Abstract

Advanced innovations such as digital transmission technologies with interactive return paths and digital/personal video recorders have clearly changed the consumer’s television viewing behavior. These innovations have also widened the range of channels for advertisers, entailing sweeping shifts in marketing budget allocations from traditional media to digital, interactive and personalized media. Television advertising revenue streams are slowly declining while several marketing gurus announce the end of the 30 second spot. In order to maintain their position as the world’s largest and most authoritative advertising channel, broadcasters are highly dependent on accurate and in-depth data of their viewers. Unfortunately, the traditional audience measurement techniques fail to keep up with the challenges of the current broadcasting market.

This paper reflects on the present state of audience measurement and describes our search to tackle some of the challenges of the interactive and digital broadcasting market. As this paper is the result of a multidisciplinary approach, it reflects both on expert user requirements as well as on the technical requirements of an audience 2.0 measurement system for one specific scenario for an innovative audiometric approach. Contrary to traditional measurement systems which use dedicated and expensive hardware, this paper presents the challenges of a set-top box-only approach as all measurement related algorithms and application logic is solely running and managed on the set-top boxes. The main advantage of this approach is the feasibility for large scale deployment. The extended accuracy level of these new systems could prove to be an important factor in the adoption process of interactive digital television platforms by the advertising community.

Keywords

Interactive advertising, audience measurement, personalization.

1 INTRODUCTION

Traditional advertising and media markets are going through radical changes. The advances of digital media have distorted the sound relations between all the stakeholders in this economical sector [4], [14], [18]. Several innovations have widened the range of channels for advertisers, entailing sweeping shifts in marketing budget allocations [32]. New media, such as interactive digital television (iDTV), internet and mobile applications, which allow for more personalized and direct response advertising, are gaining in importance and are grasping a bigger share of the advertising revenues at the expense of the mass media which are very dependent on these advertising revenue streams [5], [6], [10], [12].

In comparison with other media, Television is mostly affected by these developments. The fragmentation of the audience has major consequences for the broadcasters’ advertising revenue streams [15], [22]. The reach of the channels declines, therefore increasing the cost of the advertising space accordingly. Due to the rising complexity of the sector, advertising space should be purchased using planning software in order to select the most interesting channels to grasp the attention of the audience [15], [23], [24], [32]. Due to the growing amount of clutter, the efficiency of the 30 second spot is questioned by advertisers [1], [14]. The very nature of the broadcasting market, selling eyeballs to advertisers (meaning access to audiences), is challenged by several innovations, therefore, the traditional business model of free audiovisual content financed by ad revenues is severely questioned by all stakeholders [9].

In order to maintain its position as the largest and most authoritative advertising medium, television has to bend these challenges into opportunities and is therefore increasingly dependent on detailed and up to date information regarding their audiences. The access to attractive consumers segments amongst is very interesting to advertisers. Their spendings can be reinvested in the production of qualitative content which can again be used to attract more viewers, a practice often referred to as the vicious cycle of network television [12] [14].
Today, television is one of the best measurable mass media although audience data and ratings have not always been this important to broadcasters [29]. In the early years of television, the European broadcasting landscape was dominated by the monopolies of national public broadcasters. Due to the limited amount of available frequencies, it was technologically impossible to offer a wide range of channels [13], [27], [13]. National governments were controlling the spectrum which was strictly regulated [3]. As there was no competition in the market and advertising was strictly limited, therefore, there was no need for audience data or viewing figures.

Nevertheless, the old order, as McQuail [18] describes this era of scarcity and government monopoly, started to stagger in the early 80’s. New transmission technologies such as cable and satellite transformed the broadcast market to an era of availability [13], [16], [17], [31]. These technologies offered several opportunities to broadcast more stations, to reach larger regions and to work for cheaper rates and therefore, the monopoly of the public broadcasters could no longer be supported and market were opened up to private broadcasters [16]. Additionally, several European countries also witnessed a climate of deregulation in other areas due to the changing political and societal climate. The deregulation led to the commercialisation of broadcasting as the state controlled government monopoly of the public broadcasters was replaced by a dual broadcasting system characterized by the presence of both public and private broadcasters [2], [3], [8], [26], [27], [28]. The business model of private broadcasters was solely based on advertising revenues. New national and international competitors entered the broadcasting market slowly fragmenting the viewers into these different channels.

Ellis [13] identified a third era in the history of broadcasting, the era of plenty, which started with several technological advances in the production and the distribution of audiovisual content. Due to new, digital transmission technologies like DVB-T, DVB-C, DVB-H, DVB-S and digital compression techniques it is possible to broadcast even more channels using different devices, a trend which is often described as divergence [11], [25], [29], [7], [19], [20]. The classical fixed television set is also challenged by new media such as the internet and several mobile devices but has also transformed its appearance and picture quality [19]. Digitalization blurs the boundaries between the different media and reinforces existing trends of commercialization and the fragmentation of the audience.

In this era of plenty, the availability of accurate data on viewing behavior is of the utmost importance for the commercialization of (Belgian) television channels. Not only commercial broadcasters but also public service broadcasters are dependent on audience ratings for the evaluation of their public assignment. Television remains the most important advertising channel worldwide and is currently also one of the most measurable media.

Despite this large dependence on audience information, traditional measurement techniques fail to keep up with the advancements in digital television. The fragmentation of the audience, changes in media usage, the arrival of new media and ad avoidance techniques challenge the traditional audiometric practices. Due to the increasing popularity of time shifting and VOD services, scheduled viewing in prime time has been partly transformed to on demand viewing. Using the technology of the PVR, viewers can fast forward and skip commercials. ‘Viewing behavior’ is clearly changing, confronting audience measurement with new challenges and opportunities. What are the implications for the traditional audience measurement systems? What are the expectations of commercial television channels, advertisers, professional advertising and communication agencies with regard to the measurement of audiovisual content on digital and mobile screens? Which are the most likely challenges and which scenarios can be identified for new IDTV audience measurement systems? And how can they be tackled technologically?

2 METHODOLOGY

The research in this paper is part of a larger research project, Stimulating Consumer Data (SKODA), conducted for Belgacom, one of the major telecom operators in Belgium. The research was conducted by an interdisciplinary group of researchers from the department of Communication Sciences and the department of Information Technologies of Ghent University who joined forces in the Interdisciplinary Institute for BroadBand Technology (IBBT).

Both research groups worked together in order to develop several scenarios for an advanced audience measurement system tailored to the interactive and digital future of broadcasting. In order to ensure the development of a better system, the standard methodologies for audience measurement were studied. Not only existing methodologies were inventoried, current experimental methodologies were also studied. In addition to this ‘state of the art’ research, several expert interviews were conducted in order to get some insight into their current practices and future requirements. Four types of expert users were identified and questioned using a qualitative research design. Firstly, 35 interviews with Belgian advertisers were conducted. Secondly, all Belgian broadcasters were questioned. Thirdly, professional support agencies such as an advertising agency and media
planning agency were also part of the research. Finally, we also questioned a rather new but already very influential market player, the telecom providers/operators which are becoming increasingly important due to their power to control the access of a broadcaster to the audiences. As this paper is the result of a multidisciplinary approach, it also reflects on the technical challenges which are imposed to the development of new measurement systems in order to cope with the current and future advancements in the digital television environment. This paper presents the challenges of a set-top box-only approach, a scenario which was selected based on the user research.

3 RESULTS: THE DEVELOPMENT OF A SET-OP-BOX BASED MEASUREMENT APPROACH

3.1 State of the art

The audience measurement market in Europe is characterised by a vigorous concentration of research companies. This oligopoly is dominated by three major enterprises: GFK (Gesellschaft für Konsumforschung), AGB Nielsen Media and TNS (Taylor Nelson Sofres), which consist of several local departments. These companies provide software and hardware as well as consulting services to local broadcasters [21].

In several European countries, these companies act as subcontractors for independent trade organizations such as the Centre for Information on the Media (CIM) in Belgium, while in other countries they have final responsibility for the publication of audience ratings. Most European countries utilize the same methodology although several local aspects are taken into account for each separate market. 32 of 43 European Countries use a people meter to measure the viewing behavior while others use diaries or conducted surveys by telephone. In several small and less wealthy countries, there is no audience data available [21]. All audience research in Europe is based on a panel approach. Panel members are selected based on a large reference study describing the national population of television viewers. The use of dedicated hardware is very expensive and maintaining the viewer panel in order to guarantee the representativeness is very time consuming.

In addition to the monitoring of viewing behavior, television content, programs as well as ads, is also logged using image registration and encryption software, this practice is often referred to as time logging. The combination of viewer data and time logging data provides advertisers and media agencies with crucial information on the viewing behavior of their target groups and is therefore the foundation of the planning schedule of most television advertising campaigns.

The arrival of new digital technologies challenges this traditional approach. Several new digital broadcasting technologies have a return path, a new way of connecting viewers directly to broadcasters using nothing but their remote control. On demand viewing and time shifting allow users more freedom to compose their own broadcasting schedule. Interactivity and non linear viewing are not incorporated in the traditional audience measurement practices. As these practices will continue to be adopted by more viewers in the near future, viewing rates based on live viewing practices will decline leaving less attractive figures for broadcasters to present to advertisers.

Regarding time shifted viewing, most audience research organizations are currently adopting a new technology. Research has shown that viewers normally watch a recorded program very quickly after its live broadcast. Experts therefore make a distinction between three types of television viewing, live viewing, Near live viewing (NLV – in the same week as the live broadcast) and Viewing On The Same Day As Live (VOSDAL). Using the Enhanced Audio Matching (EAM) technique, NLV and VOSDAL can also be added to the viewer figures. The EAM technique compares the audio signal of the broadcaster to a reference site. This technique offers the possibility to process the audio signal very quickly therefore allowing the people meter to recognize programs up to six days after the live broadcast. Several countries adopted the Enhanced Audio Matching (EAM) technique in 2008 or 2009. Data from the live viewers and the VOSDAL viewers are available to the market the day after the broadcast of a show. The final ratings are available seven days after the live data, offering additional information on the timeshifted viewers.

Although the registration of timeshifted viewing is an important step forward in bridging the gap between the old and future measurement systems, this technique has several important limitations. There is still no information available regarding the use of interactive applications such as digitext, interactive advertising commercials in dedicated advertising locations, enhanced TV applications, the electronic program guide (EPG), walled garden applications, e-mail etc. Using this kind of applications, the broadcast stream is usually replaced by a split screen application in which the live stream continues in the upper right corner of the application. The audio signal of
the live broadcast holds a prominent place and therefore the people meter continues to register this activity as viewing behavior, one could question the validity of this reasoning as most people focus on the interactive application and not on the live stream. None of the traditional people meters registers these interactive applications. Because of dissatisfaction with these limitations, the British Sky Broadcasting Group (BskyB) established its own viewer panel using the data collected by their customers’ set-top boxes which operate as people meters and register all linear and interactive television viewing behavior such as timeshifting, VOD and all kinds of interactive applications.

3.2 Expert users requirements

Despite the annoyance of different actors in the field, Centre for Information on Media (CIM), the Belgian trade organization in charge of audience research, has announced no new developments until the renewal of its contract with the sector in 2012. This statement is a serious bottleneck for the adoption of interactive TV advertising opportunities. Belgian advertisers are reluctant to invest in interactive advertising campaigns on television as long as there is no data available proving the advantage of this format compared to the classical 30 second spot. Marketing budgets are limited and choices are to be made based on objective data collected by an independent organization. When asked for a prioritization of data from the different applications e.g. VOD, timeshifting, DAL’s, walled garden, etc., this seems to be of no concern to advertisers. This response also shows that the knowledge Belgian advertisers have on the different applications is rather limited and they do not seem to be very familiar with the concept. Most advertisers simply answer that they want all available data, preferably delivered by an independent organization which collects and controls the data. They expect this information to be incorporated in the current contract and are reluctant to pay for it. They assume that the set-top boxes already register all viewing behavior of the audience and expect to get detailed information about this behavior.

In order to seize the opportunities of digital transmission technologies and turn them into a success story, broadcasters are trying to convince advertisers to test the applications. Therefore they need test cases and well-documented examples. In order to receive data they should form an alliance with telecom operators and promote these applications together.

Telecom operators are becoming more and more aware of the richness of the data they collect in their set-top boxes. Unfortunately, these data logs are currently not very user friendly and need a lot of programming before they can be commercialized. Clearly, this will not be a free service. A new business model should be developed in order to reimburse telecom providers for their efforts.

3.3 Technological concepts

As mentioned before, independent of the (hardware) solution which is used, all traditional audience measurement systems have one general concept in common: they all use a select panel group in order to map the panel’s viewing behaviour to a larger group, often a whole population. In Belgium for instance, 1500 households represent a population of approximately 10 million people. Consequently, the final results of such measurement systems are largely based on the assumption that the panel members are a perfect representation for the population. Although special care is taken to have a good mix of households in the panel, it is clear that these results can never be as representative as in a scenario in which the actual viewing behaviour of the whole population is measured.

Despite these not fully accurate results, the panel-based approach has some obvious advantages: a select group is easier to follow (in case something goes wrong) and easier to question (in order to acquire more extensive profiles). In addition to this, the need for (expensive) hardware in traditional measurement systems, incorporates that the deployment costs of such systems are tightly coupled with the number of households in the panel. Due to the fact that analogue television requires no ‘intelligent’advanced equipment to watch television, additional hardware is always required for audience measurement. Due to the broadcast nature of traditional television, the broadcast operator itself cannot deduct viewing behaviour from the data in its network.

However, with the arrival of digital television, advanced hardware, called set-top boxes (STB), are now installed at the customer premises and with the entrance of telecom operators in the television market, additional information can also be deducted from the telecom operator’s network. It is obvious, that in the digital television era, the broadcast or telecom operator could now take up the role of an audience measurement organization. But what exactly would be the advantages of this new role for a broadcast or telecom operator? Should the use of a panel completely be thrown away with no respect for current audience measurement systems? And how can a broadcast or telecom operator exactly deduct which household members are watching a specific program? In this section, we describe some technical concepts of a general solution which tackles these issues.
Figure 1 describes a high-level architecture of a digital television operator (telecom or cable) that takes up the role of an audience measurement instance. Every digital viewer has installed a digital STB next to his television set in order to watch the broadcastings in digital quality. For the operator, it is very easy to install a logging client on its STB which is able to keep track of all the programs the STB is tuned in to. As the logging client natively runs on the STB, it is also very easy for the client to log the programs which are recorded by the STB and to monitor time shifted viewing behaviour. Finally, this logging client will send all its acquired data within certain periods of time to the back-end of the operator. This process is shown in the figure by the white STB, informing the operator that that specific family was watching programs Xb and Yc during Linear Broadcast (LB), that program Xe was recorded (PVR) and then watched twice and that program Yb was watched by using Time Shifted (TS) viewing. Note that a telecom operator (not a cable operator) can often also deduct this type of information by analysing the traffic on its network.

It is clear that this type of logging data only provides information on a household level, meaning that the operator can not deduct whether someone is actually watching the tuned in television show and which members of the family are actually watching this show. Several traditional measurement systems focus on the viewing behaviour of all the individuals which are part of the panel group. In most of these systems, user-level monitoring requires a special effort of all panel members. Participants have to push a personal button in the beginning and in the end of each viewing session. In some cases each household member has to wear a special piece of hardware such as the Personal People Meter (PPM) which is able to perform audio based measurements but otherwise works quite similar compared to the fixed people meter. The accuracy of these traditional measurements is very dependent on the goodwill of the participants and therefore, several control mechanisms are used to keep panel members active. Despite this dependency, the profile data of each household member are very useful for advertisers in order to detect and reach their target groups.

On the contrary, the main advantages of logging viewing behaviour on household level instead of on an individual level are also quite obvious:

- The magnitude of the measurements can be (depending on the number of clients) a multiple of the panel based approach, therefore, resulting in more accurate measurement results as they are based on the monitoring of a whole population instead of assumptions based on a select panel;
- As no additional hardware is required, the deployment cost for household level measurements by the operator itself are negligible compared to traditional measurement systems;
- By deploying the logging service on the STB, it is more convenient to monitor recorded or time-shifted viewing behaviour. Note that some of the more advanced traditional measurement hardware nowadays can also monitor this type of viewing behaviour;
- An often not mentioned disadvantage of traditional measurement systems, is the lack of support for less popular television channels e.g. local or niche channels. However, with the STB approach, it is very easy to monitor every channel thus providing even more accurate results and reconnecting advertisers with broadcasters who are now left out of the audience measurement systems.
Despite the advantages of a set-top box approach, the lack of identification of individual viewer behaviour remains an important threshold. Preliminary results of a expert study showed that in order to be a valuable alternative to current audience measurement technologies, the set-top box approach should at least measure what is currently being measured. Therefore, our high level architecture was extended with a panel and a low involvement solution was found. A transparent monitoring solution is proposed based on the use of a webcam which is attached to the set-top box. When the set-top box is turned on, this webcam will start to take screenshots of the living room and send the stills to the set-top box. At the set-top box, face detection and face recognition algorithms are executed on the sampled pictures, thus deducing who is watching. These actions do not require any input from the user and therefore, the efficiency of the samples is in proportion with the high efficiency level of the algorithms. In order not to interfere with the privacy of the panel, only the results of the algorithms are send to the backend of the operator. This is shown in the figure where a blue STB represents a household that is a member of the panel group. Besides the information concerning which programs were tuned in to, this type of STB will now also send whether a male (m) or female (f) child (ch), teenager (t) or adult (a) were watching a specific show.

At the backend, extrapolation of this data can now take place. This can be achieved by combining the information from the large scale household-level monitoring operations, the small scale individual-level panel measurements and the information that the operator has gathered from its clients e.g. sociodemographic data, purchase behaviour, media usage, etc. This data should be requested during the installation process of the set-top box for all customers. Installing cameras in the homes of all clients would be a very invasive and expensive approach and would probably not stimulate any commercial successes. Using the methodology proposed in this paper, the information collected from the panel members can be mapped to the viewing behaviour of non-panel members. Due to the combination of data more accurate and more detailed results can be reported to broadcasters, advertisers, media agencies and other stakeholders of the audience measurement market.

4 CONCLUSION

Advanced innovations in broadcasting technologies have led to the rise of several new challenges and opportunities for all stakeholders. Commercial broadcasters e.g. suffered several losses in the advertising department. Despite these challenges, broadcasters are very hopeful to benefit from some of the opportunities for personalized and interactive communication offered by the new digital broadcasting techniques. Television has always been one of the best measurable mass media available but lately, the current audience research methodologies could not tackle the challenge of interactive digital television. In order to keep advertisers interested, it is imperative that the gap between the possibilities of iDTV and the research methodology used for audience ratings is closed. The solution possibly lies with telecom providers who are becoming more and more aware of their market power. The set-top-boxes they install at their clients’ premises, do not only decode the transmission system, they also log data on the viewing data. Instead of a traditional panel approach, telecom providers could log the data of all their clients offering a better statistical representativeness. This approach is also less expensive since no dedicated hardware needs to be installed. Despite these obvious advantages, this approach lacks a major input variable compared to traditional audience measurement. Telecom operators only receive information on set-top box level, not on individual viewer level as traditional people meters do. Our research focuses on scenarios in which the traditional panel approach can be combined with information derived from the detailed loggings of the set-top boxes. The match between the two data sources could provided all stakeholders with more detailed and representative data. One scenario in which face detection and face recognition algorithms based on webcam input was used, was discussed in this paper and will be, together with other similar scenario’s, extensively tested in the near future.

5 DIRECTIONS FOR FUTURE RESEARCH

In the near future, this and other similar scenarios will to be tested on their technical and commercial feasibility. Expert users such as advertisers, broadcasters and media agencies will be questioned using a qualitative approach, in order to investigate their experiences with the current audience measurement methodologies and their desires for audiometric data in the digital broadcasting market. Their attitude towards the selected scenario’s will also be important.

Next to the expert users, the developed scenarios will also be tested by residential users in order to get some insight in their willingness to participate in an audience measurements panels based on set-top box logs. Is logging all viewing data not to intrusive? As panel members, how active do they wish to be? What are their attitudes towards the webcam-based approach? What about privacy issues?
It is clear that this research project is only in an early stage and that several conditions need to be tested before a working model can be launched in the marketplace.

6 REFERENCES


