglect the role of continuing conflict and struggle, the possibilities of intervention and transformation, and the ability of individuals and groups to remake society to serve their own

needs and purposes. In all determinist conceptions, technology and society are conceived as matrixes of power and domination, while humans are seen as passive objects of manipulation and empowering uses of technology are not considered […]. Technics are instruments that can be actively deployed by human beings. Although they are shaped by social forces to serve specific ends, they can be reconfigured, reshaped, and deployed against the purposes for which they are designed.

Discussing aesthetics and the mass media, Rancière (2009) proposes a more nuanced and dialectical notion of "the masses" where collective and individual are not necessarily in opposition and the individual, whether or not s/he is a "labourer" can find time for reflection and engagement rather than being passive and subordinated. As Kahn and Kellner (2005) observe, there are "numerous examples of people redeploying information technology for their own political ends, thereby actualizing a more participatory society and alternative forms of social organzisation" (page 2). Progressive and repressive dimensions co-evolve and "emergent modes of fetishism, alienation, and domination [have] yet to be clearly perceived and theorized" (page 15).

For Wright (2011), scholarly opinion about new media has become a "schism", with opposing "revolution/normalization" (i.e. radical/technological determinist) frames leading researchers "to disproportionately analyse existing political institutions and practices, often using narrow definitions of politics and normative underpinnings that simply may not be relevant in the context of new media" while failing to study revolutionary change in sufficient detail (page 244).

NETWORKS, IDENTITIES AND SELF

Rainie and Wellman (2012) argue that the internet, via "networked individualism" has expanded, complicated and "speeded up" personal networks, effacing the distinctions between "people's lives offline and online" (page 3), the two now being fully integrated (page 146); "physical presence and absent presence are becoming integrated as the character of public and

private spaces changes" (page 108). Other researchers propose what Papacharissi (2008) calls "a perhaps false dichotomy between real and virtual interaction" (page 216). In new media environments, exchanges often revolve not just around mediated objects but mediated subjects – for instance, constructed and curated online identities or "virtual personas" (Papacharissi, 2010, page 17; Abbas and Dervin, 2010) formed through "ludic" or playful processes and narratives (de Mul, 2015, page) and "colonized" by commercial forces (Manovich, 2008). Because of the multi-directionality of new media, the separation of roles like author/reader, editor/contributor and producer/consumer are less distinct than in offline or "old media" based environments (Guédon, 1996, page 346).

Turkle (1997) writes that "not so long ago, stability was socially valued and culturally reinforced. Rigid gender roles, repetitive labour, the expectation of being in one kind of job or remaining in one town over a lifetime, all of these made consistency central to definitions of health. But these stable social worlds have broken down" (page 255) and fluidity is seen as healthier than stability: "What matters most now is the ability to adapt and change-to new jobs, new career directions, new gender roles, new technologies" and adults learn about this fluidity online (pp.255-6). At the same time, new groups are defined which can be identified with. Just as identities are socially constructed, "every era constructs its own metaphors for psychological well-being" (page 255). Exploring personalities in the field of computing science, she found that:

Engineers will talk about machines as tools, and will sometimes express their identification by describing themselves as tools as well. The image of the machine as tool is reassuring because it defines a means-ends relationship. What is different for many hackers is that the means-ends relationship is dropped. The fascination is with the machine itself – page 187.

Demographic discriminators such as 'race', 'gender' 'nationality' and 'class' are increasingly seen by scholars as contested forms of identification, primarily useful to older less enlightened arrangements of people and culture. Nonetheless, online communities often form around these (Gajjala, 2005;

Nyland and Near, 2007; Honeycutt and Cunliffe, 2010; Oiarzabal, 2011; Marciano, 2014), as well as around specific types of both media and content (Poster, 1998, page 184; Dutta-Bergman, 2004; Randle et al., 2008; Porter, 2004; Poor, 2013). Despite individuation people remain grouped; in networks rather than in hierarchies. Globally-focused frameworks for group identification enable a novel "postmodern, technologized tribalism" (page 184). Points of identification and difference may be used defensively, reinforcing their conceptual relevance to political and social structures at the same time as they are resisted or interrogated (Marciano, 2014, page 825). A technologically enabled process of "translation" and "cultural restructuring" is evident (page 185); yet the divisions and problems of symbolic coding and "mediated immediacy" remain (page 186).

While their structures and dynamics are remarkable and can encourage greater diversity and co-operation than offline groups, online communities devise their own processes for social ordering, control, and the holding to account of individual members (Smith and Kollock, 1999, page 12). Cyberspace is not necessarily democratic and is "often a domain of vast power imbalances" (page 13). Patterns of exchange, reward, risk and sharing (Kollock, 1999b, page 220), while devised around radically different "dynamics of motivation and co-ordination" (page 223), become systems of insurance and accounting, predicated as much on self-interest as altruism (page 226). As Ho (2012) observes, communication "serves not only a transactional function in conveying meanings, but also a relational or interpersonal function in helping practitioners demonstrate their professionalism and construct and manage desirable identities" (page 502).

The terms, values and practises that distinguish one group from another become embedded through experimentation, debate, and (ultimately) the formation of consensuses about how new media suit a group's requirements and ideals. This may lead to factionalism and oppositional definitions between 'tribes'. Luppicini (2012) proposes a new interdisciplinary field called "Technoself Studies", to address "the changing state of human identity in

society resulting from the adoption of new technologies" and the "evolving configurations of human-technological relationships that continually shape the human condition and what it means to be a human being" (page 3). At the same time, within academic and other communities issues of visibility and social reproduction are apparent. New media networks are not *opposite* to the demarcated regions of older communicative "territories" but are a specific *type* of territory which, although distinct, intersects with older ones (Brighenti, 2010). Similarly, the offline or 'real-world' aspects of an individual's life always relate to their activities online (Wellman and Gulia, page 3; Papacharissi, 2005, page 225).

Extant patterns of thought, reward and visibility are reproduced or reinforced in new media environments (Brighenti, 2010; Arora and Vermeylen, 2013; Ellison, Vitak, Gray and Lampe, 2014). For Rainie and Wellman, "the internet, especially, amplifies people's social capital", being "an outcome and a cause of larger networks"; it supplements as well as expands (page 146). For them, it is appropriate to call networked individualism an " "operating system" because it describes the ways in which people connect, communicate, and exchange information" (page 7). However, as Brooks et al. (2014) highlight, social capital is a structural concept, and the "networks articulated on Facebook tend to be large, dense, and indicative of many offline foci" (page 1). It is difficult to separate cause from effect, and material from the apparently immaterial.