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Abstract

This thesis provides an overview of key factors involved in the successful research, development, and implementation of an interactive approach to mass broadcasting in the form of television on mobile devices.

A conceptually grounded foundation is presented as the basis for a multi-purpose solution allowing for variations in practical application based on alternative contexts; this will maximize the likelihood of successful execution as the service based product evolves to commercialization. This thesis, therefore, comprehensively investigates the product development process dimensions, as well as several inherently synergistic applications in a broad variety of industries. In order to accomplish this effectively, theoretical frameworks from different functional business areas, especially marketing and information system management are integrated.

A focal point from the perspective of marketing discipline is the investigation of the business potential of such an innovative concept as well as the market research required in order to successfully define and place such a service or product. As another key point of interest, the potential product value chain is analyzed for both B2B as well as B2C models.

Within the resulting constraints and boundaries, the managerial and technical considerations for such a large-scale implementation in the domain of Information Technology are worked out and described in detail. Specific emphasis is given on the choice of project management methodology and the corresponding impact on the actual product or service development.

1. Introduction and Motivation

Conventional television and all associated technologies have been an essential and increasingly important part of life throughout first and second world countries in the last century. Society has not only been influenced but also deeply affected in its behaviour by mass media broadcasting. The sheer endless possibilities to advertise, the opportunities to sell goods or services, and to offer content of all kinds to television viewers in general have without doubt revolutionized a multitude of different markets. However, the conventional way of delivering television has proven ineffective whenever it comes to demand for an immediate response from the audience in relation to the ongoing events or plot on the screen.

Therefore, despite the original sole intention of allowing for public distribution of information exclusively in a unidirectional manner from sender to receiver, there have already been multiple attempts of little to no success aiming to enable television viewers to respond to the incoming information while consuming it, i.e. to transform the process of TV consumption from a unidirectional into a bidirectional process.

The author considers it imperative to closely examine these attempts in their respective social, cultural and technical context and to understand why some of them have failed so epically in order to be able to conceive a concept for the creation of effective feedback channels. Consequently, the necessity for a more holistic and most likely also more generic approach to the entire topic of interactive broadcasting and its applications is one of the main topics handled in this thesis.

As broadcasters have an interest in asking for feedback from viewers while they are watching content they must find not only the means in terms of technology to do so, but also investigate new and innovative concepts for presenting and offering content to their viewers. Such a strategy must also include considerations regarding the variety and multitude of different devices used for watching television these days.

To make this research an applicable piece of work, an analysis of currently existing products in the area of interactive television services providing the background information required to form an educated opinion on state-of-the-art technology is performed. This background research also serves as a springboard into an evaluation of the potential innovation factor associated with the solutions for feedback-enabled television services proposed in this thesis.

As far as the actual implementation of the proposed solutions is concerned, the author intends to give an insight into a modern, flexible, mostly agile software product development lifecycle with its inherent up- and downsides and to compare it with a traditional and more sequentially oriented development process.

The technical considerations include a comparison of different mobile devices and their fitness for purpose in different application scenarios as well as an overview of the problems to be solved in connection with controlling interactive content in a large-scale distribution network followed by a number of feasible solutions using the concept of cloud-like provisioning, also known as Software as a Service (SaaS).

In short, the author intends to sketch the concept, evaluate the market potential and subsequently design a development and go-to-market strategy that can be applied to an interactive, i.e. bidirectional broadcasting service for TV content.

2. Introduction to interactive Broadcasting

Definition of broadcasting

In the context of this thesis, broadcasting is defined as the electronic dissemination of (mostly digital) video material suitable for display on television (TV) sets through appropriate channels. Appropriate channels may vary based on local infrastructure availabilities, but usually include Over-The-Air (OTA) signals, cable networks and IP-TV connections.

The main characteristic of an interactive broadcasting service is to provide the audience with a convenient and intuitive way to interact with the programme. Summarized in a more generic statement, the aim is to technically provide the broadcaster with the means to prompt the viewer at the receiving end for input, and a visual interface and feedback channel that allows the user to respond accordingly. The more generic understanding is preferable, as it does not limit the application of the concept solely to a context of television and entertainment.

In such a generic scenario, the viewer will be presented with a graphical user interface containing one or more selectable options. The viewer provides his input by operating the user interface and the corresponding information is sent to the broadcasting party where it may simply be stored for further offline processing or analysis at a later point in time, or, depending on the nature of the actual application, may immediately be processed and trigger a response which may change the viewer's content or the viewing experience as a whole. It is also conceivable that the viewer's input based on a video feed could be used to control or steer remote processes hosted by the broadcaster.

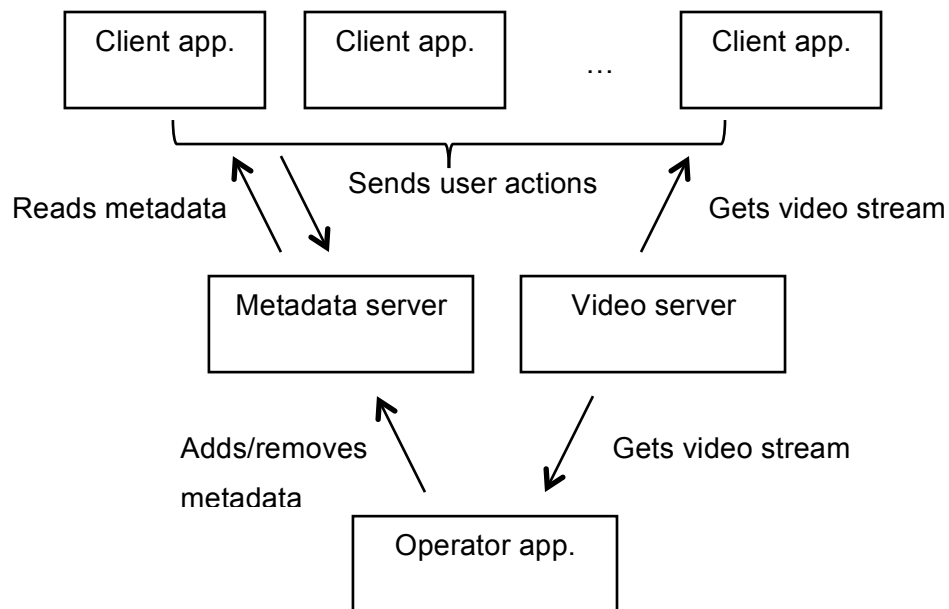


Figure 1: Basic information flow¹

So in general, interactive broadcasting can be described as a control-driven exchange of information between sender and receiver. The following diagram illustrates the basic information flow in a generic context.

¹ Own illustration

3. Product development

The product development process applied on this specific application or service follows a comprehensive five-stage approach adopted from Townsend (2013a) and is structured in the following way:

1. First, the market opportunity for the product is evaluated based on the analysis of existing solutions and their respective shortcomings (see section 3.1).
2. In a second step, the concept of the application or service in question is defined with respect to technical as well as the functional requirements and features to be implemented (see section 3.2).
3. The third stage evaluates the project, and respectively the product as a whole in the context of its competitive environment (see section 0).
4. Stage four deals with the details of the physical development process, e.g. prototyping and the aspects involved in the evaluation and the decision making process around technologies used (see section 3.3.3).
5. The fifth and final stage covers positioning of the final product and describes a market launch plan (see section 0).

Figure below summarized and graphically illustrates the process described above:

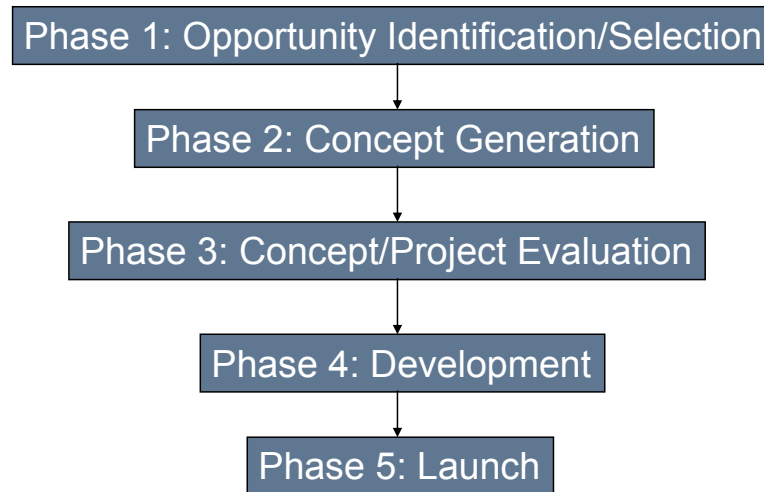


Figure 2: Product development process²

3.1. The market gap

Based on the analysis performed in section 3.1.1, the author has concluded that there is currently no available solution that directly combines receiving and sending channels to a degree which allows for any significant user interaction on a single device. Although there are plans and concepts to produce content supporting such a set of new features (see BBC, 2012), none of the analysed solutions were capable of merging the possibilities of a second screen device into the primary delivery channel. Based on the concept lined out in section 3, the unique selling proposition is defined in the subsections below.

² Adopted from Cooper et al., 1993

3.1.1. Currently available applications

This section provides an overview of currently existing solutions in the field of interactive TV as well as a critical acclaim of their shortcomings compared to the solution proposed by the author.

3.1.1.1. CloudTV

CloudTV is an interactive service provided by a Silicon Valley based company called ActiveVideo. The primary goal of CloudTV is to leverage the large existing network of primarily out-dated and non-upgradable PayTV set top boxes with a new way of content supply. In order not to create any dependency on the hardware capabilities and properties of the myriad of available devices, CloudTV streams the full content - including the user GUI- from the cloud, thus enabling high flexibility for the content provider whilst maintaining a maximum of reach and low entry barriers through the utilization of existing set-top boxes (see ACG Research, 2013).

3.1.1.1.1. Review

While CloudTV is a good example on how to leverage device-independent applications, user interaction is limited to the graphical user interface provided by the set-top box, e.g. for selecting content or adjusting settings. In contrast to the solution proposed by the author, CloudTV does not provide interactivity *within / with* the content itself.

3.1.1.2. T-commerce

T-Commerce is a solution that mainly targets the advertisement industry. It offers goods and services in advertisements with the possibility of immediate purchase through the touch of a button on the remote control. Thus, T-commerce can be understood as an extended and enhanced form of traditional teleshopping programs (see tvclever.com, 2013).

3.1.1.2.1. Review

T-commerce covers only a small area of the overall capabilities of an interactive broadcasting system. Despite the prompt for a purchase decision and an option for the viewer to confirm there is no significant interaction between audience and content. Although the idea of a single-click purchase is well known to be effective in triggering adhoc decisions in customers, the business model around T-commerce simply is not directly competing. For this reason T-commerce is not classified as a serious competitor. Furthermore, the solution proposed by the author could easily be configured to support the exact same scenarios for one-click shopping should the market demand it.

3.1.1.3. BBC Red Button

Under a label of “Enhanced TV”, British BBC has been experimenting with early forms of screen interactivity since 1999. Functionality included, among others, the possibility to switch cameras so that the content could be viewed from a different angle and perspective, or display player profiles, or answer trivia questions during the 1999 Wimbledon Championships. However, despite public availability of this service, there were no set-top boxes available supporting interactive features at the time and even the BBC were using prototype devices during their demonstrations (see BBC, 2000).

Later, the concept evolved into a more serious implementation and offered a variety of interactive features including extra information text, on-demand video or quiz shows. However, availability is limited to delivery channels capable of submitting a return signal (i.e. digital cable customers were the only customers to have full access to all features, satellite dish users or users of free view technologies dependant on publically available analogue broadcasting signals were not supported).

Future plans for the Red Button brand include second screen interaction as well as direct interaction for watching content on mobile phones or tablets, but is not meant

to fully deprecate interactivity on classic TV sets. Figure 3 illustrates the three use cases lined out by the BBC.



Figure 3: "What a future connected Red Button service might look like"³

3.1.1.3.1. Review

BBC Red Button is probably the most advanced competitor currently on the market. Integration of interactive elements in tablet and phone broadcasts as well as connected second screen concepts are already in development and therefore appear as a direct threat to the market success of the concept proposed by the author. However, since the BBC has been focusing on development of this particular product only with regards to their own programme and audience, it can be argued that a more generic approach proposed by the author which can be applied to

³ BBC, 2012

scenarios outside the BBC portfolio would be more adaptable and therefore superior.

3.1.1.4. MSN TV

The original solution under the name of WebTV consisted of a web-based service as well as a thin client running on the viewers set-top box for bringing internet content to a TV screen (see Figure 4 below).



Figure 4: MSN-TV set-top box and input devices⁴

It allowed for more or less primitive access to a web browser through a TV device. The company was ultimately acquired by Microsoft in 1997, rebranded to WebTV and served as a basis for developing TV-based entertainment systems such as the first generation X-Box. The service has been unavailable from September 30, 2013 and finally shut down for good on January 15, 2014 (see Venturebeat.com, 2013).

⁴ Venturebeat.com, 2013

3.1.1.4.1. Review

MSN TV is conceived as one of the pioneers in bringing web content to TV sets. Therefore (and due to its shutdown), it is not a competing concept but rather a historically proven proof of concept, due to MSNs failure in making the necessary adjustments in technology to survive the introduction of Smart TVs and second screen offerings by their competitors.

3.1.1.5. Philips Net TV

Philips Net TV aims at replacing second screens and computers by integrating web functionality into a TV set. Net TV enabled Philips devices provide access to popular services such as Facebook, YouTube and twitter as well as on-demand broadcasting services (see Philips.at, 2013).

3.1.1.5.1. Review

Philips Net TV is an evolution of the Smart TV concept in which the application range of the TV set is extended through the integration of Internet services. However, in most cases, usability suffers due to a lack of computing power, as a TV set simply does not contain the required hardware, and/or inadequate input devices. Furthermore, the concept is limited to Philips' own devices and thus not capable of providing the market reach required for a broadcaster to supply their own content.

Although most other TV manufacturers offer similar features, customer acceptance does not appear to be overwhelming. An analysis published by the Chinese technology corporation confirms that *"The current fragmented nature of the Smart TV landscape is creating a barrier to investment in connected TV apps. Developers argue that to customise apps for each platform is costly and time consuming – with an app needing to be submitted to each manufacturer for separate agreements - while research has shown that one of the issues slowing customer acceptance of Smart TV services is confusing user interfaces."* (see Coolech, 2013)

3.1.1.6. Brightline.tv

Brightline.tv is a provider that offers interactive TV advertisement. It uses Internet-connected TV sets (Smart TVs) and sophisticated set top boxes such as Microsoft's xbox 360 as well as Sony's Playstation 3 / 4 for displaying interactive advertisement content featuring trivia games or other types of user interaction opportunities linked with a strong analytic engine for customer profiling. The ultimate goal is to provide targeted advertisement with a maximum of audience attention. The content displayed by Brightline completely replaces the underlying content (see brightline.tv, 2014).

3.1.1.6.1. Review

Brightline is a company focused purely on advertisement. It does not cater any of the needs currently addressed by substitutes such as second screen offerings. Thus, Brightline is not to be considered a direct competitor for the concept developed by the author.

3.1.1.7. Summary

#	Solution	Advantages	Gaps
1	Cloud-TV	Device independent Leverages existing network of set-top-boxes	Provides just a GUI for content selection No interaction with content itself
2	T-commerce	Easy to use	Purchase-system only No integration in TV content other than commercials Very limited functionality

#	Solution	Advantages	Gaps
3	BBC Red Button	<p>Most advanced competitor</p> <p>Long history of interactive technology with continuous enhancements</p>	Limited to BBC content only
4	MSN-TV	<p>Pioneer in the area of IP-based broadcasting</p> <p>Historical proof of concept</p>	<p>Shutdown in January 2014</p> <p>Hardware requirements</p>
5	Philips Net TV	<p>Wide range of functionality and flexible extensions through app-based platform</p>	<p>Limited to Philips devices</p> <p>No direct interaction with broadcaster content</p>
6	Brightline.tv	<p>Advertisement driven concept with strong USP</p>	No interaction with TV content

Table : Summary overview over existing interactive TV offerings

3.1.2. Identified gaps and opportunities

Based on the analysis of the existing competitive environment in the field of interactive broadcasting, there is a set of specific needs and features which are not addressed by any of these currently available solutions. These market gaps are described below and will serve as the foundation for the remainder of the product development process.

3.1.2.1. Uninterrupted content consumption

The possibility of displaying interactive elements dynamically as an overlay on top of the actual TV content while it is being consumed allows the customer to interact without having to remove his or her focus from the content itself (as it would e.g. be required on a single screen where the content has to be minimized to pull up a browser or some other type of secondary application). This provides a clear advantage in terms of usability, as well as add-on content integration. Blue-screen technologies can be used to enhance the experience even further by tightly integrating the dynamic content appearing on the user's screen with elements displayed in the background of a live TV show.

3.1.2.1. Virtually unrestricted return-channel functionality

The format and content of screen overlays is virtually unlimited and can also be displayed on demand, e.g. by tapping on certain content sections like faces or items. Again, blue-screen technologies for displaying a digitally produced and well-designed, sophisticated graphical background during live streaming further enhances the user experience. The overlay might even be completely transparent, thus not visible to the user, but only provide a set of screen geometrics to the user's device, so that the user's gestures on the device would only trigger the transmission of screen coordinates.

Given the connectivity of tablet computers and related devices nowadays, the boundaries between computers and tablets have already blurred significantly, e.g. in terms of bandwidth, display quality, computing power etc. Applying this power to the

TV market, where end-user signal processing is still limited to a minimum and some modern devices still struggle with fluent and performant web browsing opens up a myriad of possibilities for user interaction.

3.1.2.2. Integration into a single device

Due to the innovative approach of using a virtual overlay on top of consumed content that the user can interact with, both delivery and return channel can be integrated into a single device. The technology proposed by the author is considered to have the same flexibility and capability as a second screen (see section 3.1.2.1), but without the disadvantage of requiring a separate device.

3.1.2.3. Summary

#	Identified Gap	Description
1	Uninterrupted content consumption	None of the existing solutions provides a truly uninterrupted content experience, as interactive elements are not seamlessly integrated into the content itself. Virtual overlay technology can close this gap and thus enhance the viewing experience of the TV audience.
2	Virtually unrestricted return-channel functionality	Existing solutions limited due to the computational capabilities of TV sets. Using smartphones and tablets as end user devices lifts this computational barrier and enables a much wider range of application.
3	Integration into a single device	In contrast to second screen solutions, an integrated interactive overlay solution does not require a secondary device that draws attention from actual content.

3.2. Specification phase

For developing the concept and detailed specifications, an approach proposed by Ulrich and Expunger (2003) has been adopted. Starting from a mission statement, i.e. the basic idea as outlined in section 1, currently unsatisfied customer needs are identified (see section 3.1.2). Based on these needs, a product concept is developed, challenged, refined and subsequently deemed to be fit for testing (see section 0). Figure 5 below illustrates the concept development process.

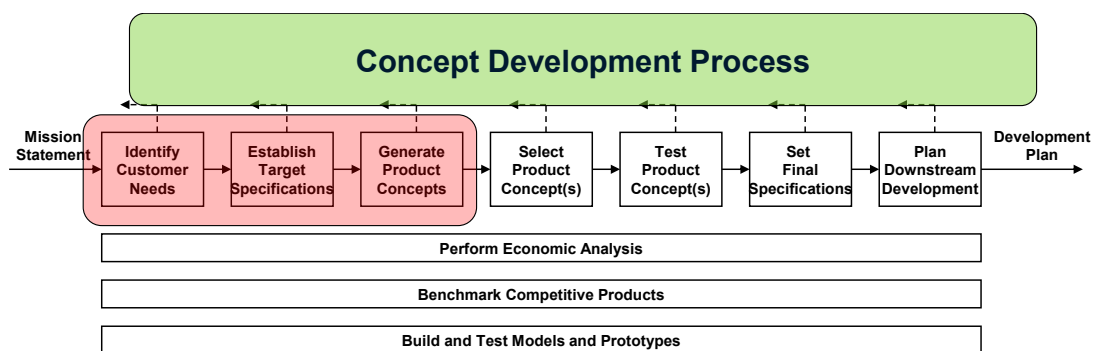


Figure 5: Concept development process⁵

3.2.1. Use case identification

3.2.1.1. Game shows

The intuitively most self-evident use case for audience interactivity in TV broadcasting is game shows in general and quiz shows, e.g. “Who wants to be a Millionaire” in particular. Even without a return channel, this type of show lives from audience participation, i.e. the primary entertainment component of this particular format for the audience solely lies in trying to answer all the questions themselves. The empathic relation to the random (and usually not particularly entertaining)

⁵ Ulrich and Eppinger, 2003

contestant in the show is rather loose and thus his personal performance only important as a benchmark.⁶

3.2.1.2. News broadcasting

News programs are usually very limited in their broadcasting time and have to condense their content to the very essence. This is also an essential part of the core operating model of news broadcasting: providing a maximum of information in a minimum of time. Therefore one aspect that is not addressed by TV news broadcasts is the diversity of interests in their audience. Topics are aggregated and ranked based on their subjective importance. Some events may get more air time than others because they are deemed to be more important by editorial staff. However, this judgment must not (and will not) correspond to the preferences of the entire audience. Some may wish to have additional background information or more in-depth research on topics that are covered only in brief.

The most obvious approach to solving this conflict of interest would be to offer supplementary material on the network's website and have the anchorperson actively refer to it whenever applicable. By applying the technological approach proposed by the author, this can be solved far more efficiently by simply tapping a "get more information" button or banner on the screen during e.g. a newsflash broadcast which triggers one or more of the following actions performed in the background:

- The relevant website of the network opens and is ready when the broadcast is over

⁶ This does not hold for the rare cases of participants with particularly appealing properties or otherwise entertaining treats or for rare cases of extraordinary performance (e.g. when a contestant reaches the final million dollar question on Who Wants to be a Millionaire).

- A download of source documents is started (e.g. a government report or proposed law draft mentioned in the broadcast)
- Additional offline TV content on the subject in question will be streamed to the user's device instantly
- The user is offered to be reminded of a TV program on this particular subject to be aired at a later point in time

3.2.1.3. (Political) debates

Political debates nowadays already heavily rely on second screen technology. Questions are accepted and brought to the show from twitter or Facebook and comments from these channels are being evaluated in order to determine a winner out of the confrontation.

With an integrated feedback channel, this (already field tested) concept can be brought to a whole new level by introducing e.g.

- Talk about what is of interested and relevant to the audience through live polls on a set or subset of potential next questions to be brought up – simply by tapping the screen. This can also help eliminate the constant accusations of hosts protecting / attacking one of the participants in particular as the audience governs the sequence and content of questions.
- Introduce a scoring or grading scheme and let the audience give away points or stars on each questions answer. Political confrontations are anyway being marketed like boxing fights and should be evaluated the same way.
- Maintain and monitor audience attention and level of participation based on their voting and interaction behavior.
- Create statistics based on audience demographics, if not for publishing them these can still be used for marketing purposes.
- Become independent from twitter and Facebook.

3.2.1.4. Education

Increasing demand in online education has also brought an increasing demand in teaching quality. Major universities have begun streaming their lectures in order to relieve the ever-growing demand for additional facilities or simply for marketing purposes.

Particularly for classes that are solely offered online, evaluation has become a highly controversial topic as some students may just turn on the broadcast and not even attend the lecture or get illicit support on exams.

By integrating feedback functionality directly into the broadcast, the traditional teacher /student conversation known from the classroom can be transferred to the digital space. Questions can be posed by teachers and answered by students directly from their device, thus confirming attendance and attention. Combined with an evaluation that takes into account participation (i.e. the answers to in-class questions), many of the drawbacks of online classes can be solved in one go.

As funding will not always allow for highly sophisticated TV studio equipment, a “low budget” version on the production side should be conceptualized and offered to educational institutions. While the technical concept remains the same, the live stream from a classroom does not need to be as high quality as a professionally produced TV show which saves money on both physical equipment as well as network bandwidth.

3.2.1.5. Sports

Interactive overlays have the potential to replace teletext information for requesting relevant side information without having to wait for the broadcaster to display it as part of the programme. With the touch of a button, viewers can access information and material, which is, displayed as semi-transparent overlays and offers significantly more comfort and versatility than the teletext protocol. Relevant info may include but is not limited to e.g.

- Current standings
- Starting order (e.g. for alpine skiing)
- Personal profiles of athletes
- Overall championship rankings updated in real time

3.2.1.1. Content-related advertising

Interactive advertising has the potential to become a specifically attractive new feature to the tourism industry. Cooperations with networks like Discovery channel create an opportunity for travel agencies to advertise trips directly as overlays on top of highly effective promotional material: documentaries filmed by professionals.

Particularly the rapidly growing industry of adventure travel is a very promising market for advertisement slots in a variety of documentaries and related shows such as survival shows (e.g. Discovery Channel's *Man vs. Wild*)

Documentaries often try to catch the audience with monumental and particularly atmospheric images and sequences; a pattern equally found (even if by far more condensed and shortened) in travel advertisement. Both concepts aim at triggering the same emotions in the audience – only a documentary has a head start through substantially more air time, thus providing a perfect base layer for placing travel advertisements in a very unobtrusive, yet effective way.

3.2.1.2. Benefits for the broadcaster

Knowing, how the audience reacts to and is interested in different topics enables completely new strategies for broadcast design and advertisement. Not only can the audience be profiled for their interests (and non interests), but also different formats and forms of content can be benchmarked based on the degree of audience interest. This is a potential solution for solving one major unknown in estimating the effectiveness and value of TV advertising slots: the question whether a user is actively watching or just passively consuming next to some other activities, sleeping or even has the TV switched on without anybody in the room.

3.2.1.3. Shopping

Besides enhancing the TV viewing experience there are other fields that can profit from the same type of technology. Supermarkets for example, can use tablets for interactive, guided customer routing. Support staff may give additional information about products or help with orientation. If there is no support call, the shopping-cart mounted tablet computer is used for displaying customized advertisements.

3.2.2. Device support

In order to achieve maximum reach, the service must support a substantial fraction of currently available devices (given their basic functional and technical suitability).

Tablet market shares over time as illustrated in Figure 6 clearly show that the market leader Apple is getting under increasing pressure from competitors, but is still the most dominant player in the market. This means, that iPad compatibility should be top priority in terms of device support.

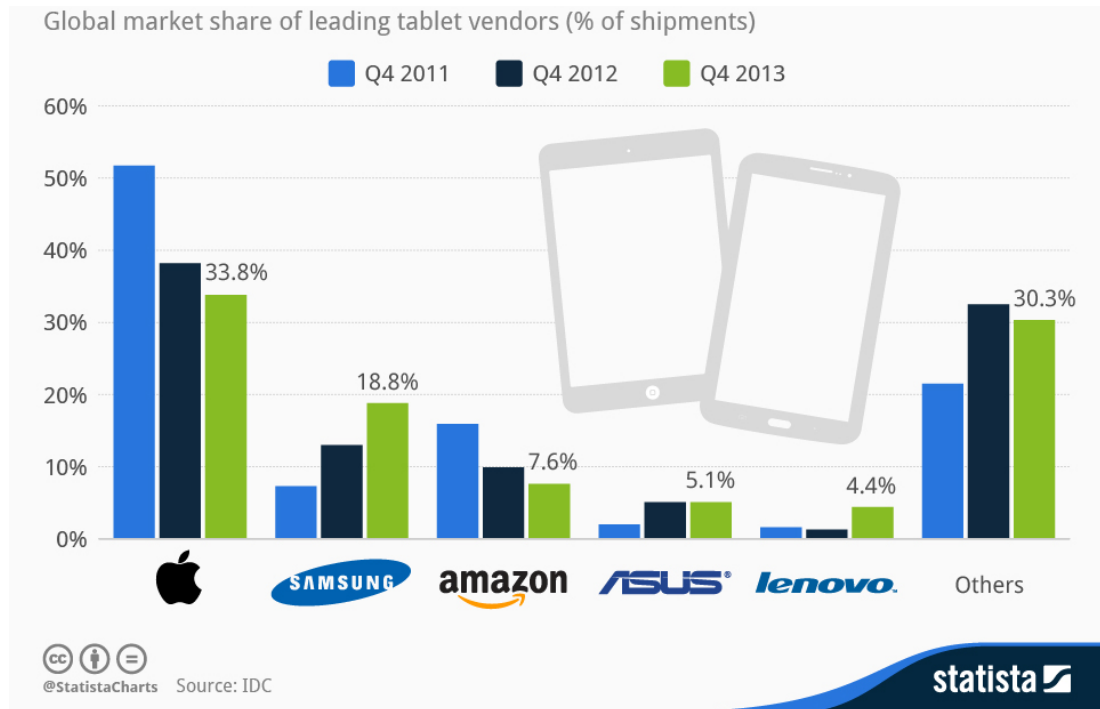


Figure 6: Tablet market share⁷

Except for Amazon's Kindle, most other tablets run on some form of Android OS, which makes Android the second priority for device support implementation. Later in the queue is Amazon before other alternative platforms such as Microsoft Windows.

One advantage of modern tablet operating systems is that they are very closely related to their respective smartphone-relatives. This makes an integration on iPhones and Android smartphones a rather inexpensive, but in terms of user experience very valuable task (see 3.2.2.2).

⁷ statista.com, 2014

3.2.2.1. Smart TVs

In order to successfully compete with existing solutions such as the previously discussed BBC Red Button concept, functionality must be ensured not only on a wide range of tablets, but also TV sets. Modern Smart TVs offer the possibility to integrate content through third party applications.

3.2.2.1.1. Potential technical challenges

Most Smart TV applications do not provide the possibility for applications to interact with the broadcast signal. This implies that the full signal, i.e. broadcast and return channel needs to be streamed over the Internet. This is not necessarily a challenge in terms of bandwidth, as on-demand video services are already operative on Smart TVs. However, processing video decoding and return channel functionality in parallel may result in issues due to computational bottlenecks.

3.2.2.1.2. Potential challenges with customer input

One key issue with integrating Smart TV devices into the interactive broadcasting offering is the audience return channel. Classical TV remotes provide only inadequate input capabilities and Bluetooth connected keyboards or mice are by far not popular enough to serve as a suitable alternative.

Alternative control mechanisms such as voice and gesture control are still in early stages of development, do not work with adequate reliability and / or are only available with high-end devices.

Therefore, a smartphone based approach should be chosen for controlling TV on screen content, i.e. a smartphone application linked to the TV should be used as a remote with enhanced capabilities. In contrast to other use cases, the smartphone would not be required to display the content itself rather than a set of dynamically changing buttons that adapt to the input possibilities of the on-screen content. Showing or hiding menus could be solved through swiping motions.

3.2.2.2. Multi-User Support

One important aspect of TV consumption that needs to be taken into account is its social consumption. Although it is gradually decreasing in popularity, the TV is still a central meeting point for many families and the basic event around daily evening activities. Thus, any new technology aiming to enter this field needs to take these factors into account as well.

For an interactive TV return channel, this can be solved by linking tablet computer and smart TV and giving every member of the family the possibility to participate from his/her own device, while results (e.g. quiz tips and solutions) are mirrored on the large TV screen. This functionality has the potential to effectively convert a TV quiz show into a game-console-like experience.

Further functionality may include the possibility to publish family high scores online, form teams and compete with friends around the country.

3.2.3. Methodologies

3.2.3.1. Agile development

All technical development is planned to be performed following agile methodology. The term “agile development” was initially coined by a group of 17 software developers in Snowbird, Utah, US. The full text of the agile manifesto is quoted below.

“We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions over Processes and tools

Working software over Comprehensive documentation

Customer collaboration over Contract negotiation

Responding to change over Following a plan

That is, while there is value in the items on the right, we value the items on the left more.” (see Beck et al, 2001).

Agile development understands (software) development as an iterative process rather than a classical production process which (necessarily) needs to be governed top down.

In the context of product development around the interactive TV service, the advantages compared to a traditional waterfall model become obvious when inspecting the core benefits of agile methodologies in practical application:

- Increased visibility and transparency for everyone involved

Agile methodologies cater for a number of checkpoints throughout the iterations and the iterative process of software creation as a whole. The goals for each iteration are set during a meeting with participants from all disciplines: software engineers, testers, business analysts, product owners. During these so called “sprint planning” meetings, a sprint being the term for a single iteration, the project team understands and defines any ongoing activities in detail together. This is a huge improvement in terms of communication efficiency compared to traditional waterfall specification practice, where analysts and/or technical writers would work on documentation describing product features as they understood it from the product owners and the actual implementation team as well as the testing engineers would only be confronted with the document once it had been finished. This resulted in a sequential process including a lot of back and forth discussions until developers and testers fully understood the documentation which had not been created by themselves and without their contribution. In an agile context, specifications are created as the team goes through their iterations and everyone gets to contribute to features as they move into focus throughout the overall project.

- A good chance of higher quality in the product

More frequent checkpoints with more frequent builds and tests enable the project team to evaluate and review their efforts at any given point during each iteration.

The concept behind this approach is based on the idea of continuous integration: the software code is stored in a repository and regularly committed by software engineers and other contributors. All project source code is then picked up for a nightly build by an automated process which results in a set of deployable software packages, ideally these packages will also automatically be pushed into a testing environment where team members can always see the latest status on a daily basis. Testers are able to give immediate feedback on the status of a certain feature implementation and clarify with stakeholders if required. Therefore, errors in logic or user interface or behaviour of the application can be found earlier in the process, which results in a higher quality of the overall project deliverables.

- The customer demands and business values are in focus

Any exit criteria for testing of features in an agile context are based on real-world business cases. This way, the needs of customers using the service or software, whether in B2B or B2C service models, are always in focus. The product owners and business analysts actively contribute to the creation of all test cases and therefore a lot of tacit knowledge around the crucial business cases is implicitly and automatically passed on to the project implementation team, which immediately adds value as the exit criteria and test cases will match the actual business requirement behind a certain feature.

- Predictability of all essential delivery figures

One important factor for successful software development is the predictability of key figures around duration, effort, schedule and budget. Time-boxed iterations lasting for no longer than one to three weeks maximum help the implementation team to achieve more accurate estimations of what can be accomplished during a certain period of time. Moreover, should certain features come together more quickly than expected due to the iterative nature of the delivery process, there is a chance to bring them into a production environment at any given point in time. In terms of cost estimations, agile methodologies such as Scrum add value because they provide an innovative way for developers to abstract the amount of work they put on a certain

feature using virtual points based on the complexity of a task ahead of them. Once successfully introduced, this technique has proven very reliable when it comes to measuring the overall productivity and working speed of implementation teams.

- An option to change requirements “as you go”

Product owners always have an opportunity to add to the scope as the implementation evolves by pushing changes to the backlog. The backlog in an agile context can be seen as a storage for future functionality which is not yet in scope and focus but should be picked up at a later point in time. During the iteration planning meetings the team may pick up items based on their priority from such a backlog and address them at the right point in time when capacity and overall progress allow for it. This is a significant advantage compared to the traditional implementation and management approach of a waterfall model, which is based on the assumption that after the specification phase has ended and the implementation team has accepted the specification documentation, changes become virtually impossible to push into an ongoing project.

3.2.4. Summary: concept definition

Summing up what has been described in the sections 3.2.1 to 3.2.2 results in a set of functional requirements, which will serve as input for the project evaluation and subsequently development phase. Although this process may appear to be rather linear, is to be understood in an iterative way (see Figure 5), i.e. any set of functional requirements that has been identified needs to withstand project evaluation and ultimately market testing, otherwise the concept will be sent back to the drawing board. The same applies to the concept subject to this paper, i.e. the functional requirements laid out below are the final result of this iterative process, rather than it's initial input straight out of the first conceptioning phase.

Having said that, the functional requirements for the interactive broadcasting solution developed by the author are the following:

#	Name	Description	Rationale
1	Multi-device compatibility	<p>Device compatibility must include</p> <ul style="list-style-type: none"> • All versions of iPads down to iPad 2 • Android tablets with market launch after 2010 except the commodity price segment • iPhone devices down to iPhone 3 • Android phones launched in 2010 or later with screen sizes > 2" 	<p>The interactive features need to be compatible with a wide range of available and widespread devices in order to reach a significant number of potential customers at product launch in order to give broadcasters a reasonably good incentive to adopt the technology.</p> <p>Support for older devices is considered an important criterion, as tablets and phones that are not used as primary devices anymore may be recycled as dedicated TV / broadcasting devices.</p>
2	Connect with other enabled devices	Protocol for linking up with other enabled devices and display user input	Linking with other devices enables multiplayer functionality in formats like quiz shows and is therefore considered to be a key feature.
3	Pairing with smart TV devices	Display the input of multiple devices on a paired smart TV	Using an existing smart-TV as an additional display is a crucial component for a game-console-like user experience in quiz / game shows and enhances the social component of the solution.

#	Name	Description	Rationale
4	Overlay load times	Overlays need to load, show and hide with a delay between 8 and 16 ms	One TV frame at a standard frame rate of 25 frames per second (fps) is on screen for 25/60, i.e. 0.04 seconds. In order to achieve a non-noticeable delay for showing, hiding, or changing content after a user interaction, the new content should show within two to four frames, i.e. the maximum acceptable lag is 16ms, while the target specification should aim at 8ms.
5	Backend-API for broadcasters	<ul style="list-style-type: none"> • Possibility to trigger elements with timer or manually according to a predefined schedule. • Synchronization with internet content management systems 	Broadcasting providers need a powerful and flexible API to incorporate and synchronize the interactive elements with their programs. If the integration of the interactive service comes with significant cost increases on the production process, product adoption will be substantially more difficult. Thus, a flexible and easy-to-use API is considered to be a key to success.
6	Flexible appearance and branding options for different broadcasters	All overlays must match with the overall layout and color scheme of the underlying format.	Broadcasting networks are very likely to demand compliance with corporate design rules for all interactive elements. Further, there will be requirement for

#	Name	Description	Rationale
			individual styling according to each format (e.g. news vs. documentary vs. sports or movie).
7	Social network support	Possibility to publish interactions via Twitter, Facebook , etc.	Established second screen solutions rely heavily on the broadcasting effect of social media channels like Twitter or Facebook, i.e. the need that is fulfilled for the audience is not only the interaction with the content (e.g. through hosts picking up questions posed through tweets or Facebook posts) but also the possibility to publish own opinions. This need must not be neglected and should therefore be incorporated in the envisaged solution as well.

Table 1: Functional requirements

The functional requirements outlined above form the basis of the project evaluation presented in section 0. Each point is derived from the gaps and opportunities identified in section 3.1.2 as well as the specific shortcomings of existing solutions described in section 3.1.1. The governing principle above all functional requirements is to provide an optimal viewing experience for the widest possible audience in accordance with the use cases described in section 3.2.1.

3.3. Project evaluation

The project evaluation aims at challenging the concept with respect to the market environment that it is launched in. This involves a critical assessment of the market itself as well as the process deriving conclusions for optimal positioning of the product, the definition of its main unique selling proposition (USP) compared to other solutions and the most likely customer target groups.

3.3.1. Five forces analysis

The product concept outlined in section 3.2 is challenged by applying the five forces analysis approach developed by Porter (2008) and illustrated in Figure 7 below:

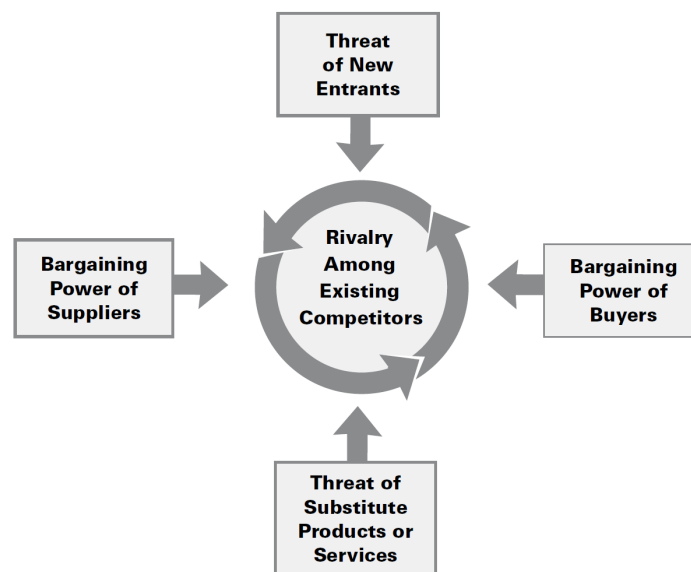


Figure 7: Porter's five forces model⁸

⁸ Porter, 2008

Porter differentiates five factors or “forces” that influence the strategic positioning of a product and determine its competitive advantage:

1. Threat of new entrants into the market
2. Bargaining power of buyers depending on their relative position
3. Threat of substitute products or services that may replace the product in scope
4. Bargaining power of suppliers, particularly for products or services that rely on rare, non commodity input or operate on markets where supplies are dominated by very few market players
5. Rivalry among existing competitors

The remainder of this section identifies and explains each of the five forces impact on the product concept. The resulting conclusion is presented in section 0.

3.3.1.1. Threat of new entrants

At the point of writing this paper, the solution in concern does not have an existing market position and is itself the new entrant in the market. Therefore, there is currently no threat of new entrants. However, emphasis should be put on protecting the intellectual property that forms the basis of the competitive advantage of the solution. Otherwise, broadcasters or other market players may attempt to create similar services once they recognize any market potential in it.

3.3.1.2. Bargaining power of buyers

Economies of scale are one of the dominant influential factors with respect to broadcasting, as most TV broadcasters are part of substantially large corporations and even where smaller players exist in the market, the concept requires a certain reach in order to work properly and be financially beneficial for the broadcasting network itself (the value of this service as a means of advertising is strongly correlated to the absolute number of reachable audience).

Taking countries like Austria and Germany as an example, the television market is dominated by very few major players. Both countries show a very high concentration and the market is shared between public networks ORF / ZDF and ARD respectively and the private Groups Pro7-Sat1 and RTL. Other broadcasters do exist, but are far behind in terms of market size. Nevertheless, some broadcasters manage to operate quite successfully in niche formats (e.g. Red Bull owned ServusTV focusing on (fun-)sports and documentaries or the German / Austrian / French public network cooperation ARTE which focuses on culturally valuable content).

Positioning a new technology in this market will either require a full buy in of one major player with the perspective of creating a competitive advantage towards the other players – most likely including some sort of exclusivity agreement – or otherwise a very limited test-offering at virtually no costs. While the first option is definitely preferred from an economic point of view, it requires a very convincing business case and comes with higher economic risk due to the highest possible customer portfolio concentration (i.e. one sole client).

3.3.1.3. Threat of substitute products or services

There main risk in terms of substitution arises from two main groups of potential substitute services:

1. Replacement by second screen solutions
2. Replacement of TV broadcasting as a whole

Second screen solutions are already well established in the market and experienced a tremendous growth over the past few years. However, they do have substantial drawbacks when it comes to “true” interactivity with the content as well as ease and comfort of use. Competing against this type of solutions will most likely be a challenge of convincing the audience of the technically superior solution.

The second group of substitutes consists of services that replace TV consumption as a whole. Mainly, this includes Internet on-demand content consisting mainly of short video clips. The absolute length of the content and the fact that they are being

usually displayed in browser, on an Internet enabled device that allows immediate background research limits the added value of on-screen overlays. Nevertheless, on-demand content also offers a potential market, particularly for longer content such as documentations or movies. The growing popularity of streaming services such as Netflix or Hulu makes this market increasingly interesting.

3.3.1.4. Bargaining power of suppliers

Due to the characteristics of the service itself, the bargaining power of suppliers is relatively low. All required resources are available as commodities and the technologies required on end-user side are mostly standard or quasi-standard. Therefore, the bargaining power of suppliers is not considered to be a critical force in this context.

3.3.1.5. Rivalry among existing competitors

Rivaling services are described in section 3.1.1. Based on the market gaps that have been identified, the solution proposed by the author is expected to outperform these offerings. However, there is a persistent risk of competitors evolving their services into an advanced offering as well. Positioning the product will involve a strong argumentation of the technical superiority in comparison to already existing solutions; otherwise broadcasters can be expected to be unwilling to adopt the new technology.

3.3.1.6. Summary and conclusion

The analysis in the sections above can be condensed into the following set of strategic action points for positioning the solution in the market:

- Focus on major players in the broadcasting industry and aim for a full buy-in with exclusivity for a determined period of time. This will help establishing the technology and reduce economic risk in the startup phase.
- Consider streaming platforms as potential targets, as they have already become relevant for the TV industry and will very likely continue to grow.

Short news snippets and video clips may not be a feasible substrate for the service, but movies and documentaries are.

- Protect intellectual property as early as possible in order to fight potential clones coming from institutions with significantly higher market and financial power.
- Prepare a strong elevator pitch and sales material that clearly defines the technological advantages and enhanced advertisement capabilities in contrast to existing solutions.

3.3.2. Market analysis

3.3.2.1. Tablet computer sales

An analysis performed by Business Insider claims that nearly 100 million tablets were sold in the year 2011 alone. Cutting away some 40 million e-Readers which may not be suitable devices for consuming video material due to their insufficient display capabilities⁹ leaves 60 million potential target devices added in 2011 alone.

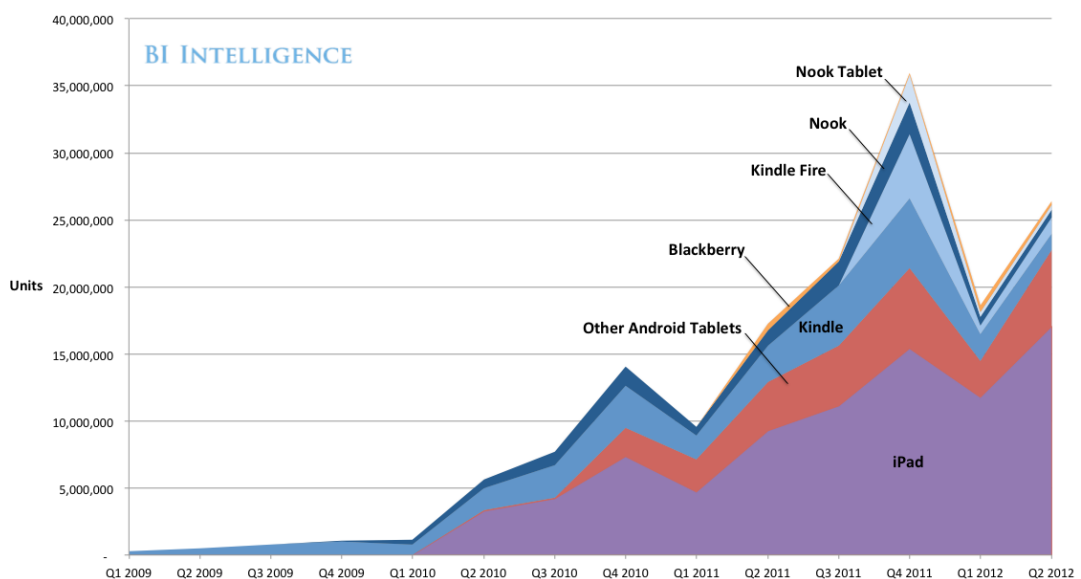


Figure 8: Global tablet shipments over time¹⁰

Forecasts go even further stating that “*tablet sales will reach 400 million units by 2016*”. Figure 9 below illustrates the forecast from 2011 until 2015.

⁹ This is a conservative assumption, as modern e-Reader like Amazon’s Kindle Fire are fully fledged tablets and can display video contents without restrictions.

¹⁰ Business Insider, 2012

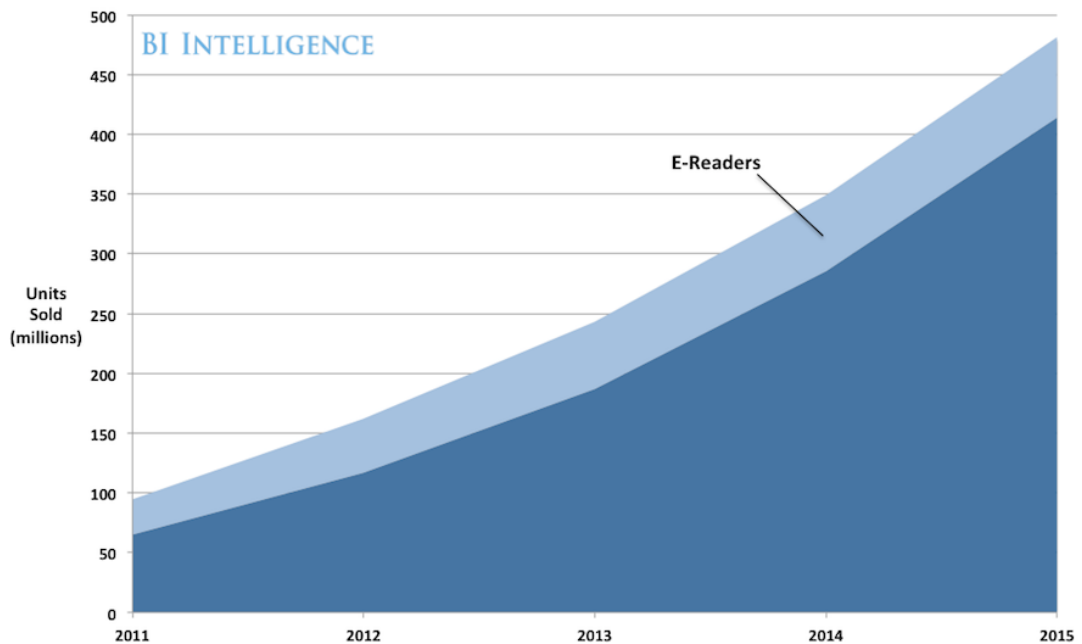


Figure 9: Tablet sales forecast¹¹

Looking at this data clearly suggests that the target group of devices capable of using the service is large enough and still growing rapidly.

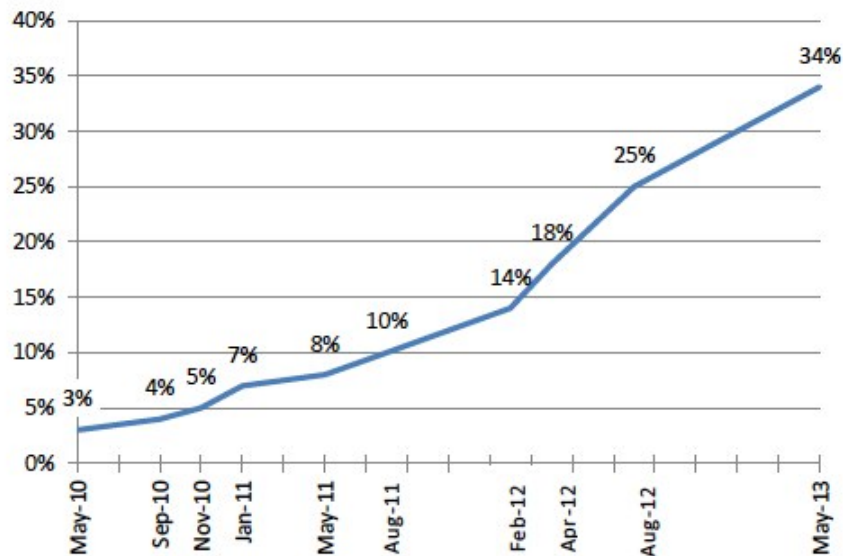
3.3.2.2. Tablet market demographics

A study performed by Pew Research (2013) shows a strong increase in tablet ownership percentages from 2012 to 2013. Although the study was focusing only on the US, it is feasible to assume that the values strongly correlate with the markets in other developed economies. Figure 10 illustrates the tremendous increase in ownership (referring to adults above 18 years) from only 3% in May 2010 to 34% in May 2013.

¹¹ Business Insider, 2012

Tablet ownership over time (2010-2013)

% of American adults ages 18+ who own a tablet computer, over time.



Source: Pew Research Center's Internet & American Life Project tracking surveys, May 2010 – May 2013. May 2013 data is from the Pew Research Center's Internet & American Life Project's April 17-May 19, 2013 Tracking Survey of 2,252 adults ages 18 and older. Interviews were conducted in English and Spanish and on landline and cell phones. The margin of error on the sample is +/- 2.3 percentage points.

Figure 10: Tablet ownership over time¹²

Analyzing the demographic properties of tablet owners, despite proving the obvious, i.e. that tablet ownership correlates with household income, yields two interesting facts (see Table 2 below for details):

- a) Tablet ownership strongly correlates with education, i.e. people with higher education are much more likely to own and use a tablet
- b) Parents with children are on average twice as likely to own a tablet than households without children

¹² Pew Research, 2013

Tablet ownership by demographic group: Education, household income, geography, parental status

% of American adults ages 18+ within each group who own a tablet computer

		Own a tablet
All adults ages 18+ (n=2,252)		34%
Education attainment		
a	Less than high school (n=168)	17
b	High school grad (n=630)	26 ^a
c	Some College (n=588)	35 ^{ab}
d	College + (n=834)	49 ^{abc}
Household income		
a	Less than \$30,000/yr (n=580)	20
b	\$30,000-\$49,999 (n=374)	28 ^a
c	\$50,000-\$74,999 (n=298)	38 ^{ab}
d	\$75,000+ (n=582)	56 ^{abc}
Urbanity		
a	Urban (n=763)	33
b	Suburban (n=1,037)	37 ^c
c	Rural (n=450)	27
Parental status		
a	Parent with minor child living at home (n=562)	50 ^a
b	Non-parent / no minor child living at home (n=1,678)	27

Source: Pew Research Center's Internet & American Life Project, April 17-May 19, 2013 Tracking Survey of 2,252 adults ages 18 and older. Interviews were conducted in English and Spanish and on landline and cell phones. The margin of error on the sample is +/- 2.3 percentage points.

Note: Percentages marked with a superscript letter (e.g., ^a) indicate a statistically significant difference between that row and the row designated by that superscript letter, among categories of each demographic characteristic (e.g. age).

Table 2: Tablet ownership by demographic group¹³

Looking at the evolution of ownership demographics over time (see Table 3) reveals that the two features identified above (high ownership ratio particularly among

¹³ Pew Research, 2013

educated people and parents) is a rather recent trend. Probability of ownership has increased by 21 percentage points for people with college education and 24 percentage points for parents. Another remarkable detail is that high-income household ownership probability rose by 22 percentage points from 34% to 56%. This can be interpreted as a sign that the technology has matured and is entering a wider market. In other words, the tablet has evolved from a product for early adopters and technology aficionados into a trendy product for the (financially well suited) masses.

Tablet ownership by demographic group, over time

% of American adults ages 18+ within each group who own a tablet computer

	April 2012	May 2013	Change
All adults ages 18+	18%	34%	+16 percentage points
Gender			
a Men	20	32	+12
b Women	17	35	+18
Age			
a 18-29	20 ^{cd}	34 ^d	+14
b 30-49	26 ^{cd}	44 ^{acd}	+18
c 50-64	14 ^d	32 ^d	+18
d 65+	8	18	+10
Race/ethnicity			
a White, Non-Hispanic	18	33	+15
b Black, Non-Hispanic	15	32	+17
c Hispanic (English- and Spanish-speaking)	23 ^b	34	+11
Education attainment			
a Less than high school	11	17	+6
b High school grad	13	26 ^a	+13
c Some College	19 ^{ab}	35 ^{ab}	+16
d College +	28 ^{abc}	49 ^{abc}	+21
Household income			
a Less than \$30,000/yr	7	20	+13
b \$30,000-\$49,999	15 ^a	28 ^a	+13
c \$50,000-\$74,999	22 ^{ab}	38 ^{ab}	+16
d \$75,000+	34 ^{abc}	56 ^{abc}	+22
Urbanity			
a Urban	19 ^c	33	+14
b Suburban	21 ^c	37 ^c	+16
c Rural	9	27	+18
Parental status			
a Parent with minor child living at home	26 ^b	50 ^b	+24
b Non-parent	15	27	+12

Source: Pew Research Center's Internet & American Life Project, April 17-May 19, 2013 Tracking Survey of 2,252 adults ages 18 and older. 2012 figures are from a March 15-April 3, 2012 Tracking survey of 2,254 adults ages 18 and older. Interviews for both surveys were conducted in English and Spanish and on landline and cell phones. The margin of error on the sample is +/- 2.3 percentage points.

Note: Percentages marked with a superscript letter (e.g., ^a) indicate a statistically significant difference between that row and the row designated by that superscript letter, among categories of each demographic characteristic (e.g. age) within that same year.

Table 3: Tablet ownership by demographic group over time¹⁴

3.3.3. Summary: market analysis

The immensely strong growth potential of tablet computers is considered one key factor for carrying the new technology into the market and expand the potential target group for a broadcaster adopting the interactive broadcasting solution.

The demographic analysis yields some important results for the positioning of the product. Key target groups should be chosen as such that the overall reach is maximized. This means that

- 1) Content that includes interactive elements should primarily focus on consumers with higher education and children
- 2) It may be well-worth to invest in further research on TV consumption behaviour for households with above-average income

¹⁴ Pew Research, 2013

3.4. Development

3.4.1. Technology

This section summarizes the technological requirements that result from the functional requirements as described in section 3.2.4. Hardware-related requirements are already covered in section 3.2.2 and are therefore excluded from this section.

3.4.1.1. Image overlay technology

The image overlay is implemented using HTML5/Javascript as far as browser-compatible elements are concerned. In scenarios of native applications (so called “apps”) any graphical element must be displayed using the operating system manufacturer’s native interfaces. The overlay does not interfere with the image itself and does not require any video signal recoding (a substantial advantage when computational power may be a bottleneck – e.g. with Smart TVs). In the case of enhancing offline content with interactive elements, the synchronization between overlay and underlying image happens through the identification of linking frames, i.e. single images in the video signal which serve as hooks for overlay content. This allows the broadcaster to precisely time all overlays if required (e.g. for quiz shows) by simply defining the frames at which new content becomes available or old content disappears. The end user’s device independently ensures that content and overlay are in sync. In case of live content being streamed and enhanced with interactive elements, the timing is driven by events controlled and sent to devices over a TCP/IP-based network broadcast.

3.4.1.2. Loading response times and buffering

In order to ensure a pleasant and performant user experience, the system’s reaction time to user input must be kept within non-noticeable limits. As explained in section 3.2.4, the upper limit for acceptable reaction time is 16ms. This necessarily implies, that most, if not all content that needs to be displayed has to be buffered within the system.

Depending on the use case, this may mean buffering substantial amounts of data. One solution for tackling this problem can be intelligent buffering algorithms, i.e. by implementing an algorithm that is capable of forecasting the next most likely user interaction and buffers accordingly. The data required for performing this analysis can be collected during the prototyping and beta-testing phase in order to gradually optimize the heuristic estimator and reducing load times experienced by the user.

3.4.2. Prototyping

3.4.2.1. Market need identification

Second screen activities are gaining in popularity for a variety of TV broadcasts, ranging from sports to news, or political discussions. Not having all the content on a single device results necessarily in a distraction from the broadcasting content. Based on this observation and after discussion with friends and family, the author identified the need of an integrated solution that combines second screen content with the underlying content on a single device for TV broadcasters.

Further developing this idea and researching existing solutions (see section 3.1.1) resulted in a variety of use cases that are not available with existing solutions (see section 3.2).

The second main need that has been identified in the market is the growing competition to classical TV consumption coming from other electronic devices. Particularly younger viewers show a slow but steady decline in their overall TV viewing habits (see

Figure 11 below).

Traditional TV Viewing Trends Among 18-24-Year-Olds

weekly time spent in hours: minutes, based on total population

Q1 2011-Q3 2013

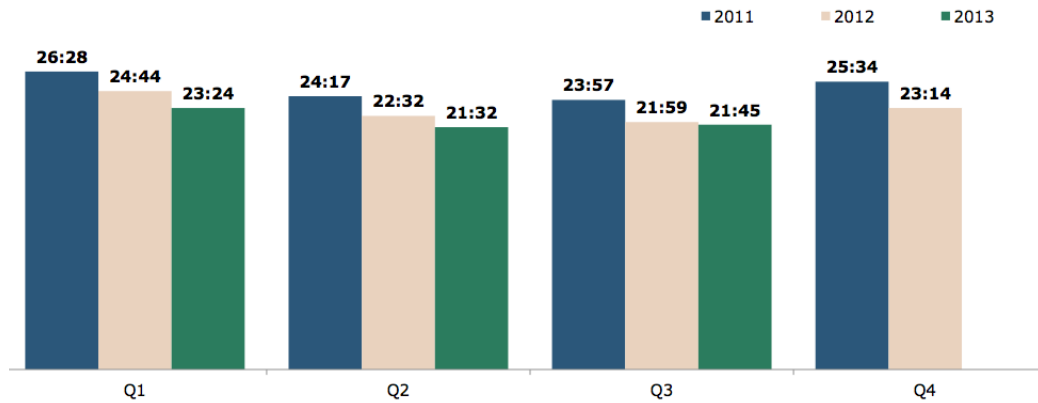


Figure 11: TV viewing habits of 18-24 year olds¹⁵

It is prudent to assume that broadcasters will be interested in finding ways and opportunities to bring the young generation back to the TV screen. Looking at the overall evolution of TV viewing behaviour as illustrated in Figure 12 below shows, that the trend observed in the young age cluster also applies - even though less drastically - to all other age groups except the generation 65+.

¹⁵ Source: Marketingcharts.com

Traditional TV Viewing, by Age

(weekly time spent in hours: minutes, based on total population)

Q1 2011-Q3 2013

	T 12-17	A 18-24	A 25-34	A 35-49	A 50-64	A 65+
Q3 2013	21:44	21:45	26:06	30:53	40:19	46:43
Q2 2013	20:39	21:32	26:18	31:16	40:51	46:54
Q1 2013	21:22	23:24	28:53	34:18	44:09	49:21
Q4 2012	21:28	23:14	29:27	34:29	43:43	48:25
Q3 2012	22:33	21:59	27:15	32:06	40:39	45:38
Q2 2012	21:37	22:32	27:06	32:02	40:02	45:20
Q1 2012	22:14	24:44	29:46	35:08	43:13	47:59
Q4 2011	22:14	25:34	29:55	34:16	42:16	47:13
Q3 2011	24:11	23:57	27:46	32:07	40:07	45:23
Q2 2011	22:24	24:17	28:08	32:58	41:04	46:16
Q1 2011	24:21	26:28	30:34	36:23	44:54	49:17

MC MARKETINGCHARTS.COM

Figure 12: Traditional TV viewing by age¹⁶

This data emphasizes the broadcasting industry's need for a new and attractive concept that brings the audience back to the TV screen and traditional TV programmes.

¹⁶ Marketingcharts.com, 2013

3.4.2.2. Prototype development

The prototyping process is built around the iterative principle of the product development process as illustrated in Figure 13 below.

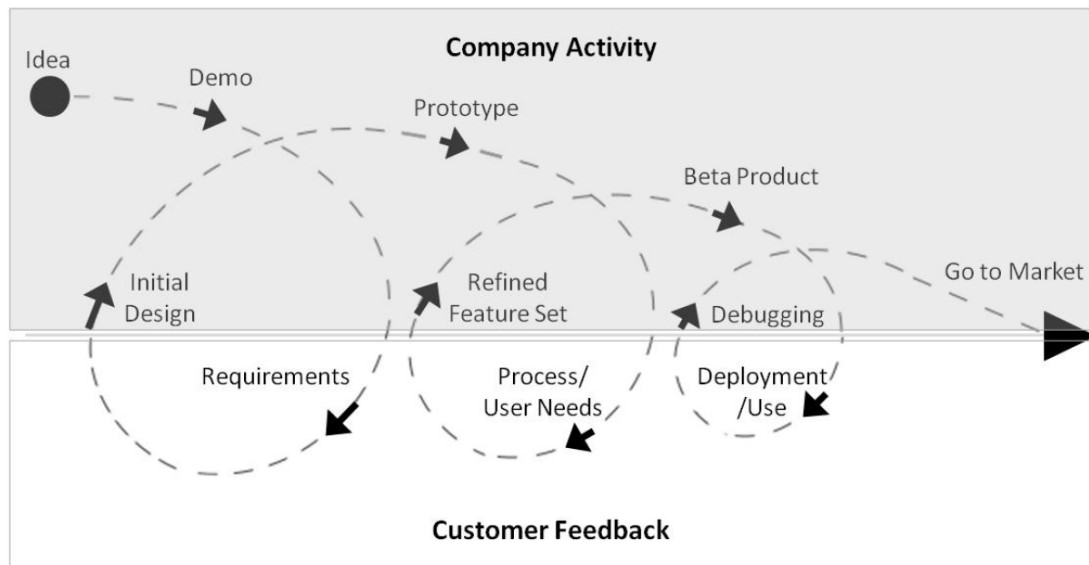


Figure 13: Iterative development process¹⁷

Starting from a very basic implementation without focussing on performance tuning and scaling, first feedback is collected from a group of independent testers. Based on their feedback, the demo version is developed further into a first fully functional prototype. This prototype is then used for showcasing the solution to potential clients and get as much direct market feedback as possible. Through steady reflection on this feedback and subsequent adaption and improvement of the prototype, a first market ready product is developed. However, the iterative process does not stop after sale and implementation. Through steady improvement and adaptation, the

¹⁷ Wortmann and Waiverly, 2012

product fit to the market is improved and gradually additional functionality that extends the market scope outside of the initially defined target group can be added.

3.5. Market launch

Marketing and selling for entrepreneurs differs significantly from classical marketing as thought in business schools. *“The professional sales person is backed by a plethora of resources from an established brand to marketing and customer service support. The entrepreneur has none of these to rely on”* (see Wortmann and Deutsch 2012).

Therefore, a classical “4P’s” analysis is only of limited use for an entrepreneur as there is simply a lack of means and insight for fully fledged market analyses and some of the marketing tactics from classical text books are no economically feasible option (e.g. developing a product with mass-market focus and trying to roll it out as such despite a lack of the required means in terms of distribution network, scale for cost efficient production, etc.).

3.5.1. Market segmentation approach

Wortmann and Deutsch (2012) claim that *“One of the toughest jobs an entrepreneur faces is deciding who to sell to first. Only when the product is in customer hands or the service has been performed a few times will the entrepreneur begin to understand how it is valued and where to take it next. But disappointing the wrong customer too early could spell the end of the company. Someday, the company may be big enough and established enough to take on all the customers who could benefit from its products or services but at the beginning, a narrowly defined initial target market gives an entrepreneur the best chance to succeed.”*

Therefore, Wortmann and Deutsch conclude that *“Defining any market is about determining what problems, characteristics, buying habits, needs, and budgets a group of customers really have in common. Starting at the highest level – the problem being solved – gives the entrepreneur essentially the entire possible market of people who might benefit from his solution. Using filters like industry vertical, size of company, emphasis on particular activities, geography, etc. allows the entrepreneur to select a group of potential customers whose similarities will speed*

his ability to use business cases, references, stories, and data to get in the door and have meaningful conversations with new clients.” (See Wortmann and Deutsch, 2012).

In a nutshell, this means that the initially defined target market needs to be very well defined and as specific as possible. Figure 14 below illustrates the concept.



Figure 14: Initial target market definition¹⁸

The target market is filtered by applying a top down approach. Deutsch and Wortmann illustrate this concept with a concept of circles that are drawn closer and closer around the specific target group (see Figure 15 below):

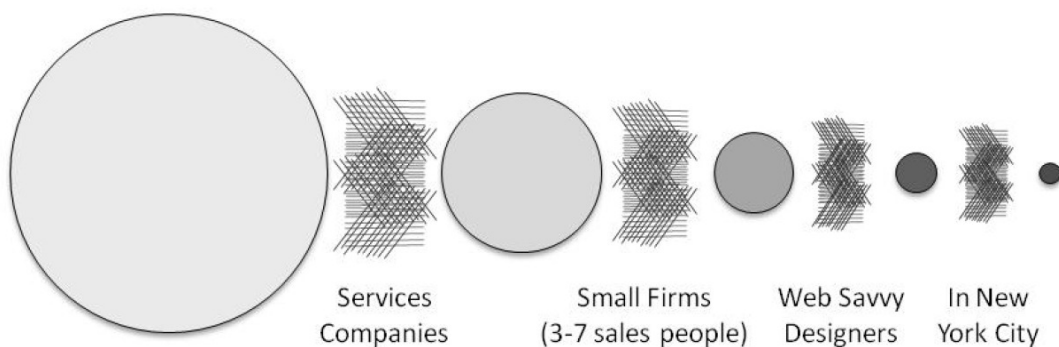


Figure 15: Filtering down to an initial target market (example)¹⁹

¹⁸ Wortman and Deutsch, 2012

¹⁹ Wortman and Deutsch, 2012

3.5.1.1. Application to the product in scope

This section applies the market filtering approach described in section 3.5.1. All bullets listed below are to be understood as AND-linked conditions.

The overall target market for the interactive broadcasting service includes

- Broadcasters with the technical capability of integrating the virtual overlay technology

Filtering down this market to those targets, where the solution makes economical sense and there is a strong selling point results in a market that fulfills the following criteria:

- Broadcasters with the technical capability of integrating the virtual overlay technology
- Broadcasters that are dependent on advertising revenues and orient their program based on this premise

This already excludes some publicly funded broadcasters whose mission is driven by a cultural and potentially also politically motivated mandate rather than revenue (e.g. ARTE in GER / AUT / FRA). Further slimming down based on the target groups identified in section 3.3.3 results in

- Broadcasters with the technical capability of integrating the virtual overlay technology
- Broadcasters that are dependent on advertising revenues and orient their program based on this premise
- Broadcasters focusing on one or more of the following demographic target groups:
 - Children
 - Well educated people
 - High income households

Taking into account the fact that the idea is born and developed in Austria, it is fair to assume that selling to local clients will be easier. Adding this parameter results in the final filter set:

- Broadcasters with the technical capability of integrating the virtual overlay technology
- Broadcasters that are dependent on advertising revenues and orient their program based on this premise
- Broadcasters focusing on one or more of the following demographic target groups:
 - Children
 - Well educated people
 - High income households
- Broadcasters located in German-speaking countries, so mainly Austria, Germany or Switzerland

Applying these filters leaves us with the first group of target clients:

Broadcasters in the DE, AT or CH region focusing on infotainment and have a strong focus on program for children and are revenue driven in choosing their contents:

- ORF 1
- ZDF
- KiKa
- SF1
- Comedy Central (GER)

Channels that focus mainly on elderly target groups such as ORF 2, ARD or BR-Alpha are excluded, as these people are less likely to own or use a tablet computer compared to the younger generation (see section 3.3.2.2).

These five clients are the core target group for the initial market launch and will be targeted specifically, one after another. Once this group is completely covered, i.e. each of the clients on the list has either evolved into a successful sale or has to be dropped from the list due to reasons that cannot be influenced actively.

3.5.2. Market launch plan

The development of the market launch plan follows a concept proposed by Townsend (2013b) and is structured in seven phases. The remainder of this section describes each phase and explains how it applies to the interactive broadcasting service.²⁰

3.5.2.1. Develop a name for your product

“Brands with strong images are able to influence customers’ choices and command a premium in the marketplace. A brand name is the foundation of a brand’s image. While the image associated with a brand name can be built with advertising over time, brand managers realize that a carefully created and chosen name can bring inherent and immediate value to the brand.” (Kohli and LaBahn, 1995).

Kohli and LaBahn (1995) advocate extensive long listing and careful selection and market testing of product names. However, this process requires substantial resources for market research. Therefore, the process will be shortened and the empirical testing will be subject to a later rebranding (if necessary). Nevertheless, the basic scientific principles of the naming process still hold and should be followed as close as possible. Figure 16 illustrates this process.

²⁰ The phases „develop manufacturing plan“ and “explain product portfolio fit” are omitted as they do not apply to this particular case.

The Brand Naming Process

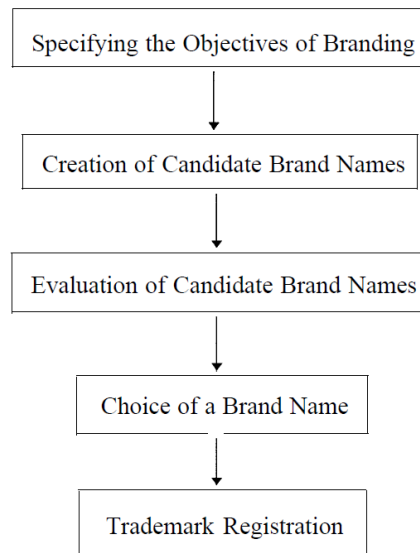


Figure 16: The brand naming process²¹

1. Specify the objectives of branding

The interactive broadcasting service must be given a distinctive and catchy name that supports sales and marketing efforts. The primary objectives in this context are

- a. Differentiation from the competition
- b. Catchy and easy-to-remember name

2. Creation of brand name candidates

The author has come up with the following candidates for the product naming long list:

- a. TapTV
- b. ActiveTV

²¹ Kohli and LaBahn (1995)

- c. iTV

3. Evaluation of brand name candidates

- a. TapTV

The name transports the overall idea, but limits the products use to tablets, which may negatively the reception of the smart-TV linking feature. The p-symbol at the end can be read as a “b” as well as a “p” letter, which represents the two main features of the system, the use of tablets as end user devices and the possibility to tap, i.e. to interact

- b. ActiveTV

ActiveTV is a good name for transporting the idea of audience participation and distinguishes the system from classical, passive TV consumption. It does, however, not provide a distinguishing element against other interactive TV concepts.

- c. iTV

The name iTV was dropped due to a very likely copyright clash with Apple computer inc.

4. Choice of a brand name and registration

Based on the evaluation performed in step 3, the name “TapTV” was chosen for the initial go-to-market. However, once the service achieves a certain stage of maturity and revenue volume, the name should be subject to an in-depth empirical analysis and subsequently a rebranding should be considered.

3.5.2.2. Develop a sales and distribution strategy

The sales and distribution strategy needs to be chosen with respect to the target customers defined in section 3.5.1.1. As the product in the first stage targets only

four clients, an approach that maximizes direct customer contact (and feedback) is preferred. Potential product presentation and selling opportunities should be actively sought at specialized fairs and events as well as in direct face-to-face presentations.

While getting an appointment to demo the product may prove to be difficult in the first place, social events and fairs provide the opportunity to approach decision makers in a much less protected environment. In order to take the maximum out of such first contacts, the elevator pitch and unique selling proposition needs to be convincing and to the point (see section 3.5.2.3).

3.5.2.3. Create and communicate unique selling proposition, positioning (vis-à-vis major substitutes) statement and tag line

The unique selling proposition (USP) is a short and precise message that clearly communicates “buy this product, for *this specific benefit*” to a potential customer (Reeves, 1961).

The USP should stress the key strengths of the product. Based on the market gap analysis performed in section 3.1.2, the USP of the interactive broadcasting solution can be summarized as:

TapTV provides a new and revolutionary viewing experience that brings the audience attention back to the broadcaster and away from second screens. Therefore, TapTV provides the following benefits for broadcasters and content providers:

- *Better audience profiling through direct feedback*
- *Higher audience rating through differentiation*
- *Higher advertisement conversion rate through higher audience attention*

This statement stresses the main benefits of the solution compared to its main competitors

3.5.2.4. Development of a launch plan (for roll-out)

The launch plan is focused on the target group defined in section 3.5.1. Once the product is ready for roll out, it is planned to present it on a specialized fair in front of as many of the target customers as possible. After the presentation, the key goal is to get feedback and opinions on the product in order to make adjustments and corrections.

3.5.2.5. Setting a price (or price range)

Given the fact that the service is marketed from a startup without any brand reputation, a certain degree of hesitation is to be expected from potential customers. Thus, a pricing strategy that makes market entry rather easy and scales over time appears to be the most feasible option.

More precisely, the solution is offered to the customer at a non-prohibitively low implementation fee of around EUR 5,000. Ongoing licensing fees are then calculated based on the actual use of the platform combines with audience acceptance. A pricing plan could have the following concept:

EUR 5,000 per month and hour on air multiplied by the average audience rating as published by an official body (Gesellschaft für Konsumforschung and Arbeitsgemeinschaft Fernsehforschung in Germany, Arbeitsgemeinschaft Teletest in Austria and Mediapulse in Switzerland respectively).

For a station broadcasting 20 hours worth of interactive material per month with an average audience rating of 15%, this pricing plan results in a monthly fee of $20 \times 5,000 \times 0,15 = \text{EUR } 15,000$.

Note that by including audience rating, the product's cost function directly correlates with the most important KPI of the broadcaster, which effectively aligns the interests of client and service provider.

3.5.2.5.1. Break even analysis

The costs for running the service are mainly driven by development amortization. Actual cash outflows in daily business amount to a low, four-digit amount for server infrastructure and organizational overhead. Thus, the operational break even point should not be used as a basis for pricing the service.

4. Summary and Outlook

The author has developed and described the way of TapTV from initial market assessment to market launch based. Each step in the process from idea to market offering is described in detail and illustrated with secondary market research. This was intended to be methodological support as well as documentation to the actual process that the author is going through with his product.

Academic research has greatly helped in developing a consistent and promising concept for competing as an entrepreneur in nowadays economic environment and has also yielded the insight, that the economics for entrepreneurs sometimes differ quite significantly from what is best practice in established industries. However, as seen on the work of Wormann and Deutsch (2012) there is a growing number of academics that is recognizing these differences and approach entrepreneurs as a class of their own when it comes to defining their sales strategies.

Bibliography

ACG Research; 2013; "*Business Case for CloudTV*"

http://www.activevideo.com/file/1961/ACG_Research_%20ActiveVideoCloudTV.pdf;

retrieved on February 02, 2014, 12:05

BBC; 2000; "*R&D Annual Review 1999-2000*";

http://www.bbc.co.uk/rd/publications/annual_review_1999_2000; retrieved on

February 02, 2014, 12:50

BBC; 2012; "*The Future of Red Button*";

http://www.bbc.co.uk/blogs/internet/posts/the_future_of_red_button; retrieved on

February 02, 2014, 12:55

Beck, Kent; et al.; 2001; "*Manifesto for Agile Software Development*".

<http://agilemanifesto.org>; Agile Alliance; retrieved on February 28, 2014

Brightline.tv; 2014; "*What we do*"; <http://www.brightline.tv/what-we-do/>; retrieved on

February 09, 2014, 16:00

Business Insider; 2012; "*BII REPORT: How Annual Tablet Sales Will Explode To*

450 Million By 2016"; [http://www.businessinsider.com/bii-report-how-annual-tablet-](http://www.businessinsider.com/bii-report-how-annual-tablet-sales-will-explode-to-400-million-by-2016-2012-8)

[sales-will-explode-to-400-million-by-2016-2012-8](http://www.businessinsider.com/bii-report-how-annual-tablet-sales-will-explode-to-400-million-by-2016-2012-8); retrieved on February 09, 2014,

14:45

Coolech; 2013; "*Smart TV: A Fragmented Market in Need of Consolidation*";

http://www.coupont.net/En/News_Detail.aspx?CorpNewsClass1_ID=3295&id=1430

[34](http://www.coupont.net/En/News_Detail.aspx?CorpNewsClass1_ID=3295&id=1430); retrieved on February 09, 2014, 15:55

Cooper, Robert G.; Elko J. Kleinschmidt; 1993 "*Stage gate systems for new product*

success" Marketing Management 1.4: 20-29

Kohli, evv Chiranj; LaBahn, Douglas W.; 1995; „*Creating effective brand names: a study oft he naming process*“; Institute for the Study of Business Markets, The Pennsylvania State University

Marketingcharts.com; 2013; „*Are Young People Watching Less TV? (Updated – Q3 2013 Data)*“; <http://www.marketingcharts.com/wp/television/are-young-people-watching-less-tv-24817/>; retrieved on February 16, 2014, 14:07

Pew Research; 2013; „*Tablet Ownership 2013*“;
<http://www.pewinternet.org/2013/06/10/tablet-ownership-2013>; retrieved on February 15, 2014, 11:30

Porter, Michael; 2008; „*The Five Competitive Forces That Shape Strategy*“; Harvard Business Review, January 2008

Reeves, Rosser; 1961; „*Reality in Advertising*“; University of Minnesota; Knopf (Publisher)

Statista.com; 2014; „*Tablet Competition Eats Away at Apple's Market Lead*“;
<http://www.statista.com/chart/1844/tablet-market-share/>; retrieved on February 15, 2014, 17:20

Townsend, Janell; 2013a; „*NPD OVERVIEW*“; Lecture Notes; Department of Marketing, Michigan State University

Townsend, Janell; 2013b; „*New Product Concept and Development Plan Project*“; Product Innovation and Management lecture notes; Department of Marketing, Michigan State University

Tvclever.com; 2013; „*T-Commerce - eCommerce im Fernsehen*“;
<http://tcommerce.tvclever.com>; retrieved on February 09, 2014, 15:20

Ulrich, Karl; Eppinger, Stephen D.; 2003; „*Product Design an Development*“; McGraw-Hill Higher Education; 3 edition

Venturebeat.com; 2013; “*Microsoft pulls the plug on MSN TV*”;
<http://venturebeat.com/2013/07/07/microsoft-pulls-the-plug-on-msn-tv/>; retrieved on
February 16, 2014, 15:20

Wortmann, Craig; Waverly, Craig; 2012; “*Entrepreneurial Selling*”;
http://www.entrepreneurship.org/~media/Entrepreneurship/FoundersSchool/PDF/EntrepreneurialSelling_SubTop1_Readings_EntrepreneurialSellingArticle.pdf; February 09,
2014, 14:03; Polsky Center for Entrepreneurship, University of Chicago Booth
School of Business