

Threats and opportunities for new audiovisual cultural heritage archive services: The Dutch case

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ABSTRACT

Purpose: The purpose of this paper is to analyze the business-to-consumer market for digital audiovisual archiving services. In doing so we identify drivers, threats, and opportunities for new services based on audiovisual archives in the cultural heritage domain. By analyzing the market we provide insights into the preconditions for provision of fruitful and viable services that can be build upon these archives.

Design/methodology/approach: The research method takes the form of a case study, including literature search and interviews. For this research we adopt the STOF-framework for analyzing purposes. This framework consists of four components: a service component, a technological component, an organizational component, and a financial component (STOF).

Findings: The authors argue an imbalance between the different factors of the STOF-model in the Netherlands. First, the service domain in the Dutch audiovisual archive domain shows little knowledge about (potential) users and their needs regarding the archive. The service domain is therefore probably the biggest question mark in this market. Second, the technical component presents few impedances and is therefore least of an issue. Third, the organization component in terms of value network presents issues revolving around the nature of the cultural institution. Non-profit cultural organizations like Sound & Vision in the Netherlands are not naturally inclined towards business modeling around development of services. Fourth and last, the financial domain shows severe bottlenecks for unlocking the content regarding intellectual property. The clearing of copyrights is one of the main tasks of Images for the Future, but engulfs much time in the primary process. In sum, the study shows promising and problematic issues that arise in the field of developing audiovisual archive services.

Research limitations/implications: This is a one-case study, so no cross analysis with other cases was possible. Future work includes the investigation of user needs regarding audiovisual cultural heritage and possible services upon the archives.

Originality/value: This is one of the first studies that look into the factors in a particular domain that influence the viability of services by using a business model framework. This paper, therefore, extends the utilization of this framework (STOF-model) as it used as a method for the evaluation of a market and provides market insights. Also, the application on the audiovisual cultural heritage domain is quite novel. For practitioners regarding the development of audiovisual archive services the paper presents fresh insights in the configuration of the different business components of the services.

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1. Introduction

Books and printed documents were for a long time considered as the cultural heritage artifacts that shaped a nation's culture. Television and radio was generally seen as mass media for entertainment purposes thus not having much cultural value. However, due to the existence of television and radio for more than 50 years audiovisual content has been seen as a vital component of a nation's historical cultural heritage (Oomen et al., 2009) in addition to its printed documents and other historical artifacts (Auffret and Bachimont, 1999). Increasingly, international television is recording historically significant moments, such as the Apollo moon landing, the assassination of John F. Kennedy, the fall of the Berlin Wall, and the 9/11 terrorist attacks on the Twin Towers. These iconic, moving scenes also increase within a national context. In the Netherlands, for instance, Big Brother and the glorification of the Dutch soccer team after they won the European cup in 1988 are now seen as landmarks in national television. Hence, the value of audiovisual heritage is progressively being acknowledged as an important asset of the cultural heritage of a country. This awareness forces governmental and cultural institutions to plan for the conservation and preservation of this material.

In addition to this awareness, it became clear that analog video material was decaying at a faster speed than anticipated in the 1990s. Moreover, new technology in the form of digital storage came available that pertains advantages. Digital storage, in contrast to analog, has the advantage that it can be easily be moved over networks, international standards already exists (Hooper-Greenhill, 1995) and became a much cheaper way to preserve audiovisual materials (Tanner and Deegan, 2003). Moreover, digital content is interoperable, searchable, and flexible (Oomen et al., 2009). Lastly, specific for the Dutch region, funding was available through the revenues from the production of gas in the Netherlands. This led subsequently to plans to preserve this material in order to conserve it for future generations (Teruggi, 2004). Hence, audiovisual archives are being built in addition to broadcast archives.

Over the past years, much technological work has been done to develop formats and standards (e.g., Chiariglione, 1995; Rakow et al., 1994) as well as metadata (e.g., Böhm and Rakow, 1994; Gabriel and Ribeiro, 2001; Wactlar and Christel, 2002) for archiving multimedia content. However, little (scientific) research in this field has been conducted regarding the development of consumer services upon these archives. The objective of this paper is to analyze the business-to-consumer market for digital audiovisual archiving services. In doing so we identify drivers, threats and opportunities for new services based on audiovisual archives in the cultural heritage domain. As access to most audiovisual archives is still minimal (Prelinger, 2007) it is vital to gain insights in the driving forces behind the unlocking these collections.

For this research we adopt the STOF-framework (Bouwman et al., 2008a) for analyzing purposes. The empirical application of this framework encompasses an explorative analytical description, rather than an explanation, of the dynamics in the audiovisual cultural heritage domain. The type of research that is applied is that of a single qualitative case study, as we offer an empirical enquiry in which a contemporary phenomenon is investigated within its real-life context where the boundaries between phenomenon and context are not clearly evident (Yin, 1994). For this study multiple sources of evidence are used (e.g., documents, archival records and interviews) where the unit of analysis is that of a holistic design pertaining a single unit of analysis aiming to study the global nature of the phenomenon.

The remainder of this paper is structured as follows. In the following section we outline the STOF-framework that encompasses theoretical propositions to guide the analysis of data. The next section will contain the results of the rendered theoretical framework on the Dutch audiovisual archive sector. The latter is elaborated in the penultimate section of this paper. We will conclude the analysis in this paper and look at future prospects.

2. Theoretical background

2.1. The STOF-framework

Because of the focus towards more market-driven service development of this traditionally non-profit sector, we propose to use the STOF-model framework, as services and services innovation are directly related to and dependent on innovations in business models. The business model concept in the STOF framework is defined as a blueprint of how a network of cooperating organizations can create and capture value from new innovative services. The model is successfully used regarding the development of business models for designing business models for mobile services (Haaker et al., 2006), for insurance intermediaries (Bouwman et al., 2005), for the describing of critical design issues for IPTV (Bouwman et al., 2008b) and in context-aware mobile services (De Reuver and Haaker, 2009).

Although it consists of other components, it covers the same areas as other business models (e.g., Osterwalder and Pigneur, 2002, 2009). The STOF-framework stresses four different domains or business model components to describe the underlying logic of business model designs, namely the service domain, the technology domain, the financial domain, and the organizational domain. The four elements of the STOF-model and their interwoven relationship are depicted in Fig. 1.

External drivers that influence the business model of a particular service consist of new technological possibilities, the changes in market demand and regulatory issues. Whereas the eventual constructed output ideally lead to network and customer value. The design of the four components that reside in the business model will be described in more detail below.

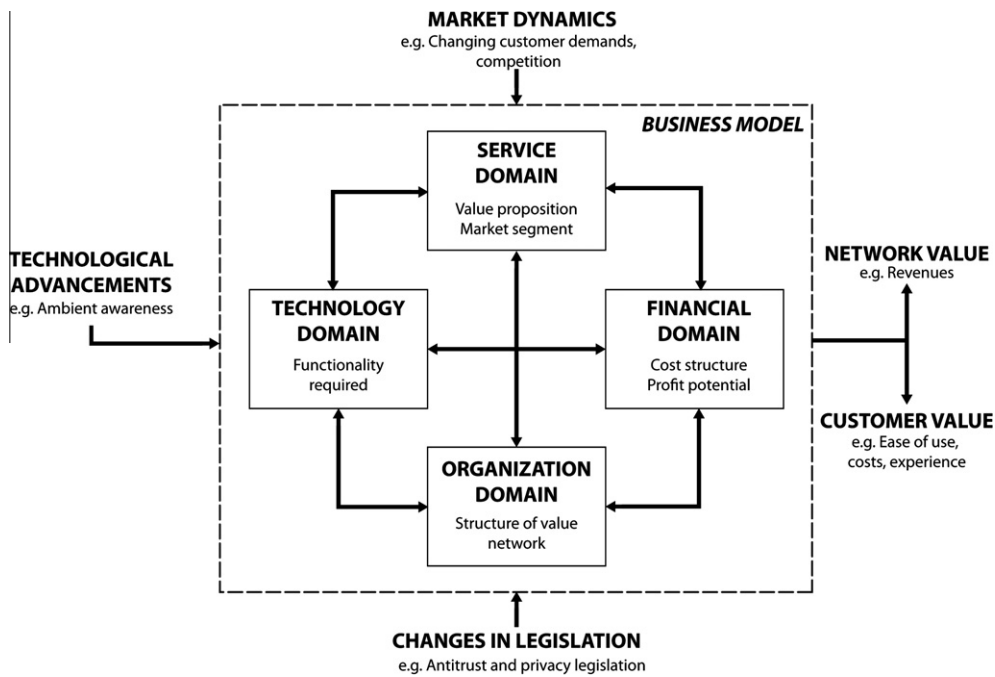


Fig. 1. The STOF-model framework.

2.2. Business model components

For each business model domain two questions are addressed: what it encompasses? and how it is analyzed or used in the case study? The latter describes the generic business model design issues that are to be studied.

2.2.1. Organization design issues

The organization design describes the value network that is needed to realize the particular service offering. A value network consists of actors with certain resources and capabilities, which interact and together perform value activities, to create value for customers and to realize their own strategies and goals.

For our purposes we adopt the steps of the Network Value Analysis (NVA) as proposed by Peppard and Rylander (2006) in order to analyze the ecosystem of the audiovisual cultural heritage domain. NVA aims to generate a comprehensive description of *where* value lies in a network and *how* value is created. The first step in such an analysis is to define the network objectives and identify the boundaries of the analysis that is performed. The network objectives are defined from the perspective of the network focal. Second step pertains to the identification of network actors, which influences the value propositions of the network focal towards the end-users. Third, the value dimensions of the different participants are mapped thus capturing the value of the different participants in regard to being part of the extended network. Fourth, the linkages between the stakeholders in the extended network identified. Last step consists of an analysis of the previous steps.

2.2.2. Service design issues

The service domain revolves around the creation of customer value. The provider of a new service intends to deliver added value to the customer through newly developed propositions. Value creation is critical when developing new services.

Analyzing the current audiovisual archive services' value creation elements we distinguish the intended value proposition and the customers' expected value. Prior research identified a gap between the value perceived by the marketer and the customer (Parasuraman et al., 1988). Different types of value can be created for customers. For instance, one service focuses on purely functional value (i.e., increasing performance), while other services focus on experiential utilization. Two additional generic types of value creation are symbolic/expressive value and cost/sacrifice value (Smith and Colgate, 2007). Closely related to value propositions is the concept of targeting. Targeting refers to the target group of a particular service.

2.2.3. Technical design issues

The technical domain is concerned with choices on two different levels, i.e., transportation and middle ware. With regard to the transportation of data, choices must be made about for which device the service must be implemented. Traditionally, television has fulfilled entertainment needs, but in the 1990s, the Internet emerged in this role. The latest trends also show

Table 1

Generic revenue models in the cultural heritage sector.

Type	Description
Original	Direct physical access to the collection, e.g., retail function (Lewis, 2001)
Digital original	Cultural heritage institution acts as an intermediary for third parties that want to use the collection for new services
Digital curator	Value proposition is increased by adding contextual data (metadata) to the collection
Digital brand	The collection provides an image and reputation. Related revenue models include advertising, friends-from-friends and crowd funding
Bundling	A mixture of the above revenue streams types (Bakos and Brynjolfsson, 1998)

an increase of mobile use to access communication and entertainment services (Gillebaard et al., 2010). However, the first window in audiovisual archive content remains, for the most part, television programming.

The middleware component is primarily concerned with the different applications that can be used to view the content. An application for viewing audiovisual archive content must support the playing of video in a specific format. Many file formats exist to accomplish this and, as stated in the beginning of this paper, much research is done on this level to preserve audiovisual content. However, the focus in this domain for this paper lies in the identification of content management systems (CMS) being used and the technical functionalities of these systems (e.g., the level of personalization).

2.2.4. Finance design issues

The design issues that arise in the financial domain are twofold. A major issue that is highly related to the digitization of audiovisual content is the cost that is incurred in the process of preserving this material. As stated in the problem description of this paper, audiovisual archive organizations are rapidly undertaking projects designed to conserve the audiovisual cultural heritage. To carry out these projects, large donations are needed. Traditionally, the costs are divided into fixed costs and variable costs, which add up to the total cost.

Revenue models of cultural heritage projects are usually based on the project's cultural benefits. However, digital heritage collections offer new forms of economic and social benefits (Anderson, 2006). The digitization of cultural heritage material can add to the value of this material for consumers. Table 1 distinguishes between generic revenue models (Niet et al., 2009). Earlier research has indicated that a mixture of revenue streams and channels seems to provide the best chance of success for diffusion (Chan-Olmsted and Ha, 2003).

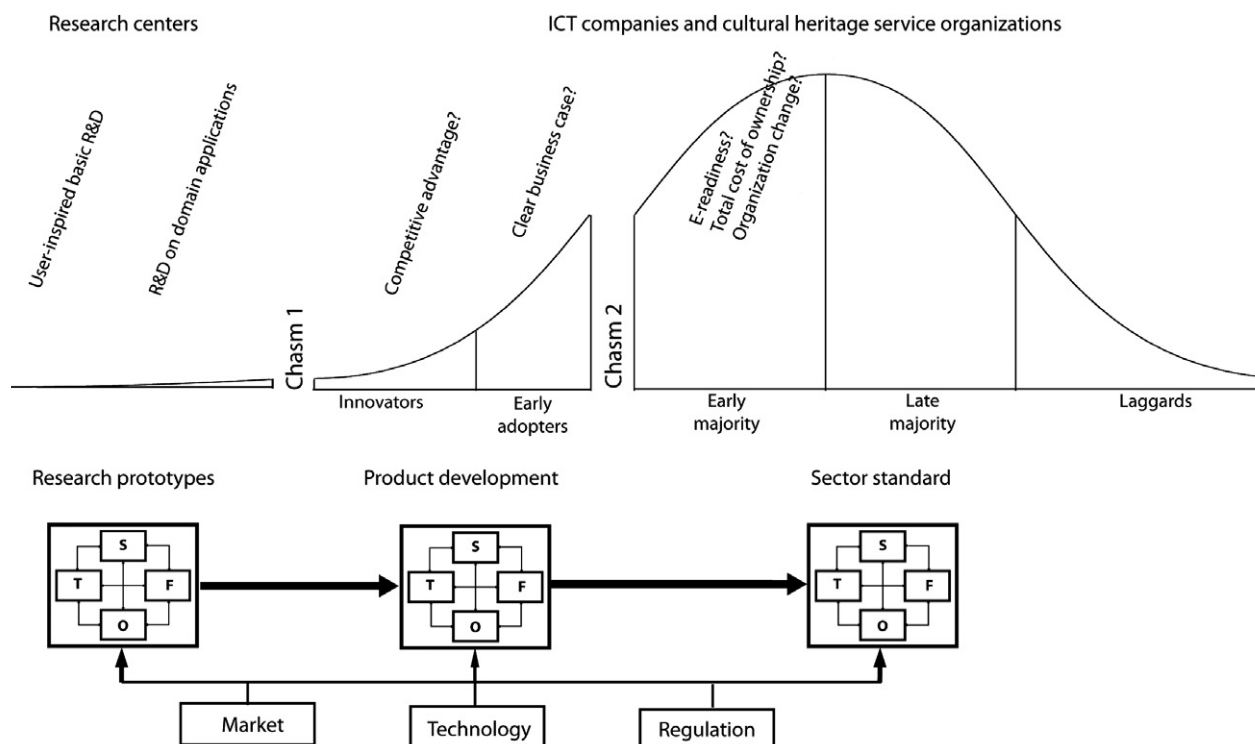


Fig. 2. Integrative dynamic business model framework (Bouwman et al., 2008a; Arnold and Geser, 2007).

2.3. A dynamic perspective

A business model can be characterized as dynamic rather than static. Likewise the development of new innovative services consists of multiple phases. Changes in the environment (e.g., technological, regulatory, market) require the business model to adapt over time. Prior research identified phases concerning the development of new services and business models (Bouwman et al., 2008a, p. 64). Although other designations, Arnold and Geser (2007) developed a technology maturity life cycle model covering similar areas. The model is shown in Fig. 2, which presents the stages of development of a service in the cultural heritage sector.

This model builds upon the diffusion of innovations model from Rogers (1995) but takes the different phases that a research and development (R&D) department goes through when developing a new service product into account. The diffusion of new technology traditionally begins with a pilot phase, wherein different prototypes are constructed. Innovative companies often adopt these prototypes to fill a niche in the market. When there is a clear and viable business case, larger companies create a *de facto* standard, after which diffusion takes place in the majority groups and then in the laggards.

Fig. 2 also displays two chasms, which are identified as thresholds in developing ICT services within cultural organizations. The first chasm involves the transfer of prototypes to early adaptations in the market. Within the field of cultural heritage the diffusion, of research prototypes is often impeded by the fact that (1) there are few organizations that convert applied-research into sustainable service solutions, (2) the cultural heritage market is not a competitor market, and there is therefore no need to seek competitive advantage, and (3) academic researchers have no incentives to support the further development of the services they recommend. The second chasm or threshold in developing services within the field of cultural heritage is the lack of adequate technical knowledge. Cultural organizations are mostly small or medium sized organizations that employ few technical experts; they are generally understaffed and have small budgets.

3. The case study: Sound & Vision

3.1. External drivers

3.1.1. Technological advancements

New technological developments influences service implementation in the (audiovisual) cultural heritage domain. These new technologies create opportunities for the development of new innovative solutions for unlocking the audiovisual archives to the public.

First, we address the increase of maturity of the infrastructure of the Internet. Triggered by convenience, cost reduction, ability to use broadband applications and to better perform current tasks (Vermaas, 2007) the diffusion of broadband Internet emerged from its innovators to the laggards. The growth in the number of households with broadband connections has subsequently fueled the growth of Internet (Gracy, 2007). Hence, from a demand perspective the deployment of the broadband infrastructure provoked an expansion of Internet usage. From the supplier side an initiative embarked from the notion to connect the different public broadcasters. This initiative called *De Digitale Verbinding* (The Digital Connection) aimed at a fiber optic network between the broadcast organizations in Hilversum. This network was completed in 2006 and enables the search and browse of material, the support of reuse of material, improved data handling, a more reliable broadcasting process and the material is ready for use for new media (e.g., the Internet).

Second, more on a presentation layer, web 2.0 applications emerge on the Internet. Web 2.0 is closely connected to interactivity. Web 2.0 creates opportunities for cultural heritage institutions as it can facilitate the interaction between users and such organizations. This new technology enables the support of adding tags, incorporation of comments and user ratings as audiovisual archives are craving for quality metadata (Hauttekeete et al., 2009). In contrast to these opportunities threats also exist regarding web 2.0 technology as YouTube, a typical web 2.0 application, is indicated more user-friendly, more reliable and has more intuitive metadata than the national audiovisual archive (McKee, 2011). The threat of substitutes (Porter, 2008) is therefore present concerning this domain of audiovisual collections. In summary, one can state that web 2.0 creates opportunities on the one hand, but enables substitutable services that can be seen as threats on the other hand.

Third technology shaping digital cultural heritage is the omnipresence of new media through the diffusion of mobile devices. In similar vein as these new devices support daily life online activities (e.g., search information, watching video clips) it also enables the accessibility to cultural events as well as the interaction in many ways with a wealth of cultural artifacts. In combination with global positioning systems the mobile device can be used, for instance, as an information aid for archeological visits (Cutrí et al., 2008). Mobile devices thus can create opportunities for cultural institution in many ways.

Fourth, the use of immersive virtual reality applications in museums is a recent trend. For over several years of increasing development virtual reality technologies have matured. Originating from military and scientific applications realm into more multidisciplinary areas (e.g., education, art, and entertainment), although still at the early stages of practical usage (Gaitarzes et al., 2001). A specific type of virtual reality, augmented reality, can be of special interest to cultural heritage organizations. Where virtual reality focuses on the replacement of real life, augmented reality aims to include modalities of the real environment thus pertain to a mixed reality. A number of projects are currently exploring a variety of applications in different domains including cultural heritage (Stricker et al., 2001; Choudary et al., 2009).



Fig. 3. Windows of audiovisual content.

3.1.2. Market demand

A major problem with audiovisual archives is that they suffer from what has been called the long tail problem. [Anderson's long tail model \(2006\)](#) can be projected on the consumption of archive content. According to his model, only a small amount of content (the head or thick tail) would be of interest to a large group of viewers, whereas more exclusive bits of the long tail would be far less popular. On-demand, one-on-one services, however, have excessively high overhead costs due to transcoding, storage, broadband, and legal fees. To provide the content free of cost, the government would have to finance an unlocking. An adequate number of viewers would be needed to justify such an investment. The most sound and efficient way to procure such a multitude of viewers would be to offer free access to content from the head of the tail. However, it is precisely that type of content that is profitable for the economy; the commercial activities of private actors could be undermined and deteriorate if this material were offered for free. For example, a 1960s youth series is recognized as a cultural heritage because it reflects the ethos of an era and the shared experiences of a generation. Nevertheless, this kind of content, situated in the head of the tail and thus high in demand, has proven to be wholly marketable. [Fig. 3](#) elucidates this model; the different windows are represented by particular kinds of television programs.

The first window includes live shows, e.g., sporting events (World Cup, 2010, Super Bowl, 2010). The second window, which is often referred to as video-on-demand (VoD), is available in many forms. For instance, YouTube contains many clips of shows that have been broadcasted, i.e., the performance of Susan Boyle in Britain's Got Talent. DVDs are also included in the second window, a format in which, for example, the series *Lost* is highly popular. Moreover, as time passes, audiovisual content becomes part of the nation's cultural heritage, e.g., the tragedy of the Munich Games in 1972 or Apollo moon landing of 1969.

3.1.3. Regulation

Culture institutions heavily depend on governmental support as conservation of the audiovisual material is in need of large donations to finance the process of digitization. European legislation offers market interventions for cultural heritage organizations, aided by the state ([Courtois et al., 2010](#)). In the Netherlands, a consortium called Sound & Vision (S&V), four other non-profit organizations and a think-tank, initiated a digitization project in 2007 called Images for the Future. Aiming to digitize 30–40% of approximately 700,000 h of video, 22,510 h of film and 2.9 m photos, it is estimated that, at the end of 2010, 55,000 h of video will be encoded and archived ([Gaarenstroom, 2009](#)). Emphasizing the potential societal, cultural and economic mostly intangible value of the digital content legitimated governmental funding for Images of the Future. Allegedly, it can also generate positive externalities through increased knowledge creation and better-educated people ([Verrips, 2006](#)). Dotation for this project originates from a fund financed by the earnings of natural gas in the Netherlands (Fonds Economische Structuurversterking). The new installed governmental body however decided that further acquired capital is for the exchequer. Precisely what the impact of this desiccation of funding will be for future projects remains to be seen.

3.2. Business model components

3.2.1. Organization domain

The process of preserving (digitization) and unlocking audiovisual content contains steps designed to preserve the integrity of the content. Most archives already have analog material ([Teruggi, 2004](#)), which can be digitized; however, archives

also produce new content. The first step is therefore identified as ‘producing’ the audiovisual digital content. This step includes the digitization of analog material as well as the formatting and editing that is needed to make sure the material meets preservation standards. The second step, which prepares the material for retrieval, is the packaging of the audiovisual media. The main activity in this step is the tagging of meta-information to the original data. This metadata is also essential for providing access to the audiovisual assets; metadata transforms the bits of video data into valuable information sources (Wactlar and Christel, 2002). These data (both the bits of video (assets) and the bits of metadata) have to be stored. Because storage is costly and somewhat complex, it makes up the third step in the process of bringing audiovisual content to consumers. When the content is stored, it can be aggregated and presented, which involves the assembling of different video assets into one service or product. The service or product then needs to be distributed. Finally, it is consumed in the last step of the value network process.

Now that the six steps in the process of the value network have been defined, the organizations that are involved in the activities described above are next identified. Broadcasting companies are often the most central actors within the supply chain of television and audiovisual preservation. The broadcasters schedule and plan programs into their timetables, after which they either begin producing a certain program, or they outsource this production to a production house. Moreover, production houses also produce programs, which they in turn sell to broadcasting companies. Several studio facilitators play a role in production as do right holders such as actors, directors, and composers. Technical facilitators, in collaboration with the broadcasters, are primarily responsible for the packaging process. In the Netherlands, however, the archiving and digitizing of the archived audiovisual material (usually from public broadcasters) is done by Sound & Vision, as was explained earlier. This institute is a central actor, and therefore the focal company, in the value network. In addition to digitizing the archive content, this organization also adds meta-information to the video data provides storage facilities to public service broadcasters and has responsibility for the audiovisual archive of the Netherlands. Commercial broadcasters, however, organize their own storage facilities and resources. S&V is experimenting with pilot methods of delivering the archive's content to different users. To accomplish this, they aggregate the content for distribution by different organizations, such as cable companies, Internet service providers or content distributors (hardcopy). Several target groups have been defined as potential consumers of the material in the S&V archive: broadcasters (public/commercial, in and outside the Netherlands), for-profit organizations (i.e., DVDs, CDs, internet, commercial screenings), non-profit organizations (i.e., museums, film festivals), education (i.e., primary, secondary, higher) and the general public (Oomen et al., 2009).

The value network of the audiovisual archive domain in the Netherlands describes the different stakeholders involved and the primary process. From the information in Fig. 4 we can draw the conclusion that there is only one party aggregating audiovisual content, which is in contrast to the model of Arnold and Geser (2007), which indicated that ICT organizations were part of the process of diffusing and unlocking the content. However, recent activities in the development of audiovisual services, in which collaboration between S&V and several Dutch universities has intensified, seem promising.

3.2.2. Service domain

Beginning with the development of a museum in 1996, a central national audiovisual archive was born. Over the last few years, several audiovisual services have been developed. The development of these services was leveraged when an R&D

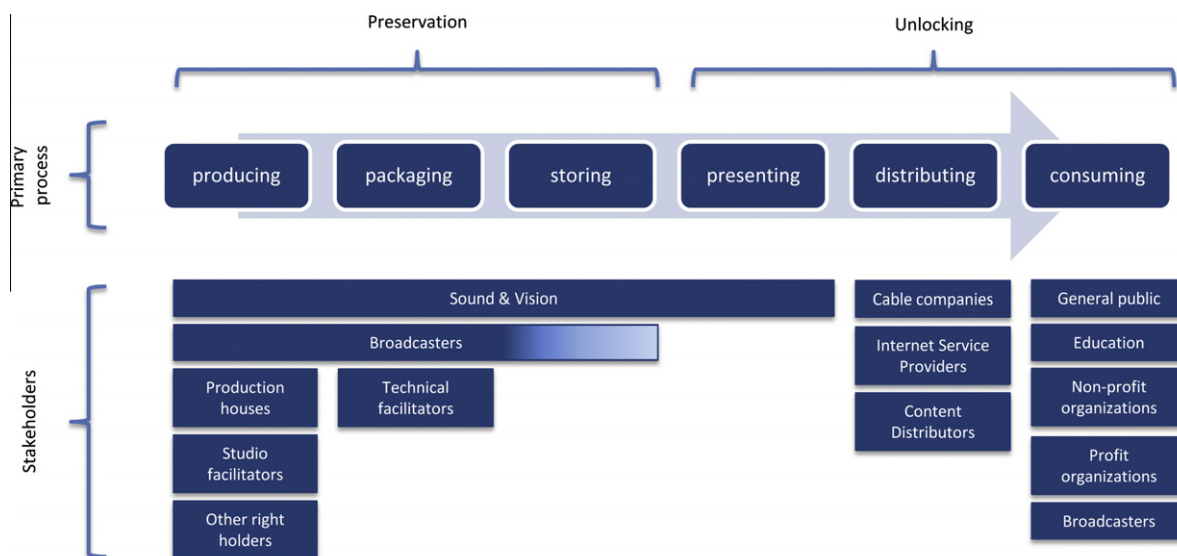


Fig. 4. Value network of the audiovisual cultural heritage archive.

Table 2
Audiovisual cultural archive services in the Netherlands.

Service	Intended value	Target group
Experience	On site access to an <i>a priori</i> selection of content from the audiovisual archive	General public, education
Search and order	Allows search of the database of S&V, with an on-demand service for ordering material	General public
Dutch Footage	A thematic ordering system of audiovisual content for film editing purposes	Professional sector (profit, non-profit, broadcasters)
Webshop	Online shop with preselected, categorized DVD content	General public
YouTube	Thematic online access to copyright free audiovisual content through an existing platform	General public
Brand Channel		
ED*IT	Remix tool with access to an educational database with video, film and sound clips related to Dutch cultural heritage	Education (elementary and high school)
Sound and Vision Wiki	Unlocks knowledge about the S&V collection, with a focus on films, radio and television programs that are being digitized within Images for the Future	General public
Filmotech	Offers access to Dutch films for consumers	General public
Open images	An open media platform that offers online access to audiovisual archive material to stimulate creative reuse based on the Creative Commons license model	General public
Waisda?	Video labeling game for adding descriptions to audiovisual content to enrich archival metadata	General public
Academia	Online collection dedicated to education and research in higher educational organizations	Higher education

department was established, and the archive began experimenting with pilot services. Table 2 shows the current services that are offered by Sound & Vision. The table indicates the service, the intended value proposition and the target group.

In general one can state that the above services that are targeted on the general public provides experiential or hedonic value (e.g., the *experience* and *Webshop*) as it yields emotional and epistemic experiences for consumers due to nostalgic feelings. However, several B2C services have been grafted for functional or instrumental value as it enriches S&V contents (i.e., *Waisda?* *Open images*, and *S&V Wiki*). This value however is reasoned from the organizations' perspective thus little argued from the end-users point of view. Lastly, the authors argue a lack of services that contemplate on symbolic or expressive value. Value propositions that reflect such value relates to concepts as self-identity, self-expression, and personal meaning. Focusing on branding of services can enhance the perceived.

The service components indicated promising results when seen in conjunction with the number of services and the anticipated target groups. Several services with a high accessibility factor are available for each group. However, the main challenge in this domain is the gap between the intended value and the perceived value. Although numerous experimental services have been developed, little research is available on the user side of these services. A vital aspect of service development is determining how to efficiently and effectively involve end users in the service design and collect information on their preferences, experiences and behavior (Steen et al., 2008).

3.2.3. Technical domain

Regarding the transport layer design of the services few impedances exist. The *De DigitaleVerbinding* consisting of a fiber optic network between the broadcasters provides the local loop connection. In addition the penetration of broadband connections in the Netherlands is rather high (Gillebaard et al., 2010) thus ensuring little threats for delivering high quality video services to end-users.

At the middleware and content layer one can state the following. The services use mainstream online software such as MediaWiki or YouTube. This increases their interoperability with users because browsers are adapting to these technologies, making them easily available. No additional software or hardware is therefore required to access the current audiovisual cultural heritage archive services of S&V.

Since the transport, middleware and content layer solutions have been well developed by many equipment providers and software companies the technical issues are less critical.

3.2.4. Finance domain

Each stakeholder performs value-adding activities in the primary process. However, every action in this process requires many hours of labor, which in turn require financial compensation. The Images for the Future project is of significant importance to S&V. This project enables the digitization of a large amount of their audiovisual archive. The budget of Images for the Future has been appraised at €173 m and is funded primarily by the Dutch Government (Ministry of Education, Culture and Science). Of this budget, €154 m originates from a fund financed by the earnings of natural gas in the Netherlands (FondsEconomischeStructuurversterking). Approximately €19 m has been reported to be derived from the market. When viewing the detailed breakdown of the budget, one can see that a large part of the budget of Images for the Future is allocated for S&V (69%). Table 3 provides a detailed monetary breakdown of the budget of S&V within this project.

We can see from the table that almost three-quarters of the total budget is reserved for the conservation, digitization and adding of metadata to the audiovisual content. These activities correspond to the preservation of audiovisual content step in the value chain. We can also see that that no significant budget has been allocated to the development of services to allow access to the digitized audiovisual content despite the fact that part of the funding has been derived from the market.

Table 3

Financial breakdown of Images for the Future's budget for S&V.

	2007	2008	2009	2010	2011	2012	2013	Total	%
Infrastructure	420	660	900	1140	1380	1620	1860	7981	6.7
Conservation, digitization, technical unlocking, metadata	10,053	11,939	12,567	12,567	12,567	13,195	15,080	87,968	73.8
Contextualization	2244	2665	2805	2805	2805	2945	3366	19,635	16.5
Copyright	414	492	518	518	518	544	621	3625	3.0
Total	13,132	15,755	16,790	17,030	17,270	18,304	20,928	119,209	100.0

Hence, one can state that the financial focus has been on preservation of the audiovisual material through donations from governmental institutions. However, subsidized services are only one method of providing access, and revenue models are another. Upon investigation of the payment models for the services mentioned in Table 2, we found that seven of the services require their users to pay a fee. However, several of the services (i.e., *Search and order*, *Dutch Footage*, *Webshop*) are priced according to the production of the DVD, thus leaving little space to increase the return on the investment. Additionally, the educational services (i.e., *ED*IT*, *Academia*) use a licensing model wherein payments are made on a per user basis. The other services, which serve the general public, are free (i.e., *YouTube Brand Channel*, *Open images*, *Sound and Vision Wiki*, *Waisda?*). However, two comments have to be made regarding these services. First, two of these services serve not only the general public but also have added value for the contextual data of the audiovisual content. The *S&V wiki*'s purpose is to enrich the knowledge about the S&V collection. *Waisda?* has a similar purpose; through a video labeling game, the metadata of the content in the archive can be enriched by the users. Second, a different department within S&V, namely, the R&D department, developed these services.

Applying the five possible revenue models of Niet et al. (2009) to the services of S&V shows that all of the services allow direct physical access to the collection. This means that all of the services correspond to the 'original' type (Table 1). This is felicitous for educational services and for the general public.

Financially speaking, it is promising to see the subsidies that have been invested to preserve the national audiovisual heritage. However, this situation is a result of the high cost of digitization, which has created a lack of market interest in the digitization of audiovisual material. These interferences can be overcome, however, if cultural organizations begin to investigate suitable revenue models.

4. Conclusions and outlook on future work

This exploratory research on the services that are currently being developed to allow access to audiovisual archives shows the impact of design issues. Applying the components of a generic business model to the Dutch audiovisual archives provides new perspectives on these design issues. The authors argue an imbalance between the different factors of the STOF-model regarding the audiovisual cultural heritage archive domain in the Netherlands thus revealing gaps in the development of services for audiovisual archives.

Technical opportunities are numerous and although not always present in current services the research and development department of Sound & Vision is exploring these possibilities for future services. These possibilities include the use of personalization through web 2.0 technology and mobile augmented reality. In sum, we can conclude that the technical component presents few impediments and is therefore least of an issue.

With regard to the service domain one can state that cultural heritage institutions associated with these archives are focused on preserving their content and are thus concerned with the back end of the value network. There is limited attention given to the presentation of the audiovisual content. Hence, little knowledge is available about the end steps in this network and as a result, little is known about the needs of the users of this content. Current services are implemented from a technical perspective (top-down) rather than from a user perspective (bottom-up). The service domain is therefore probably the biggest question mark in this market.

The organization component in terms of value network presents issues revolving around the nature of the cultural institution. Cultural organizations are non-profit organizations as is Sound & Vision in the Netherlands. Employees within these institutions are not naturally inclined towards business modeling around development of services. The culture within these organizations can therefore be seen as a hindrance in the development of viable audiovisual archive services.

The financial domain shows severe bottlenecks for unlocking the content regarding intellectual property. The clearing of copyrights is one of the main tasks of Images for the Future, but engulfs much time in the primary process. Although business modeling is mostly concerned with monetary issues, the audiovisual material in the cultural heritage service is mainly characterized by its cultural value, and its deployment is primarily based on this fact. Within cultural organizations, the economic value of the cultural materials is usually enshrouded or ignored. In line with previous comments regarding user research, users' willingness to pay, payment conditions and payment methods should be investigated to develop sustainable services for the future.

For practitioners, the results provide indications as to which design issues they should address especially in constructing audiovisual cultural heritage services and the increase the viability of the business models. It is expected that the results to support practitioners focus and streamline ongoing attempts to define business models for new services based on the audiovisual cultural heritage archive.

Theoretical implications pertain to the use of our approach, the STOF-model. Using the STOF-model as a theoretical framework and reverse engineering tool proved the usefulness of the framework. The STOF-model described in the theoretical background of this paper provides a suitable framework for identifying research gaps and giving an overview of the current state of ICT services in a particular domain (in our case, the audiovisual archive domain). Moreover, it provides relevant insights for practitioners developing ICT services.

As in any case study, the results presented in this paper should be interpreted with care, as they are based on documents and direct observations and are not meant to be applicable to large populations. However, considering the use of multiple sources of evidence and the fact that the adopted approach is established in literature, we expect that the results provide useful insights.

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