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Kirkegaard Lunn, Brian

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# User needs in television archive access: Acquiring knowledge necessary for system design

Brian Kirkegaard Lunn

Information Interaction and Architecture,  
Royal School of Library and Information Science, Denmark

[bki@db.dk](mailto:bki@db.dk)

## ABSTRACT

This paper presents a methodical approach for generating deep knowledge about users, as a prerequisite for design and construction of digital information access to cultural heritage information objects. We exemplify this methodical approach by reporting on an explorative study of information need characteristics in a television broadcast context. The methodical approach is inspired by naturalistic research, and our main data is nine in-depth interviews conducted with scholars and students within the academic field of Media Studies. The analysis identifies four characteristics. Firstly, broadcasts are needed as objects of analysis in empirical research. Secondly, the needs are related to three broadcast dimensions: 1) Transmission; 2) Archive; *and* 3) Reception. Thirdly, four fundamental types of information needs are verified in a television broadcast context: 1) Known item; 2) Factual data; 3) Known topic or content; *and* 4) Muddled topic or content. Fourthly, the interviewees' needs consist of four phases: 1) Getting an overview of transmitted broadcasts; 2) Identification of borderline exemplars; 3) Selection of specific programmes; *and* 4) Verification of facts. The present paper presents novel research on characteristics of information needs in a television broadcast context. We demonstrate how one may go about generating knowledge which is imperative for the design and construction of future broadcast retrieval systems.

## 1. INTRODUCTION

Knowledge about how and why users need access to cultural heritage is a prerequisite for constructing effective information access to collections of cultural heritage. In this paper, we present knowledge about the characteristics of users' information needs in relation to cultural heritage, as expressed in television broadcasts. The outlined methodical approach explores users' information needs prior to the existence of any information retrieval (IR) system for television broadcasts, that is, at a point in the system development process where e.g., investigation of users' interactivity with a broadcast retrieval system is not feasible. In this way, we provide knowledge about the potential future users that is relevant at an early stage of system development. This knowledge is important for the construction of IR systems that future users will experience as effective and helpful in their information seeking process. The aim of the present paper is to provide novel research on one aspect of users' information seeking behaviour, namely information needs. Further, the paper aims at providing knowledge regarding the methodical approach undertaken in order to be informed about the characteristics of users' information needs, in situations where no operating IR system is available. In this way, our overall aim is to inform everyone involved in creating effective electronic information access to our cultural heritage, as we present novel research as well as provide knowledge on the methodical aspects of gathering such knowledge.

Recent years have provided us with an intensified focus on digital access to an ever-increasing amount of television broadcasts (e.g., [BBC News, 2003](#); [Bjorkeng, 2006](#); [British Film Institute, 2006](#); [Frostholm, 2006](#); [Munck, 2006](#)). The assumption underlying the work presented in this paper is that in order to gain the benefits of novel technology, we must first improve our knowledge of people's information seeking behaviour ([Ingwersen & Pejtersen, 1986, p. 111](#)), including characteristics of their information needs. We follow Wilson's ([1981, p. 11](#)) recommendation stating that in order to "...uncover the determining factors of [information seeking] behaviour we must do so by first undertaking in-depth studies of well-defined categories of persons, developing explanatory concepts and then testing these concepts in related but different settings". Consequently, we undertake an in-depth investigation of a well-defined group of persons, in order to develop explanatory concepts. The specific group in question is scholars and students within the academic field of Media Studies. The in-depth study gives indications as to the cognitive processes of users when seeking television broadcasts. The work concentrates on a well-defined category of persons, but does not attempt to test the derived knowledge in related but different settings, as suggested by Wilson. The research question addressed in this paper is:

- What are the characteristics of information needs for television broadcast for scholars and students in Media Studies?

The research presented in this paper forms part of a larger research project concerned with the metadata elements preferred when searching and assessing the relevance of archived television broadcasts, as well as the implications for design and construction of document representations for television broadcasts ([Kirkegaard Lunn, 2009](#)). Part of the work presented here has previously been reported in Kirkegaard and Borlund ([2008](#)). This knowledge on aspects of users' information

seeking behaviour is considered the first step towards the design and construction of a future effective IR system for Danish television broadcasts.

The theoretical foundation of the research project is the cognitive viewpoint as expressed by Ingwersen and Järvelin (2005). Hence, we follow the recommendations to focus on the cognitive actors and their perceptions and use of information objects when designing and constructing effective IR systems. Further, Ingwersen and Järvelin's (2005) holistic integrated cognitive framework for information seeking and IR provides the epistemological and conceptual background for our work. Examples of this approach are given by the work of Ellis and colleagues (Ellis, 1989; Ellis, Cox & Hall, 1993; Ellis & Haugan, 1997) and by the work of Kuhlthau (1991; 2004). Ellis and colleagues identifies eight characteristics of academic users' search behaviours and corresponding system demands. Kuhlthau's model of the information search process has a similar focus on users and their perception and use of information objects. However, Kuhlthau's model also encompasses changes in users' feelings as they progress through the information search process.

The remainder of this paper is structured as follows. In Section 2, we present previous research on characteristics of information needs in general and in the context of still and moving images. In Section 3, we describe the empirical context of our research. Section 4 describes the methodical approach undertaken in order to investigate the research question. Section 5 presents and discusses the results achieved in our investigation, and the final Section 6 provides a few concluding remarks.

## 2. TYPES OF INFORMATION NEEDS

This section of related work consists of two sub-sections. In the first sub-section, we provide a review of previous work on types of information needs in a traditional textual context. The reason for this point of departure is that the concept of information need predominantly has been approached from a textual context, and we maintain that the basic issues are related whether the information objects are of a textual or non-textual nature. In the second sub-section, we present and discuss previous work concerned with information needs in the specific context of television broadcasts.

### 2.1 Fundamental types of information needs

Based on Belkin and colleagues' ASK hypothesis (e.g., Belkin, 1980; Belkin, Oddy & Brooks, 1982), Taylor's theory on the development of the information need (1968), the label effect (Ingwersen, 1982), and previous work on fundamental types of information needs (Ingwersen, 1992, pp. 116-117), Ingwersen and Järvelin (2005, pp. 291-292) propose eight types of fundamental information needs:

**Known item**, where the cognitive actor seeks information objects by means of known formal or bibliographic features;

**Known data element**, where the cognitive actor seeks information entities by means of known structured data elements;

**Known topic or contents**, where the cognitive actor seeks information objects by means of known keys or features of potential information sources;

**Factual data**, where the cognitive actor seeks informative information (facts) by known content-associated or aboutness-related data;

**Muddled item**, where the cognitive actor seeks information objects by means of insufficient formal or bibliographic features;

**Muddled data element**, where the cognitive actor seeks or explores for information entities by means of vague or ill-defined data elements;

**Muddled topic or contents**, where the cognitive actor seeks or explores for information objects by means of ill-defined or vague knowledge of keys or features of potential information sources; *and*

**Muddled factual**, where the cognitive actor seeks informative information (facts) by ill-defined or vaguely known conceptual data.

The first four information need types are well-defined and can be characterised as being of a specific nature, while the latter four are of a more explorative nature. The point of departure for Ingwersen and Järvelin is the relationship between task complexity and types of knowledge (declarative and procedural) on one side, and information need formation and development on the other. The aim is to explore the features of a user's knowledge and underlying tasks that generate which type of information need, because "[...] if we can establish properties of information needs we are better capable of designing IS&R [Information Seeking & Retrieval] environments that may act on such properties during interaction with natural work and search tasks" (Ingwersen & Järvelin, 2005, p. 290). In this way, the typology reflects the holistic cognitive integrated framework's emphasis on work tasks as the instigating factor of any information seeking activity, as well as the recognition of the information need to be multidimensional and potentially dynamic.

## 2.2 Information needs in a television broadcast context

Investigation of users' needs for audiovisual information objects is a relatively recent topic in the research literature. The first consideration of the topic is Seloff's cursory description of the dominance of known item information requests at the film archives at the National Aeronautics and Space Administration's (NASA) Johnson Space Centre. Seloff (1990, p. 684) reports that only 1/3 of the users' requests are of a topical nature. Very few studies have a specific emphasis on television broadcasts, but due to the visual character, earlier research on the behaviour of users' searching for still images seems relevant in a moving image context. Consequently, this review includes earlier research from both areas. With reference to our user target group, we give special attention to investigations of academic users' searching behaviour.

In a series of studies, Enser and colleagues (Enser & McGregor, 1993; Enser, 1993; Armitage & Enser, 1996; 1997; Enser & Sandom, 2001; 2002; Sandom & Enser, 2002) categorise genuine user requests for still and moving images, including television broadcasts. Enser and McGregor (Enser, 1993; Enser & McGregor, 1993) analyse 2,722 genuine requests put forward to the Hulton Deutsch Collection of still images. They group the requests according to two categories (uniqueness and refinement) with dichotomous values. A non-unique request contains generic concepts, and a unique request enquires about specific persons, places, events etc. Refinement of requests refers to specification of time, location, action, event or technical specification. The type of refinement is disregarded in the observation. Enser and McGregor categorise 69% of the requests as unique requests, whether refined or not. 52% of the requests are categorised as refined (unique and non-unique). The results indicate that when the user puts forward a request to the archive, he or she is already in possession of a mental idea of the image that would satisfy the need. Requests can even contain a rough sketch (Enser & McGregor, 1993, p. 26).

In a study of genuine requests made to seven different archives (five archives of still images and two archives of moving images), Armitage and Enser (1996; 1997) further elaborate on Enser and McGregor's typology of information requests. The elaboration is two-fold. Firstly, the categorisation is broadened with two non-topical categories, namely 'by named artist' and 'known item'. The requests for 'known items' are particularly frequent in the two collections of moving images. Of specific interest for the present study is the requests addressed to the British Film Institute, National Film and Television Archive (BFI-NFTVA). Armitage and Enser categorise 3% of the 365 requests addressed to BFI-NFTVA as 'by named artist', 40% as 'known item', and the remaining 57% are categorised to be of a topical nature. In relation to Ingwersen and Järvelin's eight types of fundamental information needs, we consider the 'by named artist' and 'known item' requests to be comparable to *known item* information needs. Secondly, Armitage and Enser further develop the subject categorisation of requests by adopting Shatford's (1986) matrix for analysis of topical content of images. The two categories of unique (specific) and non-unique (generic) subject requests are supplemented with a third category containing abstract concepts. Armitage and Enser verify Enser and McGregor's results in that most topical requests are for specific or unique content, particularly in relation to the television archive (BFI-NFTVA) where 90% of the topical requests are categorised as specific. Generally, across all seven collections, Armitage and Enser only categorise a few requests to be for abstract content.

Enser and Sandom (Enser & Sandom, 2001; 2002; Sandom & Enser, 2002) analyse 1,270 genuine requests put forward to 11 archives of moving images (including BFI-NFTVA). Generally, they follow the same approach as Armitage and Enser. Overall, they find that 10% (122) of the 1,270 requests are of a non-topical character. Of the 1,148 topical requests 1,143 contain elements that are related to specific content, 74% have elements that relate to generic content, while only 2% of the requests contain elements that are related to abstract content. In this way, Enser and Sandom verify the results by Armitage and Enser. For the BFI-NFTVA collection, 'known item' requests account for 57% (Sandom & Enser, 2002, p. V. 5), and hence verifies the high share of known item requests found by Armitage and Enser for this collection.

Common to these studies by Enser and colleagues is a main focus on the topical requests. When non-topical requests are differentiated in the analysis, they account for a large portion of the requests. With reference to requests for television broadcasts, the share of non-topical requests is reported to be between 43% (Armitage & Enser, 1996; 1997) and 57% (Enser & Sandom, 2001; 2002; Sandom & Enser, 2002). In relation to Ingwersen and Järvelin, we consider the 'non-topical' requests to be comparable to *known item* or *factual data* information needs, and the 'topical' requests to be comparable to the *known* or *muddled topic or content* information needs.

Keister (1994) categorises requests reconstructed from query logs from image retrieval at the National Library of Medicine into two groups: 1) topical requests, in which no specific visual cues are given by the user; and 2) visual requests, in which user constructed perceptions of concrete elements and abstract concepts are described with words. Keister estimates that the second type comprises one-third to one-half of the requests. She also demonstrates that users do not request images in a consistent manner. Picture professionals think visually and use art or graphics jargon e.g., horizontal colour image. Health professionals' requests for images are more in line with the terminology of the medical field, while the academic community "[...] often have precise citations to images" (Keister, 1994, p. 10).

Choi and Rasmussen (2003) carry out an investigation of image requests within the domain of American history. Thirty-eight end-users contributed with one genuine search request, each. Choi and Rasmussen apply four categories of topical visual information needs originating from Batley (1988, pp. 374-375): 1) specific needs (specific persons, events or activity, e.g., Thomas Jefferson); 2) general or nameable needs (can be expressed in key terms, e.g., a ruined castle); 3) general or abstract needs (might involve abstract concepts rather than concrete objects, e.g., a busy street scene); and 4) subjective needs (emotional responses that are dependent on interpretation by the individual, e.g., a scene that illustrates how times

have changed). Choi and Rasmussen (2003, p. 504) find that 26% of the 38 requests are specific needs, 61% are general or nameable needs, 8% are general or abstract needs, and 5% are subjective needs. These differences between users from different domains and with different work tasks are in line with the later findings by Sandom and Enser as described above.

Hertzum (2003) investigates film related requests addressed to the Deutsche Filminstitut (DIF) collection. He analyses 275 genuine requests made to the archive “[...] for text (e.g., dialogue lists and censorship cards), images (e.g., photos of actors), sound (e.g., the music from a film), video (e.g., video-copy of a film), as well as analyses (e.g., of the religious symbolism in the film *Metropolis*)” (Hertzum, 2003, p. 169). Based on Meadow’s (1992, pp. 243-244) four generic types of database search, Hertzum categorises the request in: 1) known item retrieval; 2) fact retrieval; 3) subject retrieval; and 4) exploratory retrieval. Hertzum finds that 40% of the requests concern known items, 13% concern facts, 32% concern subjects, 10% are exploratory, and 3% could not be placed. Hertzum does not distinguish the specific type of information object requested. Consequently, the results do not specifically demonstrate whether the types of requests for e.g., moving images differ from the types of requests for film-related text. One may, for instance, maintain that fact retrieval is more often associated with text than with moving images.

In summary, the results show that the majority of topical or content requests are for named entities, and that “[...] the demand for uniquely defined and named visual features increases when requests are for moving image items” (Sandom & Enser, 2002, p. 53). This said, the results are dissimilar across the different types of collections investigated, and they also indicate that general topical and subject entities are frequently contained in the user requests. When requests for abstract concepts or affective aspects are specifically identified in the investigations, they represent a minority of the requests. The low frequency of requests for abstract concepts may be due to the fact that the investigated requests originate from an operational retrieval system, where users may be reluctant to put forward requests that cannot be handled. This is in line with the observation made by Keister (1994, p. 17), that operating IR systems for images generally cannot handle such abstract or subjective requests.

The studies reviewed in this section are important, e.g., for gathering knowledge about the problems associated with indexing of moving images, but the studies do not consider the dynamic evolution and maturation of a user’s information need. Instead, they focus on a static representation of the need in form of the user’s request. Hence, e.g., muddled information needs may have matured into focused information needs prior to the user’s interaction with an archive, as will be discussed later. Such maturation may be forced due to a lack of effective IR facilities or the muddled needs may be dropped all together. Further, the focus on static requests, might also explain the low share of requests for abstract content. The studies are conducted in non-digitized collections, and they do not involve user interactions. Therefore, they cannot explain searching behaviour in terms of how users formulate their requests, and the strategies applied for searching moving images. In the present work, we aim at providing such knowledge. In addition, we describe methodical aspects in relation to the gathering of such knowledge. This ends our review of related research. In the following section, we present the empirical context of our research.

### 3. EMPIRICAL CONTEXT

The empirical context is presented in three subsections. Firstly, we describe how we understand the domain under scrutiny, namely the academic field of Media Studies. Secondly, we provide a short introduction to Danish television broadcasting history and infrastructure. This is important because it enables the reader to better understand the behaviour of the test participants. Thirdly, we describe the Danish national collection of television broadcasts, since this is the main archive from which the test participants can gain access to television broadcasts.

#### 3.1 The academic field of Media Studies

The empirical user target group is scholars and students in the academic field of Media Studies. Wiberley and Jones (1994, p. 503) continue using an earlier definition of the humanities: “[...] those fields of scholarship that strive to reconstruct, describe, and interpret the activities and accomplishments of men and women by establishing and studying documents and artefacts created by those men and women”. The differentiation of the humanities in relation to e.g., fields in the natural sciences is presented as a decrease in control of the data material to be analysed. An important element of the definition, and thereby the distinctiveness of the humanities, is that information objects, or artefacts, created by humans, are the primary sources for analysis, with the purpose of reconstructing, describing, and/or interpreting human activities. In popular terms, one might say that the library is for the humanist what the laboratory is for the scientist. We agree with this perception of the humanities, and consider Media Studies to be placed within the Humanities.

We focus on academics in Media Studies for two intermingled reasons. First of all, the field of Media Studies covers a tangible unit of users. Secondly, the investigation shows that scholars and students in Media Studies comprise a rather large portion of the users of the archive. Due to several reasons, television broadcasts are only applied by a somewhat limited number of scholars and students, and in our choice of a user target group we were attentive to selecting a user target group that could be expected to comprise a fair amount of information needs for television broadcast. This is important in order to ensure the methodical soundness of our investigation. Based on the nature of the field, we expected Media Studies to constitute a fair number of the users of television broadcasts. Hjarvard and Søndergaard (1998, p. 268) state that Danish media research has a primary focus on television broadcasts (see e.g., Agger, 2005; Frandsen & Bruun, 2007), and that the media departments at Copenhagen University and Aarhus University give specific attention to television broadcasts. In

brief, our user target group is scholars and students associated with one of the two main university departments, which offer Media Studies educations in Denmark: Information & Media Studies, Aarhus University, and Film & Media Studies, Copenhagen University. In the following, we provide an introductory description of the history, content, and methods in Danish Media Studies research.

According to Hjarvard and Søndergaard (1998, p. 265) the post-war expansion of the mass media provided a catalyst for the development of media research in Denmark. In the late 1960s and the early 1970s systematic and continuous research in mass media began to develop in the literature and film departments of Danish universities, and media research became institutionalised in the 1980s within the faculties of the humanities.

Media Studies is the study of mass media in its historical, cultural and social context. This includes audiovisual media, e.g., Bondebjerg's (1993; 2006a) focus on television broadcasts, traditional media, e.g., Poulsen's (1999) investigation of newspapers, as well as new media, e.g., Finnemann's (2005) focus on the Internet. The field comprises all types of communication, e.g., art, entertainment, news, commercials, and interactive communication. The focus is contemporary as well as historical (e.g., Jensen, 1996-2003; Hjarvard, 2006b). Media Studies is predominantly concerned with Danish mass media, but foreign mass media (for instance, Scandinavian, European or American) are also included in some of the comparative research (e.g., Bondebjerg, 2006b).

The focus in Media Studies can be ascribed three main traditions: 1) reception studies; 2) aesthetic analysis; and 3) media structures and the contemporary development of media systems. Empirical reception studies are mainly qualitative studies of the audience's experiences of the media. Cognitive film theory (e.g., Grodal, 1997) is an example of a theoretical approach within the audiences responses to visual media. The reception analyst often uses computer software for analysis of reception data. Aesthetic analysis is, for instance, concerned with the investigation and definition of different media genres (e.g., Bondebjerg, 1993). Within the tradition of media structures and the contemporary development of media systems, examples include the focus on local electronic media, and consequences of the late abolishment of the Danish television monopoly, which is further explained in the following section.

Media Studies is concerned with the preparation, mediation and use of mass media, and though placed within the humanities, the field comprises inter-disciplinary elements, and qualitative as well as quantitative methods are applied in the field. The field applies traditional text and language analytical tools for analysing the content of mass media, alongside with psychological and sociological tools for analysing viewers', listeners', and/or readers' reception and use of media, and cultural and social science theoretical tools for analysing cultural developments and trends, and the media's place and function in our society (Jensen, 2002).

### 3.2 Television broadcasting in Denmark

Here we will briefly describe the historical and contemporary settings for television broadcasting in Denmark. The purpose of this sketch is firstly for the reader to better understand our results on the characteristics of information needs, and secondly to understand the motivations associated with the Danish national collection of television broadcasts, which is described in the following subsection.

The Danish television culture is regarded as one of the most stable television cultures in Scandinavia, with DR as the supreme broadcasting institution until the second national channel (TV2) commenced broadcasting in October 1988 (Bondebjerg, 1994, p. 45). In line with Søndergaard (2006, p. 26), we divide Danish television broadcasting into three phases: 1) the formative phase (1951-1964) 2) the monopoly phase (1964-1988) and 3) the competitive phase (1988-present).

**The formative phase:** In 1951 the Danish authorities (Radiorådet) decided to broadcast television in a try-out period of three years. Television broadcasting was considered a national affair, and it was established as a public monopoly with public service responsibilities (Søndergaard, 2006, p. 29). Production and broadcasting was undertaken by the Danish State Broadcasting Service (Statsradiofonien), later the Danish Broadcasting Corporation (Danmarks Radio) or in short DR. The formative aspects of the phase concerned the broadcasting station (e.g., technical equipment), the establishment of the broadcasting infrastructure (e.g., broadcasting towers), as well as the distribution of television sets, exemplified with the development of television licenses from zero in 1951 to nearly 1,000,000 in 1964 (Søndergaard, 2006, p. 30). The broadcasting infrastructure for all of Denmark was in place by 1960 (Ahm, 1972, p. 171). The broadcasting in the first years was comprised of one hour, three days a week, which rose to nearly 30 hours a week at the end of the formative phase in 1964.

**The monopoly phase** started with the segregation of the organisation of radio and television production in 1964, and ended with the abolishment of the broadcasting monopoly in 1988. DR was the sole national television channel during the 24 year period. Towards the end of the phase a few small local television channels were established e.g., TV Syd in 1983. The weekly broadcasting doubled from 30 to 60 hours during this period. One of the main technical developments in the monopoly phase was the transmission of television in colour starting in 1967 (Ahm, 1972, p. 234). According to Hjarvard (2006a), DR is to be considered a cultural institution in the monopoly phase, in contrast to the media company it turned into in the competitive phase.

**The competitive phase** started with the establishment of TV2 as the second national television station. TV2 was partly financed by licence fees, and partly by commercial revenues. The already existing regional channel TV SYD became part

of TV2|Danmark in 1988, and seven other regional channels were gradually established within the TV2|Danmark broadcasting corporation. Prior to that, TV3 had started broadcasting to the Danish audience from England in 1987, and the abolishment of the monopoly meant that several channels were to follow, e.g., DR2 in 1996 (the main DR channel is at the same time re-launched as DR1); TV2 Zulu and TV Danmark (later Kanal 4) in 2000; TV2 Charlie in 2004; TV2 News in 2006. The new channels on the market meant more competition, and the audience share became one of the strongest parameters for measuring the penetration rate of each channel. The competitive phase gave rise to the extensive use of audience ratings for measuring channel performance. Further, the competition meant an explosive rise in the weekly hours of broadcasting e.g., 138 hours in 2005 from DR1 alone.

In recent years, the development of the broadcasting corporations into media corporations with specialised broadcasting channels (e.g., TV2 Sport), Internet broadcasted television, and Web 2.0 portals containing the users' own video clips, may be the beginning of a new phase in Danish television, which might be referred to as the atomised and personalised audience phase. However, such analyses are outside the scope of the present paper.

### 3.3 Access to television broadcasts

The main collection of television broadcasts is the Danish national collection of television broadcasts. The collection is located at the State Media Archive at the State and University Library of Aarhus, Denmark. The State and University Library collects, preserves, and provides access to the Danish cultural heritage as it is expressed in television broadcasts. The State and University Library collects all transmitted broadcasts (e.g., news, documentary, commercials, spots), from the Danish television stations, and the collection is accordingly heterogeneous in nature. The collection was established in 1987 ([Ministeriet for Kulturelle Anliggender, 1987](#)), and the State Media Archive has mainly focused on the collection of future broadcasts, as opposed to collection of broadcasts transmitted prior to 1987. At present the collection contains more than 350,000 hours of broadcasts, which mainly originate from the competitive phase (and the atomised and personalised audience phase), described above.

Access to the Danish national collection of television broadcasts is restricted in concordance with copyright legislation, and it has been revised on several occasions ([Fønss-Jørgensen, 2002](#)). At the time of our data collection non-restricted access is granted to academic users with documented research activities, whereas the broader public can only access the collection at the premises of the State and University Library ([Kirring, 2006](#); [Statsbiblioteket, 2007](#)).

Until January 1<sup>st</sup> 2006 all broadcasts were received and stored analogically on VHS-tapes. The indexing of television broadcasts is traditionally very labour intensive, because it involves manual processing of each individual television broadcast ([Brunelli, Mich & Modena, 1999, p. 79](#); [Smeaton, 2004, p. 380](#)). The inevitable need for manual resources has so far prevented the State and University Library from indexing the collection of television broadcasts. Therefore, at the time of our investigation searchable records representing the broadcasts do not exist for the Danish national collection of television broadcast. Consequently, neither librarians nor users are able to search the collection in a systematic or electronic manner. Retrieval of television broadcasts is entirely based upon the shelf arrangements of the analogue VHS-tapes. The VHS-tapes are arranged chronologically according to date of broadcast for each television channel. For retrieval to be feasible, substantial knowledge of formal data of the requested television broadcast is needed. In addition, retrieval of broadcasts is facilitated at the granular level of programmes, only. That is, whatever the level of granularity a user's need addresses (e.g., a series of television programmes, a specific television programme, or a feature from a television programme), retrieval must be made at the level of television programmes as a whole. Users are, at present, required to provide the librarian with the formal data of the requested television programme, including the name of the transmitting channel, the title of the broadcasted programme, and the exact date and time of transmission, as well as additional administrative information.

Kirkegaard and Borlund ([2006](#)) analysed all requests addressed to the collection in 2004. In total the collection received 1.688 requests from 340 users. Kirkegaard and Borlund found that 80% of the requests were related to academic teaching or research tasks. Further, they show that approximately 50% of the requests were for broadcasts transmitted within one year of the request. The predominance of requests for recently broadcasted programmes is presumably affected by the deficiencies of the current access to the collection. Due to the lack of electronic search entries of the present collection, users have to rely heavily on their memory when requesting programmes, which most likely has a great effect on the television programmes requested by the users. In this light the predominance of requests for current programmes is only natural.

The Danish national collection of television broadcasts at the State and University Library is the main collection of television broadcasts, which are accessible for research purposes in Denmark. However, no search facilities are provided for the collection, and the collection is consequently not searchable. Instead, other databases are available to search for transmitted broadcasts, examples are the Registrant ([Hjarvard & Jespersen, 2006](#)) and the TV-Meter system. However, such databases are either only concerned with old broadcasts (1951-1964), or new broadcasts (1992 and onwards). Further, these registers focus on transmitted broadcasts only and they do not hold any information about the availability of television broadcasts.

## 4. METHODOLOGICAL APPROACH

In this section, we provide a description of our methodological approach. In the present work, we have applied an inductive interpretivist qualitative research approach, with its main inspiration stemming from the Grounded Theory research strategy (Glaser & Strauss, 1967; Strauss & Corbin, 1998). This methodological approach is in line with our epistemological stance in the holistic integrated cognitive framework for information seeking and IR (Ingwersen & Järvelin, 2005), and it is applied in several studies of user behaviour in Library and Information Science (e.g., Schamber, 1991; Ellis, 1993; Spink, 1997; Pharo, 2002). Further, Grounded Theory is ascribed to be the "...most widely employed interpretive strategy in the social sciences today" (Denzin & Lincoln, 2005, p. 382). Grounded Theory is an overall strategy for conducting research, which has emphasis on inductive generation of theories, models and/or hypothesis from raw empirical data. For this Grounded Theory employs a particular set of techniques and procedures.

In our reporting, we are attentive towards the criteria that are applicable for assessing the quality of our qualitative research. That is, our research should not be assessed in relation to quantitative notions of e.g., reliability, validity and generalisability. Instead, criteria such as credibility, trustworthiness, and transferability are appropriate for assessment of the present work. In this way, we are inspired by the recommendations by Bryman (2008, pp. 377-380), and Klein and Myers (1999), on reporting interpretive field studies. Further, we are inspired by Strauss and Corbin's (1998, pp. 265-274) criteria for evaluating grounded theoretical research. Accordingly, we aim at providing a methodological description that enables the reader to assess the overall appropriateness of our analysis, results and conclusions. In the following two subsections, we firstly describe the methodological approach for collecting our data, and secondly, we describe how we conducted our data analysis.

### 4.1 Data collection

Our data collection consists of web-questionnaires and in-depth interviews. Prior to collection of empirical data we have gathered informal domain knowledge on television broadcasting and archiving (including indexing), the users and use of archived television broadcasts, and the academic field of Media Studies. The purpose of these informal information gatherings is to gain the necessary intellectual knowledge for the identification of a user target group, selection of an appropriate sample, and analysis of the collected empirical data.

A work place at the State Media Archive, three visits to television stations, and a two-month research visit at a Danish University Media Studies department are the main sources for gaining knowledge about television archiving in Denmark. The work place at the State Media Archive provided insight into the routines at the archive, and the process of archiving of television broadcasts, as well as insight into the Danish national collection of television broadcasts. The three research visits at operating archives associated with broadcasting corporations gave us insight on how television broadcasts are handled in the professional community. That is, the community that has been prominent in dealing with television broadcast retrieval systems. It is important to acknowledge that the purpose of the archives at television stations is to serve as a production archive and not as a research archive (Hjarvard, 2006a, p. 22). The difference in purpose between production units and researchers will naturally affect the construction of the archive. This diversity can e.g., be seen in the different types of work tasks in relation to television broadcasts, as described by Markkula and Sormunen (2006). The two month research visit at the Department of Information and Media Studies at Aarhus University gave invaluable insight into the field of Media Studies, since we are able to observe and participate in the life at the department, including scientific discussions. This is comparable to participatory observation in Bogdan and Taylor's (1975) terminology. Participatory observation is a research approach which allows the investigator to become part of the community in order to understand what is not usually made explicit. Kvale (1996, p. 104) states that participant observation, including informal interviews, is appropriate when the researcher is interested in implicit meanings, tacit knowledge and/or taken-for-granted assumptions of a group or a culture. Our role is similar though not analogous to what Lave and Wenger (1991) from a learning perspective call the legitimate peripheral participant. This role is powerful since it enables us to be embodied in the practice and learn the tacit knowledge of the community, which does not necessarily get articulated but has to be absorbed (Jordan, 1994; 1996). In this role, the observer can participate in meetings, lunches, and other story telling sessions. As a result of the research visit, we built up interest for the research project. By increasing the respondents' motivation for participation, and decreasing the risk of misinformation and perceptual distortions in the collected data, we increased the overall credibility of our work (Foster, 2005, p. 2).

We used web-questionnaires to gather initial information about the respondents' information needs. The questionnaire consisted of eight sections, and it was designed in order to derive data for answering several research questions in relation to the larger research project (Kirkegaard Lunn, 2009). Consequently, not all sections of the questionnaire were of relevance for the work presented in this paper. Of relevance were the 2<sup>nd</sup> and 7<sup>th</sup> sections. Section 2 invited the respondent to describe a work task that included a need for obtaining television broadcasts in general terms. In the 7<sup>th</sup> section the respondent was asked to leave contact information if he or she would like to be contacted for follow-up interviews.

We used information obtained in the web-questionnaire to obtain a sample for our in-depth interviews. The questionnaire was e-mailed to approximately 1785 scholars and students at the two Media Studies departments. We received 108 questionnaire responses, corresponding to an overall response rate of 6%. Based on an analysis of the data from the 2<sup>nd</sup> section of these 108 questionnaire responses, we selected nine interviewees by purposive and theoretical sampling. One



interviewee was a Master's student, two were PhD students, two were Assistant Professors, two were Associate Professors, and two were full Professors.

The criteria for our purposive sampling were constructed in line with gaining knowledge about the field, as well as conducting, and analysing the questionnaire responses. This ongoing learning and adjustment of the data collection process goes hand in hand with theoretical sampling ([Glaser & Strauss, 1967, p. 45](#); [Strauss & Corbin, 1998, p. 82](#)). We focused on six different criteria for our purposive sampling. These criteria were: 1) methodical approach; 2) types of television broadcasts used; 3) status of work task; 4) academic status; 5) academic department; and 6) the interviewee's experience in the field. All in all, the nine interviewees represent diversity with respect to our six criteria for purposive sampling.

The number of interviewees is not set beforehand, but based on the notion of saturation (e.g., [Strauss & Corbin, 1998](#); [Guest, Bunce & Johnson, 2006](#)). After the ninth interview, we considered the characteristics of television broadcast information needs well covered in terms of its properties and dimensions, demonstrating diversity in the collected data.

Information needs are somewhat intangible entities as they are internal cognitive phenomenon, e.g., according to De Mey's ([1980](#)) stages of processing and Taylor's ([1968](#)) information need stages. Interviews are considered to be appropriate for the task of uncovering such internal phenomenon, because if one wishes to collect data on cognitive perceptions it is important to allow respondents to use their own wording. An interview guide that assures an overall structure and at the same time enables great variability is constructed, with inspiration from Schamber's ([2000](#)) variation of the time-line interview technique, and Kvale's ([1996](#)) guide for conducting qualitative research interviews.

The interview guide consists of six parts: 1) introduction; 2) focus on a specific situation or critical incident; 3) sources for searching and retrieving television broadcasts; 4) idealised searching and retrieval; 5) typicality of described situations; and 6) closure. The guide gives an overall structure for the interviews and makes sure that each of the six parts is covered, but the interviews do not follow discrete, formal procedures. Instead, much is left for improvisation and intuition on the interviewer's behalf.

## 4.2 Data analysis

The transcription is the first part of our analysis, and it is conducted as verbatim word-to-word transcriptions with no indication of emphasis in intonations or emotional expressions ([Kvale, 1996, p. 170](#)). Upon transcription, the transcripts are handed to the interviewees for review, and the interviewees are urged to respond with clarifying comments, and corrections. Along with other member checking facilities (e.g., group discussion of preliminary results), it increases the credibility of our investigation ([Neuendorf, 2002, p. 103](#); [Foster, 2005, p. 3](#)).

Inductive content analysis is applied to derive theory from data rather than verifying existing theory ([Schamber, 2000, p. 735](#)), and we developed codes inductively from the transcripts being analysed. An important element of such inductive research is that "[...] analysis *is not* a structured, static, or rigid process" ([Strauss & Corbin, 1998, p. 58](#)). Our coding is conducted in several iterations, and in line with the recommendations by Strauss and Corbin ([1998, pp. 55ff](#)). In this way, we apply techniques developed for Grounded Theory to guide our analysis.

The coding process is commenced with a microanalysis of the nine transcripts. All transcripts are read thoroughly line-by-line, in order to be able to "[...] uncover new concepts and novel relationships and to systematically develop categories in terms of their properties and dimensions" ([Strauss & Corbin, 1998, p. 71](#)). The data is mined so to speak. This first reading involves open coding in which concepts are identified and their properties and dimensions are discovered in the data. In this microanalysis, the coding scheme is slowly being developed. After coding all transcripts once, a second iteration is commenced. This second iteration includes open coding as well as axial coding. Axial coding denotes the process where codes are merged or split into distinct codes, and relationships between codes are established. Subsequently, we conduct selective coding where categories are integrated and refined, and thereby the analysis takes form of a theory. Iterations in our coding are conducted until we reach a point where we did not add any new codes or relationships, the point of saturation ([Strauss & Corbin, 1998, p. 136](#)). In this way, we followed the recommendations by Glaser and Strauss ([1967, pp. 101-115](#)) to conduct a constant comparative analysis as a mean to identify categories in the data. This approach for coding allows for the researcher to be systematic and creative at the same time, and to derive from the data, what anthropologists call thick descriptions ([Geertz, 1973](#)).

## 5. CHARACTERISTICS OF TELEVISION BROADCAST INFORMATION NEEDS

Based on the methodical approach just described, we derive four characteristics of the interviewees' information needs for television broadcasts. In brief, the characteristics are that:

- 1) Television broadcasts are needed for empirical analysis;
- 2) The television broadcast needs are related to three broadcast dimensions;
- 3) Needs fall into four categories; and
- 4) The television broadcast information needs are divided into four phases.

In the following sub-sections, we provide a description and discussion of each of the four characteristics. To explicate the nature of the analysis by which we have derived the characteristics, we provide a few quotes from the interviews. Though presented individually, the four characteristics are naturally interrelated and interconnected.

## 5.1 Objects for analysis

The respondents' needs are characterised by a need for the broadcasts to serve as data objects in scientific empirical analysis. This is in line with Wiberley and Jones' (1994) definition of the humanities, since human created artefacts are the primary sources of analysis. Similarly, it is in line with e.g., academics' use of literature within the field of comparative literature studies. Though it might seem trivial, this knowledge is imperative, because it signifies a particular behaviour. These needs for television broadcasts are different from the everyday television viewer's need for broadcasts as objects of entertainment. That is, the broadcasts are needed in order to conduct active viewing in contrast to passive consumption as previously described by Auffret and Prié (1999, pp. 319-320). This active consumption is different from the focus on information objects as learning or entertaining objects, which is the general focus for users' interaction with IR systems. An example of the consequences of the difference in perspective is a description of a motion picture in relation to entertainment (e.g., as expressed in television guides) and research on television broadcasts, respectively. In the 'entertainment' perspective the plot of the motion picture should not be described, while an academic researcher may very well be interested in the plot of motion pictures.

## 5.2 Dimensions of needs

The interviewees' needs are characterised by addressing three different broadcast dimensions. These dimensions are:

- 1) The transmission dimension;
- 2) The archive dimension; *and*
- 3) The reception dimension.

The transmission dimension is concerned with a need to be informed about each broadcast's originally transmitted context. In this dimension, the respondent's needs are focused on transmission aspects of the broadcasts, e.g., where and when particular broadcasts were transmitted, as well as the broadcasts transmitted in the proximity of the broadcasts in question. An example of a research project that instigates such a need is the investigation of media strategies as they are reflected in different channels' reaction to audience magnets on competing channels. The engendered information need could be a need to be informed about the broadcasts on DR1, DR2, and TV3, at the time where TV2 transmits a particular broadcast (e.g., 'Vild med dans' – ['Strictly Come Dancing']). The interviewees also have a need to be able to search for all transmitted broadcasts. This is connected to the 'criticism' of production archives, which only convey what has been stored, instead of conveying what has been transmitted, e.g., as expressed by Hjarvard (2006a, p. 22), and in this interviewee's critique of the Danish Broadcasting Corporation (DR):

*"The main problem in DR's broadcast retrieval system is that it is constructed as a database of archived broadcasts, whereas our fundamental need is to have an overview of transmitted broadcasts".*

This entails that to facilitate the users' fulfilment of this characteristic; a future broadcast retrieval system must hold descriptions or document representations for broadcasts that are not retrievable, because they have not been stored. This is fundamentally different from the very purpose of IR systems, namely to enable the user to retrieve, and be provided with access to information objects. However, the interviewees' needs are not (necessarily) concerned with retrieval of the television broadcasts, but rather retrieval of information about broadcasts, which is related to the factual data type of information needs, described in sub-section 4.3.

Further, the interviewees' needs are concerned with information about whether and where the broadcasts have been stored, the so-called archival dimension. An example of a research task, which instigates information needs related to this dimension, is an investigation of the types of broadcasts stored in the Danish Broadcasting Corporation's archive in 1968 - 1975, as an illustration of the perceived importance of different types of broadcasts for cultural heritage preservation. In addition, this dimension is important in order to know which broadcasts are available for the interviewee, and hence can be obtained for further analysis. Archival information is also important for relevance judgments as described by Kirkegaard Lunn (2009).

Furthermore, the interviewees wish to be informed about the audiences' reception of the broadcasts. The reception dimension provides contextual information, which is important for the interviewees' needs. The reception dimension is largely associated audience ratings e.g., as created by TV-Meter. An example of a research task that instigates needs that are related to this dimension is the development of different types of popular broadcasts from 1992 until 2002. Here popularity is equal to audience ratings and the researcher would then need broadcasts with high ratings.

The three dimensions just described are obviously also related to different sources of information or information channels. However, they do express different aspects of the information needs observed. In this way, they are expressions of the types of information needs that the interviewees expect a future broadcast retrieval system to handle. Consequently, it is important to explicate these different dimensions, and for the future IR system designer to consider these dimensions.

### 5.3 Four categories of information needs

In comparison to Ingwersen and Järvelin's (2005) eight fundamental types of information needs, the interviewees' needs are characterised as concerning 1) known items, 2) factual data, 3) known topic or content, or 4) muddled topic or content types of information needs. The know item need is related to obtaining access to specific broadcasts, the factual data need is concerned with gathering facts about specific broadcasts, while the two types of topic or content needs are related to the generation of overviews of the broadcasts. The need to generate an overview is characterised to be explorative in nature, and it is connected to the development of the research and the work task. In relation to Kuhlthau's (1991; 2004) ISP model, the explorative need for an overview of broadcasts is comparable to the pre-focus vague conception of the work task at hand. The generation of an overview of the primary sources is a step towards gaining a clear and focused perception of the work task.

The different types of needs go hand in hand, and they might appear several times during the fulfilment of a particular academic work task. To illustrate this point, the following quote expresses an interviewee's experience with gaining an overview. Being asked when access to broadcasts is needed the interviewee replies:

*“That is very early on in the project. Because transmission began in 1951 only few living people remember the first broadcasts [...] The broadcast were just stored in the archive, and the content of the early broadcasts is a matter of conjecture, and as it turned out we got surprised [...] It transpires that almost all modern documentary genres already exist in the 1950s, not in the same extent and state of development as is found later on, but they exist. It was a surprise that the universe happened to be much richer than expected”.*

In this way, the types of information needs are connected to the fourth characteristic identified.

The verification of these different types of information needs is in line with previous research showing that when dealing with moving images, users are concerned with the moving images per se as well as information about moving images (Hertzum, 2003).

Though the present work does not verify the existence of Ingwersen and Järvelin's (2005) remaining four types of information needs, it is important to state that this should not be seen as a confirmation that these four needs do not exist for television broadcasts. Our results merely show that they are not present in the specific context under investigation.

### 5.4 The phases of the information needs

From our analysis, we identify four phases of the information needs for broadcasts. These needs are: 1) 'Getting and overview of transmitted broadcasts'; 2) 'Identification of borderline exemplars'; 3) 'Selection of specific broadcasts for analysis'; and 4) 'Verification of facts'. The four phases are depicted in Figure 1, and they are described and discussed below.

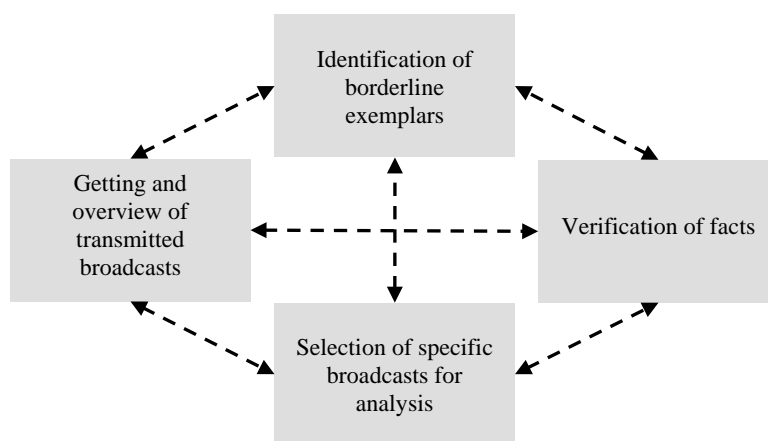


Figure 1: Four phases of the interviewees' television broadcast needs.

In the first phase, the interviewees need to generate an overview of their empirical field or primary sources in their area of research. However, this phase of the information need may not necessarily be expressed, as the respondents often generate such knowledge as part of their everyday activities, and hence prior to any interaction with an IR system. Several interviewees express that they generate such knowledge either through everyday activities or in their 'normal' research and

teaching activities, e.g., knowledge from external sources such as television guides. The following quote is an example of such a generation of knowledge:

*“[...] it is something I know. I do not examine which children’s programmes are broadcasted, because I just know that”.*

Knowledge about the empirical target area is a prerequisite for identification and selection of specific broadcasts, which are relevant for analysis in relation to the scientific research question.

Based upon the overview of the empirical field, some interviewees need to identify borderline exemplars. This is, for instance, the case for an interviewee with the research objective of defining a new television broadcast genre. In this work, it is important for the interviewee to identify, analyse, and describe prototypical as well as broadcasts at the border of the genre definition. This is related to work on human categorisation. Wittgenstein is ascribed to be the main proponent in modern theory on categorisation ([Lakoff, 1987, p. 16](#)). Wittgenstein’s contributions are that categories do not have clear boundaries, and that some members of a category are more central or prototypical than others. Lakoff ([1987](#)) builds on this work as he proposes the idea of an idealised cognitive model as the instigator of category structure and category centrality (prototypicality). A genre definition is comparable to an idealised cognitive model in the way that it aims at describing which members fit within the definition. The members of a genre definition can be graded in relation to how central or prototypical they are for the genre. In order to come up with such an idealised cognitive model (or genre definition) the interviewee is interested in examples which are clearly central to the genre definition, examples which are non-central members, and most interestingly, examples which are at the border of the definition. These borderline exemplars are very important for the interviewee, in order to provide a clear definition of the genre. In identifying the broadcasts that are just inside and outside the definition, the interviewee is able to describe the border of the genre, which is extremely important if the interviewee is to come up with a clear and precise definition of the new genre. The properties of relevant broadcasts are not known by the interviewee in advance, but they are slowly being identified as the interviewee is closing in on the genre definition, and hence the broadcasts that are part of the genre as well as those broadcasts that are not considered to be part of the genre. Since the properties of the relevant broadcasts are not known, it is impossible to construct an IR system which is able to identify borderline exemplars prior to the description of the genre. Instead, an IR system should, for instance, enable the researcher to conduct exploratory browsing in order to identify prototypical as well as borderline exemplars. Details on such design issues are outside the scope of the present paper, and it will require further research on the work processes of Media Studies researchers. This need for borderline exemplars may be related to the first characteristic described, namely the fact that the broadcasts are needed to serve as data objects in empirical research. Again, the need for broadcasts can be compared to the literature critics need for literature.

Knowledge about the television broadcasts or the empirical field is also important in order to select particular broadcasts for further analysis, whether this selection concerns one or several broadcasts. Knowledge about the broadcasts is a prerequisite for identification or selection of the specific relevant broadcasts, which are needed for analysis. However, the overview of the primary sources may be generated prior to interaction with an IR system, e.g., as expressed in the quote above.

Finally, the interviewees express that they need to verify facts regarding the broadcasts. This is closely related to the factual data type of information needs described above. The interviewees may, for instance, need to be informed about the time of transmission of a broadcast or the director of the broadcast. This information may be found in the broadcasts or it may be found in the metadata for the broadcast. In this way, this is connected to the fact that respondents do not necessarily need access to the broadcasts as such, but may sometimes be concerned with information about the broadcasts as described in relation to the transmission dimension in Section 4.2.

It is important to differentiate between the need to generate an overview, and thereby be informed about all transmitted television broadcasts, and the need to gain access to television broadcasts in order to study the broadcast as such. The former is for instance concerned with generating an explorative overview of a genre of broadcasts, including a brief examination and analysis of specific broadcasts, which is expressed by this interviewee:

*“[...] for much of what we have discussed so far, I do not need to see the programmes in question. Sometimes I need to see the programmes in order to conduct a detailed analysis or to gain a sense of the content of the programme”.*

The four phases are not identified in all nine interviews, and we do not claim that all television broadcast information needs consist of the four phases. Neither do we claim an exact order of appearance of the phases. The phases of the information needs may occur in an intermingled way, which is signified with dotted lines in Figure 1. Further, some phases may occur prior to the information seeking activities, e.g., the overview of the empirical field may be generated as part of the ‘normal’ activities, and may hence not be an explicit information seeking activity. This said, Figure 1 does indicate a natural order of the phases. That is, ‘*Getting an overview of transmitted broadcasts*’ will logically be conducted early on, while ‘*Verification of facts*’ will have a tendency to appear at the end of a research project. This is in line with the order of ‘Information seeking features’ identified by Ellis (e.g., [Ellis, 1987; 1989; Ellis, Cox & Hall, 1993](#)) and diagrammatically presented in a model by Wilson ([1999, p. 255](#)).

This ends our reporting in relation to characteristics of information needs in a television broadcast context. The final section concludes on the knowledge reported in the paper.

## 6. CONCLUDING REMARKS

In this paper, we have presented results on characteristics of users' information needs in the context of our television cultural heritage. The purpose of such an investigation is to provide knowledge as a prerequisite for design and construction of effective information access to digital information objects. With a focus on investigation of such information needs, we explain our methodical approach as a means to demonstrate how one might generate similar knowledge prior to design and construction of information access to other cultural heritage information objects. From our investigation of television broadcast information needs we learn that:

- 1) Television broadcasts are needed for empirical analysis;
- 2) The television broadcast needs are related to three broadcast dimensions;
- 3) Four types of information needs are identified; *and*
- 4) The television broadcast information needs are divided into four phases.

In this way, we have provided novel results in the arena (first, second and fourth characteristics), as well as verified previous results found in relation to other types of information objects (third characteristic). Further, we have demonstrated how our methodical approach can be applied to gather essential knowledge early on in the systems development process. This knowledge is imperative for the creation of digital information access to our cultural heritage. One example of such knowledge is our identification of three television broadcast dimensions, which entails that a future broadcast retrieval system should be able to provide document representations for all transmitted broadcasts, whether the broadcasts are stored or not. In addition, a future IR system ought to combine the three dimensions into one coherent broadcast retrieval system.

In line with the characteristics of naturalistic research (e.g., [Lincoln & Guba, 1985](#); [Mellon, 1990](#); [Foster, 2005](#)), the methodical approach applied in the present investigation does not generate results that can be generalised to other contexts. Instead, the methodical approach generates a descriptive and explorative explanation of the phenomenon in question. To be exact, characteristics of television broadcast information needs. The soundness or credibility of the results should hence not be measured in relation to generalisability, but rather in relation to the richness of our description of the phenomenon in question. That is, a description which ensures that the research theme is transferable and open for further developments.

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