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Voice Control for Interactive Audible News in the Home: Research Through Design of News Butler

Kasper Bruus Frank
Søren Bruus Frank

Supervised by
Olav W. Bertelsen

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ABSTRACT

Speech recognition is a technology which recently has been getting an increasing amount of attention on the consumer market. Research on the use of the technology in everyday situations is however still sparse. This thesis explores the potentials and limitations of using voice control for audible news consumption in the home. This is accomplished through a research through design approach, developing News Butler, a news application prototype for Amazon Echo, in collaboration with a major media group in the United Kingdom.

As a part of this thesis we condense already existing literature within the domains of voice user interfaces and speech recognition, news consumption, and designing for the home into a set of guidelines to use when designing into the specific context of voice controlled interactive audible news in the home. We use these guidelines along with the Human-Artifact Model, a theoretical framework building on the principles of activity theory, to inform the design of the News Butler prototype application. Subsequently, the design of News Butler is evaluated through a field test of the News Butler application in the everyday use context of five news consumers in their homes. Finally, we discuss the findings of the field test along with the guidelines presented and the use of the Human-Artifact Model as a tool used in several steps of the design process.

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ACRONYMS

TTS Text-to-speech

VUI Voice User Interface

AWS Amazon Web Services

API Application programming interface

ASK Alexa Skills Kit

WPE World Publishing Expo

1

INTRODUCTION

Over the past few years, voice user interfaces (VUIs) have gained a lot of momentum. Even though voice control and continuous speech recognition has been around for quite some time now, the technology has not been commercially viable until recently. The major breakthrough for VUIs in consumer products have arguably been its introduction into mobile devices, most notably the introduction of Siri [13] into iOS, Apples mobile operating system for the iPhone.

As voice control has become increasingly accepted in our everyday lives, we are now seeing the technology being implemented in an increasing amount of consumer products, and within a variety of domains such as smartphones, cars, healthcare, TVs, smartwatches, and home automation. One of the interesting products utilizing speech recognition that has recentely been made commercially available is the Amazon Echo [4], a voice controlled wireless speaker, which is the first commercially available product of its kind to feature a VUI as its primary interaction modality.

At the same time, the dominating media outlets of yesterday such as television, radio, newspapers, and magazines are quickly being overtaken by websites and mobile applications among others made available through the introduction of new technology. People no longer consume news solely through the aforementioned traditional outlets, but increasingly consume news through a variety of different devices such as computers, smartphones, and tablets [89].

As consumers become increasingly connected to each other and the world, voice controlled devices like the Amazon Echo hold the potential to support the practices of modern news consumption in the home through interconnectivity with other devices communicating with the same services accross the internet, thus fitting well into the multiplatform experience of todays news consumption.

1.1 MOTIVATION

Researching the area of voice user interfaces in the household, we found that most research has been directed at enabling accessibility for disabled or elderly. With companies embedding voice control into the households through devices such as Apple TV (Siri) and most recently the Amazon Echo, a product developed by Amazon, an inter-

esting research opportunity presented itself in how these would be adopted by consumers and how they can be used within the home.

An everyday practice shared by many households is news consumption. Working with Stibo Accelerator, Archant Media Group, and Cxense, companies all working with aspects of the news industry, we gained insight into this field. The news industry in general struggle to keep up with the possibilities offered in new technology such as the Amazon Echo, as it calls for innovation both within the field of news consumption and news production.

Listening to news content is a practice shared by mostly traditional media such as radio and TV, presenting news content in a linear fashion. In the case of the Amazon Echo, news content will also be presented acoustically while having the opportunity to be interactive, thus making it possible to present content non-linearly as seen on websites, smartphone applications, etc.

We find this opportunity interesting as it calls for rethinking how news content can be presented in an audible format in order to adapt to technology featuring both acoustic input and output modality. Furthermore, with the recent advancement of speech recognition technology, we are interested in investigating the interaction possibilities offered in voice user interfaces in the household and how these are applicable to navigation of non-linear news content.

1.2 RESEARCH SCOPE

The focus of this thesis project is to investigate the potential and limitations of using devices such as the Amazon Echo for news consumption in the household. Specifically, we want to explore how news stories in the form of interactive, acoustic content is best presented and navigated by users in their homes.

To help accomplish this goal, we explore research within the fields of voice user interfaces, news consumption, and designing for the home. Furthermore, we will examine how news are consumed in the home on a broad scale through a survey of artifact ecologies related to news consumption of individuals by applying the Human-Artifact Model, presented in the work of Bødker and Klokmose [26], to empirical data collected through use experiments for the relevant artifacts.

With the research and empirical studies in mind, we develop an Alexa Skill (an application for the Amazon Echo), called News Butler through an iterative design process, which is tested by users who are asked to report on the use of Amazon Echo and News Butler used for news consumption. The data collected in the field test is structured in the Human-Artifact Model and analyzed to gain insight into the potentials and limitations of an application like News Butler.

1.3 RESEARCH QUESTION

What are the potentials and limitations of using voice control for audible news consumption in the home.

1.4 THESIS STRUCTURE

This thesis is structured as follows: Chapter 2 defines voice user interfaces and speech recognition and its use both in the acedemic and commercial world. This chapter also introduces the Amazon Echo as a product utilizing speech recognition as a technology. Chapter 3 describes news consumption and how this has developed along with its practices and chapter 4 describes the home and households as a design area and technological domain. All of this theory introduced in chapters 2-4 is then synthesized into six design guidelines in chapter 5. Chapter 6 introduces the Human-Artifact Model, and hereunder explains the core concepts of activity theoretical HCI. Chapter 7 describes the design process behind the prototype news application, News Butler, developed in this thesis project followed by chapter 8 which describes the prototypes developed leading up to and including the final prototype, News Butler. Chapter 9 presents the data collected through testing of the News Butler application prototype and following interviews used in chapter 10 to generate findings. Chapter 11 evaluates News Butler through the use of the Human-Artifact Model presented in chapter 6. This is followed by a discussion of the findings related to News Butler, the design process, and the use of the Human-Artifact Model throughout the project. Future work that could be inspired by this thesis is proposed in chapter 13 and finally the thesis is concluded in chapter 14.

1.5 CONTRIBUTION

This thesis contributes to the HCI community with the proposal of a set of guidelines for the design of voice controlled, audible news applications for the home grounded in research from the fields of voice user interfaces, news consumption, and designing for the home. Furthermore, the thesis presents the evaluation of the concepts proposed in the developed prototype: News Butler. This is done both through discussion incorporating the proposed set of guidelines and through structuring the empirical data collected in the Human-Artifact Model framework.

Furthermore, we contribute to design process and evaluation methodology through a reflection and discussion of the different elements incorporated in our design process including testing methodology, workshops, and the Human-Artifact Model framework. Lastly, the thesis contributes to the research within the field of voice user inter-

faces by providing insight into users' challenges of navigating a voice interface in the context of the home.

2

VOICE USER INTERFACES AND SPEECH RECOGNITION

In this chapter we describe the recent development in the domain of voice control. After this, a brief description of common structure for applications using voice control is given, followed by an explanation of literature exploring the use and design of voice user interfaces both theoretically and in practice in the areas of home automation, in-car computing, and games. Lastly we describe the current commercial state of the art, followed by a description of the Amazon Echo and its limitations and advantages in relation to news consumption.

2.1 RECENT DEVELOPMENTS IN VOICE CONTROL

Arguably, the most important aspect of a voice control application is the ability to understand acoustic input delivered by the user of the voice interface. Within the last decade, advances in computing power and machine learning algorithms have allowed for the introduction of deep neural network algorithms to be utilized for acoustic modelling and speech recognition [35, 49]. The advance in computational power has allowed for the neural networks to get deeper, thus outperforming the old algorithms significantly. A result of the technical development in this area, is smarter, i.e. larger vocabulary, faster, and more stable applications [49].

2.2 VOICE INTERFACE APPLICATION STRUCTURE

When structuring a voice interface application, there are two apparent approaches to take with regards to the placement of the speech recognition module: client side and server side. Both these have their own set of advantages and disadvantages. Placing it on the client side, limits the amount of available computational power as opposed to the a server side implementation where computational power to run the algorithm will only be needed at a single point instead of on all clients running speech recognition. This also means that client side implementations are harder to update, as each client needs the update as opposed to a single server getting updated. Client side implementations will function without connection to the internet, while server side implementations will not. As such, the purpose of the

application should be the deciding factor when structuring the application.

An example of a client side implementation is JustSpeak [111], which intends to help users navigate the interface of android smartphones by speech. As the tasks are extremely local to the device, e.g. open an application, and furthermore relatively simple, the entire application structure is stored in the client itself [111].

In the example of [90], a server side implementation is needed as commands are to be executed not on the client itself, but remotely. The implement an application for controlling robots remotely through voice input from mobile clients. For this, a server implementing the speech recognition module is used to parse and exchange commands with the robots being controlled remotely.

2.3 DESIGNING VOICE USER INTERFACES

As described by [57], readiness of speech recognition interfaces should be judged by other factors than just the technology implementing the acoustic model: *"Would a typical user judge the automated interaction to be satisfactory - that is, is the user successful at completing the task, and is the interaction easy and efficient from the user's viewpoint?"* [57]. As in any interface, voice interfaces consist of both input and output modalities. As described in [57, 67, 94, 2, 1], it might be preferable to have different input modalities available, different output modalities, or both. In [67] the operating room is presented as a use case for hands free interaction. It is recognized that different gesture input and speech input have different qualities, and as such should be used differently to be most effective. In [57] and [2], a screen as an accompanying output modality. This is described in both as one way of providing the user with input confirmation along with the comfortability of being able to choose between reading and listening.

When designing a purely acoustic interface implementing speech recognition and voice output either in the form of human voice output or speech synthesis, different literature provide a set of guidelines to consider. Kamm provide a general overview of considerations regarding voice interface application design [57]. He divides these into three areas: *task requirements*, *technological capabilities and limitations*, and *user expectations and expertise*.

2.3.1 *Task requirements*

When designing a voice interface, the nature of the task should help define the interaction possibilities. In line with [67] and [94], different input and output modalities might be used as a way of handling errors through input confirmation. Another point raised by [57] is,

that human human dialogue may be studied to make complex interactions with underlying structure feel more natural for the user.

2.3.2 *Technological capabilities and limitations*

The input and output capabilities and limitations of the interface should match the scale of the application. A small scale application used routinely for a specific task may have a small acoustic model, i.e. vocabulary, and provide some initial user guidance to succeed, as opposed to a commercial application seeking to understand a variety of utterances spoken by a range of users.

The output requirements of the application can help define the optimal output modality. As also stated by [94], human speech is prefered over speech synthesis but a large scale application requiring very dynamic output capabilities is best implemented with speech synthesis as the output mode.

2.3.3 *User expectations and expertise*

The expertise level and expectations of a user should be accounted for in a successful design. Novice users might expect a voice interface to be accessible through speech spoken in the behaviours of normal human-human dialogue. These are defined by [57] as: (1) speaking in a continuous manner, (2) anticipating responses and speaking at the same time as the other talker, and (3) interpreting pauses by the other talker as implicit exchange of turn and permission to speak.

Expert users might want to have access to functionality in a more effective format. One way to do this is as implemented in [111] as command chaining, i.e. have multiple commands executed from a single utterance, or as implemented in [50] as vocal shortcuts.

2.4 APPLICATION DOMAINS OF VOICE USER INTERFACES

Voice user interfaces allow for a more natural man-machine interaction and allows hands-free interaction. The natural form of interaction facilitates users being able to use applications without having to focus on the actual interaction. In [50, 97, 66, 27, 82] the design of voice interface design is explained and implementations utilizing voice control are evaluated within the domains of home automation, in-car computing, and games.

2.4.1 *Home automation*

The Sweet-Home is a French national supported research project with the aim of designing a new smart home system for the elderly fo-

cusing on three main aspects: providing assistance via natural man-machine interaction, easing social inclusion, and providing security reassurance by detecting situations of distress. Portet et al. [82] explain the design of the smart home voice interface for the Sweet-Home project and test it with the purpose of user evaluation and assessment of the acceptance and fear of this new technology. Regarding the voice control of the system, the authors found that a majority of the test participants find the voice interaction of the system natural. They also found, that nearly all of the test participants were tolerant towards the system asking them to repeat orders, as long as it did not happen too often [82].

2.4.2 *Voice control to assist people with disabilities*

People with certain physical disabilities can benefit greatly from assistive systems based on speech recognition. In [39, 65] such systems are developed. In both the examples of [39] and [65], the authors develop a system utilizing voice recognition implementing a mouse emulator, a keyboard emulator, and certain home environmental controls for the disabled who have difficulty in moving pointing devices or pressing buttons, but are able to speak. Xian finds that voice command controls are critical features for home environmental control, especially for the disabled users who may have difficulties controlling their hands or fingers [65]. In [39] it was found that their system was too inefficient especially when it came to moving the mouse, as test subjects were not satisfied with the many repetitions of moving the mouse when the target was far away.

As previously mentioned, Zhong et al. [111] have developed JustSpeak, an application enabling android phones as an accessibility service (support for users with accessibility issues e.g. blind users). This was found to significantly reducing the time spent interacting with the phone for blind users.

2.4.3 *In-car computing*

One application domain where hands-free interaction and not having to focus on the actual interaction with various systems is of importance is in-car computing as explored in [50, 97, 66].

[97] and [66] explore how information such as personal e-mail and social media feeds can be delivered and handled in the car. A big concern for this area is safety and as stated in [97], driving the car has to be the primary focus of the driver, everything else should be secondary. [50], [97], and [66] all measure the success of applications in the car in the distraction level of the driver when using the application. Not surprisingly, because of the amount of focus required when driving a car, the interactions have to be kept as simple as possible

[50, 97, 66]. An interesting finding from [66] indicates that the difference in distraction levels of passively listening to information in the car and navigating the same content through simple vocal interaction is small. The speech recognition module also has to be robust, as a driver's attention could suddenly shift to more relevant aspects of driving, thus leading to incomplete commands [50].

2.4.4 *Games*

The use of player-to-player voice is widespread in the domain of gaming, but as stated in [27] the use of voice as an input for games is relatively unexplored. Carter et al. [27] study player experiences related to voice interaction in four commercial games and discuss the implementation of the voice interaction in these games, seeking to understand the dimensions of failures and successes within voice interaction in games.

The authors state that voice interaction is curiously polarizing in games. "*Players routinely express frustration with its accuracy, its social awkwardness, its potential for griefing and its inefficiency.*" [27] But they also find that some instances of voice interaction are well received, attributed with increasing flow and immersion. The instances where voice interaction is generally well received are the ones where there is a convergence of identities between the player and the character identities [27], meaning that player and character identities overlap. This is seen in one of the games they study (Splinter Cell: Blacklist) where the player can yell "Hey you!", making the character also call out "Hey you!" to e.g. attract the attention of guards. This ability to relate directly to the fictional character was found to contribute towards increasing player sense of flow and immersion [27]. It was found, that in games where there was no such convergence the interaction was in most cases found to be unnatural and uncomfortable and causes a dissonance between the player and character identities which could diminish the player's sense of flow and immersion [27]. Interestingly this identity dissonance is not always negative. The authors note that "What is interesting about approaching voice interaction in games through this lens is the way it reveals the character identity in sports simulation games like FIFA." [27] In the case of FIFA (soccer simulator) voice interaction allows for the player to make substitutions, change team formations, use custom tactics etc. Players praised the voice interaction for improving their ability to perform in the game and for avoiding a sense of discomfort; the voice commands felt natural and not forced [27].

2.5 COMMERCIAL STATE OF THE ART

As previously mentioned, speech recognition is the translation of spoken words into text. Application areas currently utilizing this technology include voice user interfaces such as voice dialling simple data entry (e.g. entering a credit card number), speech-to-text processing (word processors, emails, text messages etc.) among others [106].

2.5.1 *Technological advances in speech recognition*

"Three years ago, Google's voice recognition could recognize just three out of four words coming out of your mouth, Schalkwyk says. Thanks to an accelerated pace of innovation, the Google apps on your phone right now can correctly guess 12 out of every 13 words. Pretty soon, according to Tuttle, 'We're going to live in a world where devices don't have keyboards.'" [24]

One of the reasons for speech recognition suddenly becoming much more reliant over the past few years can be explained by the revival of an old technology from the 1980s used for predicting and analyzing large fields of data. This technology is called deep neural networks. These types of neural networks only became a viable option recently, following a massive speed-up in computer processing and in the development of new software approaches [24].

The use of this technology for modelling speech in computers is, according to Google engineer Jeff Dean the *"biggest single improvement in 20 years of speech research."* [24]

Tim Tuttle, a Ph.D from the Massachusetts Institute of Technology who has also worked at the A.I. Lab at M.I.T claims that we are going to see speech recognition systems that have human or better-than-human accuracy become commercialized [24].

Along with the advance in speech recognition accuracy of requests are also being improved in other ways. To give an example Google's system currently uses context, physical location and "certain other things it knows about the speaker" to make assumptions on where a conversation is going and what it all means - just like humans do [24].

2.5.2 *Speech recognition applications areas*

2.5.2.1 *Smartphones*

Speech recognition is widely used in smartphones. The most well-known are Apple's Siri [13], Google's Google Now [46], and Microsoft's Cortana [68]. These systems allow for interaction simply by speaking commands to the smartphone. Examples of ways utilizing this include searching the internet, finding nearby Vietnamese places

to eat, or simply writing a text message to a friend by speaking the message and hitting send [95].

2.5.2.2 *Cars*

Speech recognition has been implemented in cars for a while now with varying success [29]. A lot of cars manufacturers are implementing an advanced speech recognition system developed by Nuance [71]. Many of these systems support very few commands though and mostly only allows users to facilitate hands-free navigation or calling but Siri-like voice systems in vehicles are desperately needed for automakers to keep up with consumer expectations. Apart from Nuance, Apple also made a system, CarPlay [10], which facilitates a safer and better way of using an iPhone in a car. This system features Siri voice control and is according to Apple specifically designed for driving scenarios. It also works with the knobs, buttons, or touchscreens of cars that implement the system [10].

2.5.2.3 *Healthcare*

Nuance [71] also develop speech recognition systems for the healthcare sector [73]. Clinicians spend a lot of their time documenting, and can utilize speech recognition to turn dictations directly into formatted documents without the need for transcription. Speech recognition also makes it possible to dictate directly into EHR[1].

2.5.2.4 *Smart TVs*

Samsung are implementing speech recognition in some of their Smart TVs [88]. Apple have also implemented their Siri voice control for the latest version of Apple TV (2.0) [11]. This was announced on september 9 at WWDC (World Wide Developer Conference) 2015 [14].

2.5.2.5 *Smartwatches*

Smartwatches is another new commercial product where the voice controlled personal assistant is one of the key features. This makes it possible to do most of what is possible on a smartphone by speaking to your watch. Examples of smartwatches with speech recognition capabilities include Android Wear [9] utilizing Google Now [46], pebble [79] powered by speech recognition software from Nuance [72], and arguably the most popular smartwatch the Apple Watch [12] using Siri [13]. Common for these smartwatches is that the voice control is very similar to that of a smartphone and the fact that they need to be connected to a smartphone in order to access most of the functionality.

1 EHR (Electronic Health Record) is a *"longitudinal electronic record of patient health information generated by one or more encounters in any care delivering setting [**?**]"*

2.5.2.6 *Home automation*

Recently there has been quite a few voice controlled personal assistants for home automation coming out. The most popular examples include ivee [55], cubic [33], VoicePod [101], and arguably the most popular of them all the Amazon Echo [4]. Common to all the products is that they allow the user to tap into various internet connected services controlling locks, lighting, climate, security, etc. These devices also act as personal assistants making it possible to do most of what you can do with personal assistants on smartphones such as getting news, weather reports, cooking recipes, etc.

A central point for this thesis is the development of a news application prototype, News Butler, for the Amazon Echo. As such we will focus on the Amazon Echo in the next section.

2.6 AMAZON ECHO

An example of a recent application of voice control is Amazon Echo (as seen in figure 2.1), which is a voice controlled device from Amazon.com [4].

The device has been available to the mass market since June 23, 2015 and according to [23] has been Amazon's first attempt at expanding their product portfolio beyond the Kinde Ereader [8]. The device is connected to a cloud service, called Alexa, storing the funtionality of the device. At the current time of writing, Amazon Echo is the most popular commercially available product for voice controlled home automation [23]. In line with Weiser's vision of ubiquitous computing [104], Amazon accomodates the emerging desire for embedding sensors into objects in the home, thus providing means for interacting with these [23]. As default, it comes a range of services including Amazon's own music service, alarms and timers, and shopping and to-do lists. Users can also connect calendar accounts. It also integrates with smart objects such as lamps, e.g. Philips Hue [81].

Figure 2.1.: The Amazon Echo seen from the front.

2.6.1 *Companion application*

While the Amazon Echo can be controlled just by voice input it comes with a companion application for smartphones, tablets, and web which is used for a couple of things. (1) To set up the Amazon Echo device in your home with access to wifi, (2) to access basic functionality such as starting a music playlist (this can also be done by voice), and (3) to enable or disable the applications available on the device and configure these. The main purpose of the companion application is to give remote access to the functionality provided by the software (i.e. Alexa), or present additional information related to the acoustic input. The otherwise purely acoustic input and output from the physical device is then augmented with visual elements within the application [4].

2.6.2 *Hardware and technical details*

The Amazon Echo that has been used in this thesis for the development of our News Butler application is the version that was released for the general public on June 23, 2015. As of yet no versions of the Amazon Echo featuring other hardware specifications have been released. The hardware specifications of the Amazon Echo are as follows [4, 107, 53].

- Physical dimensions: 235mm x 83.5mm x 83.5mm.
- Weight: 1045g
- Audio: 2.5 inch woofer and 2.0 inch tweeter.
- Processor: Texas instruments DM3725 ARM Cortex-A8 processor.
- RAM: 256MB of LPDDR1 RAM
- Storage space: 4GB
- Wi-Fi: Dual band, dual antenna Wi-Fi (MIMO). Supports 802.11a/b/g/n Wi-Fi networks. Does not support connecting to ad-hoc Wi-Fi networks.
- Bluetooth: Bluetooth 4 with A2DP and AVRCP.
- Sensors: seven-piece microphone array.
- System requirements (for companion app): The Alexa App is compatible with Fire OS, Android, and iOS devices.

See figure 2.2 for a visual representation of the hardware and the inside of the Amazon Echo.

Figure 2.2.: An overview of the Amazon Echo on the inside.

2.6.3 *Software*

As mentioned previously, the software defining the functionality of the Amazon Echo runs entirely in the cloud. The core cloud processing functionality (Alexa) runs on Amazon Web Services (AWS)[5] and features a state of the art voice recognition module. The text-to-speech engine generating the audio feed to be played on the client side also runs on the cloud, thus streaming the audio to the client.

The client side of the device mainly consists of hardware. The only responsibility of the client is to recognize the *wake word* (Alexa), i.e. the word to be spoken for the client to activate, in order to additionally send the command spoken by the user to the cloud software [91].

Third party developers have the opportunity to develop applications that Alexa can connect to. These applications are called *Alexa skills*. Third party applications run either on a dedicated web server or, as Alexa, through AWS. Alexa thus functions as a relay module for the third party applications, connecting the client and the potentially third part server. The communication protocol is based on http with a JSON API. The request and response syntax is defined in the *Alexa Skills Kit* (ASK) [3]. Developers also define an interaction model consisting of two modules: (1) a JSON object defining the possible *intents* and (2) a list of string commands for each possible intent. An intent is defined as the intention behind the spoken command, resulting in a specific response defined by the individual application [3].

2.6.4 *Interaction*

Besides the voice interface, the physical device features a tangible interface giving access to very basic functionality as seen in figure 2.2 from the previous section. The action button functions as a substitute to saying the wake word. The light ring is turnable, resulting in manipulation of the speaker volume, and lastly, the microphone button

functions as a microphone mute toggle. When interacting with the Amazon Echo, processing feedback is given through the light ring, which has different visual expressions depending on the state of the interaction. (1) red (figure 2.3a) means microphones are muted, (2) blue with light blue pointing in a direction (figure 2.3b) means that the device is listening for spoken phrases, and (3) mix of blue and light blue (figure 2.3c) means that the could is processing the request.

The interaction with Alexa skills is done primarily through voice. Some default applications are accessible through the companion application, but third party applications are accessible purely through the voice interface defined in the interaction model as described in the previous section. The interaction possibilities given by the interface are defined in intents, which are coupled with one or multiple commands triggering the intended request and application response. Commands activated by phrases, which are divided into four parts: *wake word, request identifier, invocation name, and command* [7]. An example of a request could be: 'Alexa, ask News Butler to get the news'.

2.6.4.1 *Wake word*

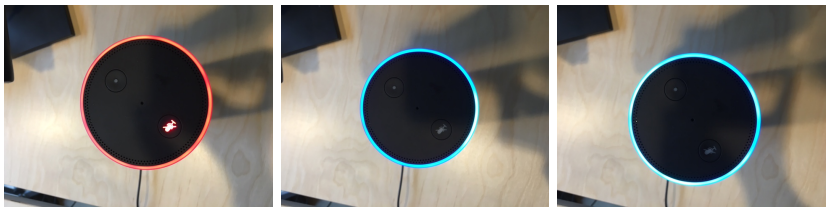
As mentioned previously, every vocal interaction with Alexa starts by pronouncing the wake word, Alexa. It is also possible to mimic this functionality by pressing the action button on the device.

2.6.4.2 *Request identifier*

The request identifier have multiple supported phrases and surrounds the invocation name. In the example above, the request identifier consists of the words 'ask...to'. Other supported phrases include 'tell...to', 'ask...for' among others. The request identifier functions as Alexa's method of identifying the invocation name.

2.6.4.3 *Invocation name*

The invocation name functions as the link to the application. In the above example, the invocation name is 'News Butler'. An invocation



(a) muted (b) pointing (c) processing

Figure 2.3.: An overview of state feedback. (a) means muted, (b) means listening for phrases, and (c) means request processing

name is coupled with a network resource, either stored remotely or on AWS.

2.6.4.4 *Command*

The command of the spoken phrase is the direct link to the intention of the user interaction, which is specified in the interaction model as intents. Commands result in the specific request and corresponding response triggered by the individual intents.

2.6.4.5 *Continued interaction*

Each response feature a flag indicating whether the interaction is to continue at the end of the response or not. This gives Alexa skills the possibility of mimicing human-human dialogue as adviced by Kamm [57]. When the interaction is set to continue, the first three parts of the phrase spoken to the Amazon Echo, i.e. wake word, request identifier and invocation name, are obsolete.

2.7 LIMITATIONS AND ADVANTAGES OF NEWS CONSUMPTION ON THE AMAZON ECHO

When analyzing the limitations and advantages of consuming news on the Amazon Echo there are a variety of factors that need to be taken into account. The most important factors are the input and output modalities of such a device along with the fact that voice control as a form of interaction has only recently become commercially viable.

We believe that the Amazon Echo, as a product for the home environment, has great potential for fitting into an already existing ecology of artifacts used for news consumption. The Amazon Echo has the potential for making of audible news consumption a more interactive, efficient, and personalized experience and as the device is always on and alwas connected, an updated news feed can be as accessible as on any other connected platform.

2.7.1 *Audible news*

The Amazon Echo delivers news audibly. This means that news are consumed by listening. Listening as an activity performed with the purpose of consuming news is usually tied to another activity, and is thus mostly done while doing something else e.g. cooking, cleaning, etc. [31]. As listening to the news is a practice that is not done as intensely or with as much focus as e.g. reading the news [31] it is necessary that the content presented is tailored to fit the practice.

2.7.2 *Hands-free interaction*

Perhaps the biggest advantage of the Amazon Echo is the voice interface. While the interaction will be slower than that of a tangible interface, this also means that users can interact with the interface while being occupied with other activities. Utilizing a voice interface also opens up for the possibility of implementing a wide array of interaction possibilities, possibly chaining individual commands together. Voice control matches listening as a practice of news consumption well, as they both have the ability to not be the primary focus of the user [31]. As described by Kamm having an interface supporting both voice input and output also creates the possibility of mimicing human-human dialogue [57].

2.7.3 *Text-to-speech synthesis*

Third party developers can produce audible output consisting of strings and mp3 files, which are compiled into an audio stream through text-to-speech (TTS) synthesis. This means that developers are limited to using Amazon's audio production module. As described previosuly, TTS synthesis is generally prefered for producing dynamic audio output. TTS synthesis is a limitation compared to being able to use a stream of audio produced professionally for news, as it requires a greater amount of attention to understand the response output produced by TTS synthesis [57].

2.7.4 *Personalization of content*

Compared to media such as TV and radio, Amazon Echo, along with other connected news services, has the opportunity of having a user model, as described in [15], attached to the individual news application. This means that content can be personalized to the individual user. While traditional media (again, TV and radio) will be limited to delivering news for the mass market, Amazon Echo applications can deliver news related to the interests and context (e.g. location) of the user.

2.7.5 *Multi-platform news experience*

Another advantage to implementing a user model is, that it creates the possibility of upscaling applications to multi-platform services. Utilizing the same user model accross platforms allows different media platforms to use the experience accumulated by the individual applications, thus rendering the redundancy of an individual user model obsolete. Multi-platform applications also have the possibility of delivering different amounts of detail related to e.g. a news story

corresponding to the individual platform. A full size article might not be feasible output for a purely acoustic output modality [57], but will fit the format of a website instead.

2.7.6 *Challenges related to development*

There are a few challenges assosiated with developing Alexa skills. First of all, the application structure revolves around requests. Developers are limited to developing applications thay users can pull information from sources with. Currently there is no possibilities in the API for pushing content to the individual Amazon Echo, thus eliminating the possibility of two way communication between the device and other connected devices.

As the Amazon Echo uses an acoustic input/output modality, with the exception of the companion application, developers must consider the points raised by [57] with regards to providing constant acoustic confirmation and error handling. It can be difficult to maintain an overview of the application and the current state of the interface without visual confirmation.

Limited output size is another limitation of the cloud software, Alexa. In regards to news, this limits the platform to a short format compared to a detailed article from news paper. As described in the previous section, developing a multi-platform application is one way to overcome this limitation.

Lastly, the passive nature of media like TV and radio is irreplicable through the use of ASK. To receive a continous stream of news within news application developed for the Amazon Echo, the concept of *continous interaction* described previously has to be utilized.

3

NEWS CONSUMPTION

In this chapter we describe the recent developments in news consumption and to a high degree technology's impact on how news are consumed followed by a description of the concept of personalization. Finally, we outline the practices of news consumption covered by [31].

3.1 RECENT DEVELOPMENTS IN NEWS CONSUMPTION

Sasseen et al. [89], and Meijer and Kormelink [31] research how people's news consumption has changed over the years. In [89] the authors analyse a survey on news media consumption conducted by the Pew Research Center in 2012. They find that in 2012, about 39% of respondents got news online or from a mobile device the day before they participated in the survey compared to 34% in 2010, when the last survey was conducted. Combining online and digital news sources, the share of people who got news from one or more digital forms on average rises to 50%, just below the audience for television news, but ahead of print and radio [89] (see 3.1 for a visualization of the data).

The survey also shows that Americans over 50 are still somewhat less likely to consume news digitally compared to those under 50. Especially interesting, it shows that those under the age of 30 are moving away from traditional news delivery systems such as TV, radio,

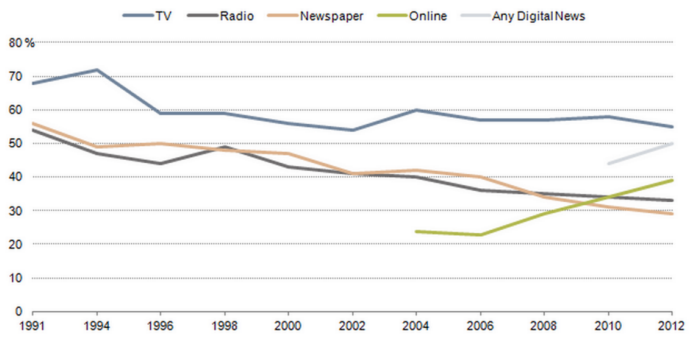


Figure 3.1.: The development in news media consumption [89].

and newspapers altogether [89]. Meijer and Kormelink find that people perform certain activities when interacting with news, which can be described by the following verbs: *reading, watching, viewing, listening, checking, snacking, monitoring, scanning, searching, clicking, linking, sharing, liking, recommending, commenting, and voting* [31]. They conclude that when people engage in the activities of reading and watching news, they do so with great attention and immerse themselves in the content. Consistent with [89], Meijer and Kormelink claim that reading and watching news has become less tied to the specific platforms (newspapers and TV, respectively) associated with the activities. They also find that *checking* to find out as efficiently as possible if something new/interesting has happened has become increasingly popular with the introduction of news applications and such [89]. Pavlik has looked into how technology has influenced journalism in general [78] and found that with the emergence of the internet, the way we consume news and interact with them has been changed. He finds that the online news world increasingly use immersive and interactive multimedia news reports. In [34], De Bruine et al. seek to explore the potential of Digital Audio Broadcasting (DAB) through a series of user trials where users can interact with a set of web pages broadcast alongside the digital audio stream. They find that users are willing to interact with content broadcasted on the digital audio stream, provided the interaction is easy [34].

3.1.1 *Non-linear news*

As described in [89] the practices of news consumption are changing from the traditional forms of media towards the web based media such as smartphones, tablets and computers. Although they might deliver the same stories to the consumer, there is a large difference in how they are being consumed [31]. While news delivered through traditional media is consumed in a linear fashion, i.e. the user has no control over the flow of information being presented, new types of media let users consume news in an active manner, thus forming new practices for consuming news [31].

While the most common examples of nonlinear news is the web through computers and mobile platforms [28], research literature shows examples of experimental implementations of nonlinear news presented in a way that resemble TV and radio [64, 66, 62]. While [64] and [62] are systems which seek to build on the experience of watching TV, [66] explores information delivery in the car.

In the implementation done by Lindstedt et al. [64] three core interaction features are implemented: *more*, which is feature intended to provide an elaborated version of the story, *related*, which appends stories related to the current story to the list of stories to play, and lastly *increase/decrease time*, providing the user with a way to control

the length of the news story segments being played. It was found, that users liked the control the active style of consumption gave them. These findings are in line with the findings of [62], which is a very similar study.

The work presented in [66] revolves around in-car information delivery, and explores the impact of active control. The interaction capabilities given to the user includes skipping forwards or backwards and getting more detailed information regarding the content being presented. A user study of both a passive and active control style is tested, and it shows that while the levels of distraction of passive and active control were mostly similar, the impact of active control was of little significance. Which control style was prefered, varied from user to user, which was also seen in both [64] and [62]. Users with experience in navigating similar applications through technology such as tablets, smartphones and computers were more likely to also like the active style of interaction with news content.

The work done by [28] explores the theory that mental models of users are tied to the platform used to access content. They study how users interact with the same content across different platforms. In this case, the platforms studied are a laptop, a PDA, and a mobile phone (not a smartphone). Contrary to what the expected, they find the platform to be more or less irrelevant. Instead the content being accessed is of greater importance - the users expect the content to be structured in a certain way, which is independent of the platform used to access it [28].

3.2 PERSONALIZATION

Fischer [36] argues that one of the fundamental challenges of systems design is how to make software for the mass market, while making it function as if it was programmed specifically for one. He states that *"A fundamental objective of human-computer interaction research is to make systems more usable, more useful, and to provide users with experiences fitting their specific background knowledge and objectives."* [36] Thus, a need to tailor content to the specific user through the concept of personalization has risen with the ever increasing amounts of content available through news portals [40].

Thurman and Schifferes [96] define personalization as: *"A form of user-to-system interactivity that uses a set of technological features to adapt the content, delivery, and arrangement of a communication to individual users' explicitly registered and/or implicitly determined preferences."* [96] They also identify two different approaches to personalization: *explicit* and *implicit personalization*. Explicit personalization requires a specific user profile specifying what content is interesting to the user, as implemented in [66]. The implicit approach builds the user profile itself, based on the choices and interactions the user performs as im-

plemented in [108]. A very popular to combine the two, as seen in modern news aggregators for mobile devices, such as Flipboard [37] and news360 [70], and also in the research provided in [64].

3.2.1 *Content recommendation*

In order for a service to deliver a personalized feed of stories to consume, it has to implement a filtering algorithm. This concept is called content recommendation and is the process of presenting an output in form of content based on contextual information as the input [42, 38, 40]. The work done by [42], [38], and [40] all explore different aspects of content recommendation.

In [42], the importance of geographical information is explored. In a study of ten different news portals, it is found that geographically categorized also have a geographically distinct reader segment, thus leading to the conclusion, that this can be exploited by news portals through implementation in recommender systems.

[38] study the difference in relevance of twitter [98] content recommended by two different profiles: a trend oriented profile, and a user interest oriented profile. The trend oriented profile recommends trending topics on the site, while the user interest oriented profile recommends content based on the interests of the specific user. While a combination of the two proved to perform the best, the interests of the user were found to be of much greater significance than the current trending topics.

Finally, [40] study recommendation of content based on the current content visited, but in different ways. One approach, called *collaborative filtering*, recommends content based on the behaviour of other users who previously visited the same content. Another approach, called *content-based filtering*, recommends content based on only the content currently presented, i.e. the topic of the content. Even with the sparse data available for fresh news content, collaborative filtering outperformed the content-based approach. Furthermore, the collaborative approach was found to scale better with more data as well.

3.2.2 *User models*

In order to make content personalised and tailored to the individual user we need knowledge about the user. We store this knowledge in user models and these are what drive personalization. In [15, 36], these user models are described and their uses are explained. Fischer [36] analyzes the evolution of HCI as a research area over the last 15 years and briefly characterize problem in HCI where user modeling may provide some answers. He claims, that one of the central objectives of user modeling in HCI is to *"... address the problem that systems*

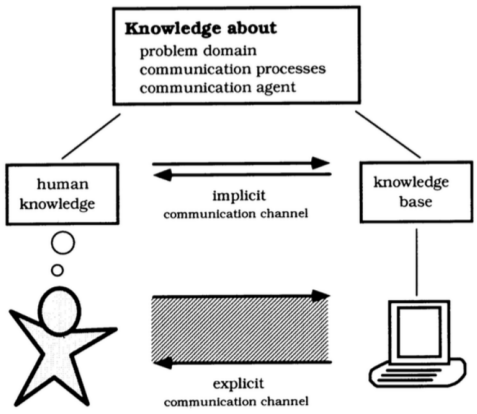


Figure 3.2.: The explicit and implicit communication channels between human and computer [15].

will be unable to interact with users cooperatively unless they have some means of finding out what the user really knows and does." [36]

Some of the beginnings of user modelling were derived from this need and desire to provide better support for human-computer collaboration. Fischer states that human-computer collaboration can be approached from two perspectives: (1) *the emulation approach*, based on the metaphor that to improve human-computer collaboration computers need "human-like abilities"; and (2) the *complementing approach*, based on the fact that computers are not human and that human centered design should exploit the asymmetry of human and computer by developing new interaction and collaboration [36]. Focus has historically been on the human emulation approach in user modeling but based on the limited success of this approach, the interest shifted more and more to the complementing approach.

Traditionally, computer and human were only connected by a narrow *explicit* communication channel. Knowledge-based architectures for HCI have explored the possibility of an *implicit* communication channel (see figure 3.2). This implicit communication channel supports communication processes that require the computer to be provided with a considerable body of knowledge about problem domains, communication processes, and the communication agents involved [36]. Fischer [36] summarizes the preceding work of other authors and finds that techniques usable to achieve this body of knowledge include: (1) being told by the users (e.g. through questionnaires, setting preferences, or specification components); (2) being able to infer it from the user's actions or usage data; and (3) communicating information about external events to the system.

Similarly but in a simpler fashion, Barua describes user models stating that they store the personal information acquired by devices and services and that this is what drives personalization [15].

3.3 PRACTICES OF NEWS CONSUMPTION

An important concern when working with news is how information should be presented. A widely accepted and standardised writing style and form of presenting news is the inverted pyramid [87].

The inverted pyramid follows a lead-and-body principle, meaning that *"The most important information is summarised in the so-called 'lead sentence' that, according to standard practice, has to answer four or five 'w-questions' (who? when? where? what? and perhaps why?). After the lead sentence comes the rest of the story, which may already be redundant for the reader."* [87] The inverted pyramid can be seen in figure 3.3.

In [78] Pavlik loks into how technology influences journalism and proposes that technology influences the content of news among other areas. He argues that the emergence of the internet has changed the way we consume and interact with news. He further states that *"The once basic inverted pyramid news writing style is becoming obsolete in the online news world. It is being supplanted increasingly by immersive and interactive multimedia news reports that can give readers/viewers a feeling of presence at news events like never before."* [78]

As previously mentioned, the work done by Meijer and Kormelink [31] covers the different practices associated with consuming news. The study is a synthesized analysis of multiple research projects with the intention to find a change within the specific practices that form a complete description of how people consume news. The research projects studied span from year 2004 to 2014. The practices presented in the work include: *reading, watching, viewing, listening, checking, snacking, monitoring, scanning, searching, clicking, linking, sharing, liking, recommending, commenting, and voting* [31].

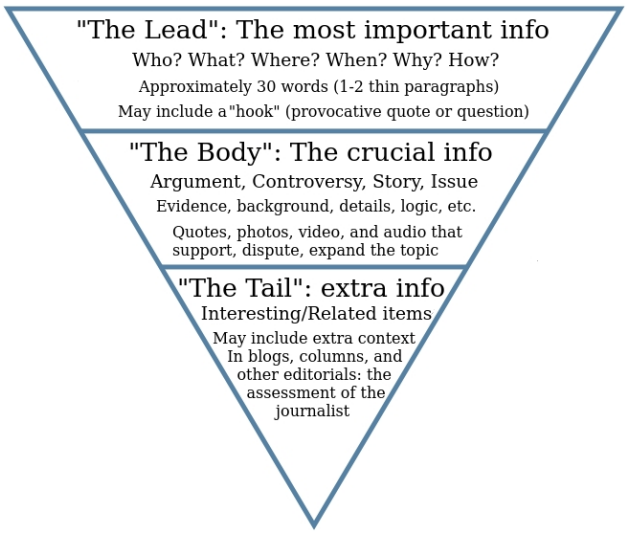


Figure 3.3.: The inverted pyramid.

3.3.1 *Reading*

Reading news is about depth and is done with great attention and when users have enough time to have a reading session. It was mostly newspapers associated with this, but has changed to become less tied to that specific platform.

3.3.2 *Watching*

Just like reading. watching is an intense practice where you immerse yourself in the story. Watching news is often used in part to structure people's day e.g. watching TV in the evening after kids a laid to bed. As with reading the amount of platforms making this news practice available has increased.

3.3.3 *Viewing*

Viewing is described as a subordinated form of watching; the platform of the news can function like a wallpaper while you're doing something else. One example of this is having the TV turned on while preparing dinner.

3.3.4 *Listening*

Listening is usually tied to another activity, and like viewing, is something done while doing something else e.g. driving a car. Podcasts aren't mentioned by the participants of the survey.

3.3.5 *Checking*

This compares to checking an email account. It is the process of discovering whether anything new or interesting has happened as efficiently as possible. As time has passed, checking has become more popular with news apps and such. This is done in micro-periods of time, such as waiting outside a bathroom. People develop a 'checking cycle', which involves checking the latest in terms of news, e-mail, facebook, etc.

3.3.6 *Snacking*

Snacking is a practice used to get a sense of what's going on, and is not in any way tied to depth of a specific story. It's about diversion and getting an overview of the news stories.

3.3.7 *Monitoring*

Monitoring is about being alert to danger and anticipating calamity to yourself and those around you. Today monitoring has been made easy by push notifications and social media, inviting people to follow stories with this kind of interest.

3.3.8 *Scanning*

Scanning is domain specific, and is about seeing and checking for developments within a specific domain.

3.3.9 *Searching*

Searching is about finding an answer to a specific question. In contrast to the previous activities, people prefer search engines and wikipedia over conventional news sites/organisations. Efficiency is valued.

3.3.10 *Clicking*

Clicking refers to hitting a news item to receive more information. Not clicking is found to not illustrate a lack of interest. Instead it is found, that headlines are often sufficient information to get enough of an impression of the story.

3.3.11 *Linking, sharing, liking, recommending, commenting, and voting*

Research participants all have similar considerations regarding these social practices. The participants do not want to put themselves on display. It is found that people need an incentive to participate in journalism. When they share, they do so as a communicative function and as a tool for personal impression management.

4

DESIGNING FOR THE HOME

This chapter describes research done within the field of designing for homes. We start by giving a brief introduction to technology in the household and the relationship between the two. After this, we outline the values important to consider when designing for homes, how the designs have to fit in already existing *artifact ecologies*, and what is characteristic of how people behave in their homes. Concludingly, we describe the process of adoption of technology in households.

4.1 TECHNOLOGY IN THE HOUSEHOLD

Technological artifacts was once mainly for workplaces [20] but as time has passed and prices have dropped, technology has moved from being workplace specific to being used everywhere [20]. In line with the vision described in Weiser's paper [104], homes are getting increasingly smart as they are filled with technological artifacts. As this transition was happening, research on how technology fits in households has become ever more relevant. The workplace has a set of values appropriate in terms of usability, which differs from the ones of the home [16, 20, 32, 75, 74, 80]. As such, within the past two decades, much research has investigated the relationship between households and technology and how technology is intertwined in the daily routines of householders.

We were able to identify 4 general categories, which work done in this area generally falls into. The earliest research conducted in the area covers the relationship between household and technology [99, 100]. Other work has covered which aesthetics and usability values are particularly important to consider when designing for households [16, 20, 41, 109]. Some work has gone into the description of homes as ecologies of artifacts [16, 26, 99]. Studies of how people behave in their homes have been conducted, to help identify routines in households [32, 48, 75]. Lastly, much work has been conducted to study how new technological artifacts are adopted and how these should be designed to have a high probability of adoption in the existing ecology of the household [51, 74, 80, 93].

4.2 THE TECHNOLOGY-HOUSEHOLD RELATIONSHIP

When trying to understand consumers and the use of technology in the household, the traditional approach has been to only focus on the nature of adoption of technologies [99]. The work of Venkatesh [99, 100] suggests that we should not only examine adoption of technology but patterns of use and the impact of technology on household dynamics as well because while adoption is an important component of the technology/consumer interface, it provides but an incomplete picture of the totality of the interface itself. In understanding the relationship between household and technology, the conventional approach has been to look exclusively at the household and not the technology itself [99]. It is proposed that we take a more balanced approach meaning that we not only examine the nature of the household but also the characteristics of household technologies [99]. When examining the characteristics of household technologies Venkatesh proposes that we embed them in a multidimensional space with the following five dimensions: (a) Instrumental vs. Expressive; (b) Task oriented vs. Pleasure oriented; (c) Passive vs. Active; (d) Unifunctional vs. Multifunctional; (e) Low social impact vs. High social impact [99].

Venkatesh later establishes a framework motivated by the need to understand the role technology plays in family life [100]. This framework helps us understand the interaction between the social space in which family behavior occurs and the technological space in which the technologies are embedded and used. Knowing that entry of new technology into the household means entry into both the social space and the technological space we can investigate the social space by posing questions related to sub-environments, activities targeted by technology use, and household members as diffusion agents [100]. We can then find an entry into the technological space interacting with the previously investigated social space in two ways: (1) by performing existing tasks better or more efficiently and at less cost, or (2) by permitting activities not previously possible, creating new realities and possibilities [100].

4.3 VALUES OF THE HOUSEHOLD

Venkatesh also states that households have internal value systems which come into play when adopting new technologies [99]. These values are investigated in the works of [16, 20, 41, 109]. Bødker argues that there are going to be problems because the lines between work life and non-work life get blurred and that *second wave* HCI (work life) has to be rethought to accommodate the problems of *third wave* HCI (location independent computing) [20]. The problems of location independent computing arguably become increasingly relevant

as computers get smaller and more portable. But while the benefits of flexibility, fluidity, and portability are obvious, a design process that places access-anywhere at its centre misses the opportunity to build upon an alternative set of values: those associated with designing for a particular place [109]. According to Ylirisku [109], designing for the home as a particular place means moving away from the concept of *task* to a consideration of how the physical environment itself is actively constructed in a way that supports its occupants' values, needs, and ways of being. Following the thoughts of [109], Gaver states that people do not just pursue tasks and solve problems, they do also explore, wonder, love, worship, and waste time and that there is a danger that as technology moves from the office into our homes, it will bring workplace values such as efficiency and productivity along with it at the expense of other possibilities [41]. Bell describes these values and asks that designers make considerations such as pleasure, fun, emotional effect, aesthetics, experience of use, along with social and cultural impact when thinking about design for the home [16].

4.4 TECHNOLOGY AS ARTIFACTS IN ARTIFACT ECOLOGIES

Bell further argues that one has to remember that technology will be situated or embedded in an *ecology* of artifacts which combined form a certain meaning and aesthetic experience [16]. Venkatesh also briefly comments on the role of internal ecologies and how they come into play when adopting new technologies [99].

Artifact ecologies are also described by Bødker and Klokmose [26]. They describe artifacts ecologies as a set of artifacts used by users in relation to a given activity[1]. In line with Bell and Venkatesh, they identify how artifacts are never seen in isolation, but their use is influenced by the ecology in which they exist.

In addition, they claim that the historical artifact ecology plays an important role when appropriating new artifacts, since it is what shapes the user's perception of other artifacts. The historical artifact ecology consists of all the artifacts that previously have been applied to realize the activity. There are different types of relationships between artifacts in an artifact ecology. As an example, the pen and paper co-occur and are used at the same, whereas *substitution* may occur in environments of many interchangeable artifacts [26]. An artifact ecology often consists of multiple artifacts built for similar purposes, but with slight variations and no clear delineation of when to use which artifact [26]. In this case the choice of artifact can depend on a number of different things e.g. the intended outcome.

1 Activity in this case is understood in the sense defined by activity theory. We come back to this in chapter 6.

4.5 THE BEHAVIOUR OF PEOPLE IN THEIR HOMES

All the research conducted points to the importance of considering the internal structure and behavioural patterns of the household. [48] identifies how different types of activities are centered in their respective physical areas of the home, while [32] and [75] cover how technology is used within homes to intertwine with actions of the householders to form practices and routines.

In the work done by Crabtree and Rodden [32], studies are oriented towards communication patterns of the household, and identifies three different areas relevant to these: *ecological habitats, activity centres,* and *coordinate displays.* Ecological habitats are places where communication media reside, i.e. places where users return to find resources needed to handle communication. Activity centres are places where communication media are consumed. Lastly, coordinate displays are places where communication media is made available to others in the domestic setting to support the coordination of activities.

Some of the work done by O'Brien et al [75] covers the nature of householders' everyday life as activities intertwined with technology. They identify how spaces in the home are used, how different technological artifacts are used, and how these should be distributed as a result. Households have many routines, as identified in [32, 48, 75] which incorporate technology. The artifacts implementing these technologies are placed in spaces which are used in certain ways, and at certain times by different household members. In [75], this is described as *ownership of space* along with *coordination of home life* and O'Brien points to these as important issues to address when designing for the home, as individual people are not the target of the design but instead the target is the entire household. Both [32] and [75] identify that technology can have a certain status within the home, thus forming the foundation for the configuration of a space. A good example of this is the configuration of furniture around the TV set in the living room which most households have [75].

4.6 ADOPTION OF NEW TECHNOLOGY IN HOUSEHOLDS

As a technological artifact enters a home a process of adoption begins. The usability attributes of the artifact and the corresponding desired values of the home as well as established artifact ecologies all come into play when adopting new technologies in the household.

Much of the work within the area of technology adoption in homes describe the artifacts ability to augment already existing practices as crucial to its adoption [51, 75, 74, 93, 100]. As O'Brien and Rodden write: *"In short, technologies that effectively mesh with these organizational routines have every likelihood of succeeding. Those that do not do so are*

consequently perceived as problematizing the "equilibrium" of home life and tend to be met with resistance." [74]

In a study of smart home technology conducted in [93] it is found that people prefer having control over their daily routines as opposed to having routines automated by different sensor inputs. This is in line with the general thought in the literature of augmenting the routines of the home, as well as Venkatesh's [100] description of a new technology's ability to enter the household as its ability to better perform tasks. This, along with how well the usability attributes correspond with the desired values of the home previously described, seem to be critical factors in the adoptions of an artifact in the home.

Hindus et al. [48] and Petersen [80] describe how technologies must be expressive, yet simple in terms of interaction. Contradictory to the vision of ubiquitous computing presented by Weiser in [104], it is argued in both [80] and [93] that *unremarkable* or ubiquitous computing is not in line with the natural perception of the home. The home is not described as an unremarkable place, but instead a projection of the household with the purpose of displaying the personal attributes of its inhabitants [48, 51, 80]. As such, [80] proposes the design of aesthetic interaction of playful nature for technologies targeted for use in households to maintain the remarkable nature of the home.

5

DESIGN GUIDELINES

In this chapter we describe how the literature reviewed in the previous sections can help inform the design of applications within the domain of voice control for audible news services in the home. As written by Kamm, the applicability and success of adapting a voice user interface relies on more than just the technology implementing the application: *"Would a typical user judge the automated interaction to be satisfactory - that is, is the user successful at completing the task, and is the interaction easy and efficient from the user's viewpoint?"* [57]. Gaver [41] and Bell [16] argue that merely designing for easy and efficient is not enough as technology moves out of the office and into our homes. Furthermore, much research has been conducted on the practices of people consuming news. The following design guidelines are synthesized from theory within the domains of *Voice user interface design* (chapter 2), *News Consumption* (chapter 3), and *Designing for the home* (chapter 4).

5.1 DESIGN INTO ALREADY EXISTING ARTIFACT ECOLOGIES

When designing a new artifact it is important to recognize that users already have existing ecologies of artiacts that they use in relation to given activities [26]. As such it is important to account for the already existing artifact ecology when designing an artifact to be used for a given activity. Furthermore, a household has a social space in which family behaviour occurs and a technological space in which technologies are embedded and used [100], and thus where we find the aforementioned artifact ecologies. Interaction between the social space and the technological space of a household can be seen as the already existing well-defined practices and routines of the home. When introducing a new artifact or technology it is important that it is able to effectively mesh with these practices and routines to have a high likelihood of success. If a technology or artifact fails to do so it is likely to be perceived as *"problematizing the equilibrium of home life"* and thus tends to be met with resistance [74].

5.2 DESIGN FOR FUN AND PLEASURE, NOT EFFICIENCY AND PRODUCTIVITY

As presented by Gaver [41] , Bell [16], and Petersen [80] a different set of values in regards to usability and interaction principles is represented such as pleasure, fun, and explorable. Within the domain of voice user interfaces, Carter et al. study games as an application for voice control. They find that convergence and transparency are important factors in designing a voice user interface that is pleasurable to use [27]. As humans have been communicating by voice long before the dawn of technology, Kamm argue that human-human dialogue can be a great source of inspiration when designing voice user interfaces [57].

5.3 THINK ABOUT USE CONTEXT AND OWNERSHIP OF SPACE

When designing for the household one has to consider the use context and ownership of space. These are important issues to address because spaces are used in certain ways, and at certain times by different household members and because more often than not, individual people are not the target of the design but rather the target is the entire household [75]. As an example, if use of an artifact is usually done while focusing on something else (as in the case of [66]), the needs of all users of the space have to be met. This means that if one users prefers a high degree of interactivity while another prefers close to none the artifact has to support both. One also has to consider that users consuming news audibly do so by *listening*. The work of Meijer and Kormelink [31] shows that listening, as a practice of news consumption, is usually tied to another activity. Because of this it is not possible to rely on having the full attention of the user. As such, different use contexts have to be taken into consideration as well when designing possible ways of interacting with the artifact.

5.4 PROVIDE INITIAL USER GUIDANCE

As a purely acoustic interface lacks the possibility of showing application state through the interface itself, it is important to give the user information of this through other means such as input confirmation, error handling, and by providing a way of explicitly communicating application state [57].

5.5 OFFER BOTH SIMPLE AND COMPLEX INPUT METHODS

As indicated in [57], it is important to accommodate the needs of both the novice and expert user. In line with this, Petersen argues that when designing for the home, learnability as a usability aspect

becomes particularly important as users will likely lack the possibility of getting help from more capable peers [80]. Following the thought of providing initial user guidance, as users become experienced in the use of the interface, efficient ways of navigating the interface should be implemented [57, 50, 111].

5.6 CHOOSE AN OUTPUT MODALITY BASED ON YOUR CONTENT

As stated by [57], human speech is prefered over text-to-speech synthesis (TTS) but large scale applications requiring very dynamic output capabilities are best implemented with TTS as the output mode. A news application must be considered a small scale application compared to e.g. a home automation system but news applications do require dynamic output capabilities. This is because new content is generated constantly, thus news applications need to be able to support dynamic output.

As indicated in [62, 64] bringing interactive news to new platforms might mean that it is necesarry to rethink how news are produced. This could mean that content should be produced so that it exploits the cababilities of interactive audible news. Following [57] this would mean interactive news content available as recordings of human speech.

The conclusion is that if interactive news content support human speech as the output modality is available, this is prefered over TTS.

6

HUMAN-ARTIFACT MODEL

In this chapter we describe a theoretical framework proposed by Bødker and Klokmose [26] called the Human-Artifact Model. It is a tool for summarizing and structuring empirical findings, but may also be used to analyse the use of specific artifacts in relation to the history of artifacts mediating a certain practice. Activity theoretical HCI forms the foundation of the Human-Artifact Model. As such, we cover the basics of activity theory in HCI first. Then we describe the concept of artifact ecologies followed by a description of the Human-Artifact Model.

6.1 AN INTRODUCTION TO ACTIVITY THEORETICAL HCI

An activity is understood as purposeful interaction with the world carried out by any *subject*. In the case of activity theory in human-computer interaction, we look at human activity as the unit of analysis [58]. An interaction by a subject is made purposeful by the subjects motive for interacting with the world; this motive of the subject is realized through an *object*. Kaptelinin Nardi [58] provide the most basic representation of an activity, as seen in figure 6.1.

6.1.0.1 *Subject*

As previously explained, the subject of an activity is whatever carries out an activity towards the object. In classical activity theory, the subject of an activity is not limited to people, thus the biological needs of an animal to survive by eating food can also be analyzed in the terms of activity [58]. Within HCI it makes sense to view the subject as human, as the meaningful interaction will always be between a human and a computer.

Figure 6.1.: Activity seen as a relation between subject and object as described in [58].

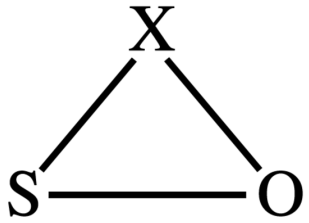


Figure 6.2.: Vygotsky's triangle of activity showing human activity mediated by artifacts.

6.1.0.2 *Object*

According to Bertelsen and Bødker, Leontjev (1978)[1] states that *"Activity is directed to satisfy a need through a material or ideal object"* [18]. We know that an activity is always directed towards a motive but this is not the same as the object. If we look at the relation between the motive of the activity and the object we find that the motive is *"The subject's reflection of (including expectation to) this object"* [18]. An example from HCI could be a photographer editing a photo by using a image editing tool. The object of the activity in this case would be the image. The motive could be to alter the photo to make it look as good as possible.

6.1.0.3 *Mediator*

According to Bertelsen and Bødker, Vygotsky (1978)[2] sees human activity as having three fundamental characteristics: firstly it is directed towards a material or ideal object; secondly, it is mediated by artifacts; and thirdly, it is socially constituted within a culture [18]. He introduces a mediating X to the previously isolated relation between subject and object. This mediating X is also referred to as instruments which can be either technical instruments (tools) or psychological instruments (signs). Vygotsky's notion of human activity mediated by artifacts can be seen as a triangle of activity as seen in figure 6.2.

6.1.1 *Hierarchical structure of activity*

In activity theory, activities in its broad sense, i.e. a relation between subject and object, can be analysed at different levels. In [18] and [58], these levels are defined as *activities, actions,* and *operations*. Each level corresponds, respectively, to the *motive* of an activity, the *goal* of an action, and the *condition* of an operation. Kaptelinin Nardi [58]

1 Bertelsen and Bødker refer to Leontiev, A. N. "Activity, personality, and consciousness." Englewoods Cliffs: Prentice-Hall (1978). [63]

2 Bertelsen and Bødker refer to Vygotsky, L. "Mind in Society" Harvard, MA. (1978). [102]

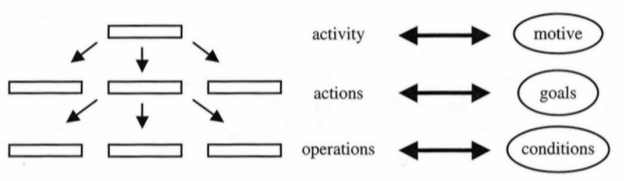


Figure 6.3.: The hierarchical structure of an activity as seen in [58].

provide a figure explaining the correlation between these levels, as shown in figure 6.3.

6.1.1.1 *Actions*

An activity can be composed of a sequence of steps which might not be directly related to the motive. The sequence of steps as a whole may result in attaining the motive. This sub-level of activity is called an action. As activity is directed at a motive, actions are directed at goals. The motive of an activity might not be conscious to the subject, but the goal is. An action can be divided into sub-actions directed at sub-goals [58].

6.1.1.2 *Operations*

Operations are routine processes providing an adjustment of an action to the ongoing situation. They are oriented toward the conditions under which the subject is trying to attain a goal [58]. People are typically not aware of operations. Operations can emerge as an improvisation or as the result of a spontaneous adjustment of an action. An example given by [58] is walking through a crowd, where one can carry out elaborate maneuvering to avoid colliding with other people and physical objects.

Another source of operations is the *automatisation* of actions. Over the course of learning and frequent execution, a conscious action may transform into a routine operation. An example of this could be changing lanes when driving a car. At first this action requires thinking through and thus is an action in itself. When done extensively, it transforms into an operation done to adjust for the conditions of the road as part of an action towards a goal [58]. The opposite, i.e. *de-automatisation*, can also occur. Using the example above, this could happen when driving in a country accustomed to driving in the opposite side of the road. Executing the action through previously formed operations is no longer possible [58].

6.1.2 *Internalisation-externalisation*

Activity theory differentiates between *internal* and *external* activities. The traditional notion of mental processes (as in cognitive science)

corresponds to internal activities. External activity is activity performed externally from the perspective of the mind [58].

6.1.2.1 *Internalisation*

Internalisation is the transformation of external activities into internal ones. Using the example of driving a car, driving a car with manual transmission has to be practiced before done fluently without giving it much attention. The driver must get accustomed to the car, the clutch, the stick configuration, etc. The internal activity grows out of the external activity [58].

6.1.2.2 *Externalisation*

Externalisation transforms internal activities into external ones. This is often necessary when internal activity needs to be "repaired" or scaled. When needing to add two numbers, but the numbers are too big, externalisation can occur through using a calculator [58]. Again, we can use the example of driving a car with manual transmission. A different stick configuration, e.g. when the position of the reverse gear changes can cause externalisation to occur. Lastly, externalisation also occurs when something needs to be coordinated among several people. The internal activity needs to be communicated, thus externalising the activity in order for other people to understand [58].

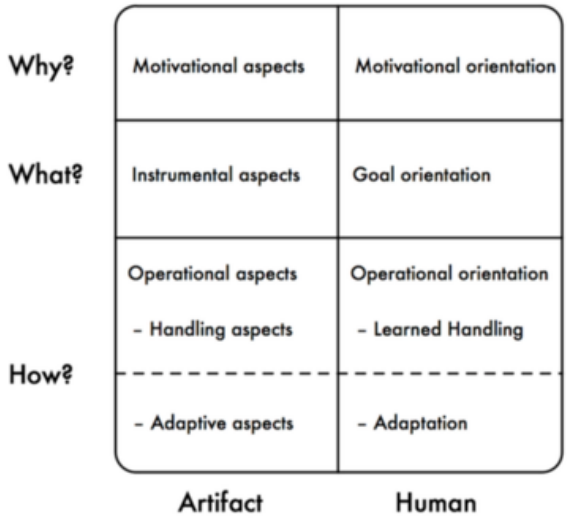


Figure 6.4.: The Human-Artifact Model as shown in [26]. The left hand side of the figure ties to the artifact; the aspects. The right hand side is the human side, and ties to the user's orientation.

6.2 THE HUMAN-ARTIFACT MODEL

As previously mentioned the Human-Artifact Model is a tool used for summarizing empirical findings. Bødker and Klokmose further state that it is also usable for analytically reasoning about the dynamics between the levels of interaction and the relationship between the aspects of the artifact and the orienting basis of the user, the possibilities, and problems of a functional organ [26]. The Human-Artifact Model can be seen in figure 6.4. In classical activity theoretical terms the three levels of activity relate directly to the different levels of the Human-Artifact Model. The motivational aspects of the artifact and the motivational orientation of the user relate to activities; the instrumental aspects of the artifact and the goal orientation of the user relate to actions; and lastly, the operational aspects of the artifact along with the operational orientation of the user relate to operations [26].

6.2.1 *Motivational aspects and motivational orientation*

The motivational aspects of the artifact addresses the supported motives in the artifact, i.e. why users should perform actions by using the artifact. Correspondingly, the motivational orientation of the user addresses the motive of users to perform given actions through the artifact. These are the drivers of activity, and are often implicit and unspoken in use scenarios.

6.2.2 *Instrumental aspects and goal orientation*

The instrumental aspects of the artifact and the corresponding goal orientation of the user address the goals of an action embodied in the artifact on one hand, and the goals for an action carried out by a user through the artifact on the other.

6.2.3 *Operational aspects and operational orientation*

This level is divided into two sublevels: handling apsects/learned handling and adaptive aspects/adaptation of user. From an activity theoretical point of view, both of these address the operational aspects of activities, but in the Human-Artifact Model framework, they are seperated to differentiate human low-level response to conditions from handling learned by e.g. using other artifacts.

Handling aspects and learned handling address how artifacts tension between the functionality of an artifact and the learned routines of the user.

The adaptive aspects of an artifact and the adaption address the tension between expectations of how the artifact should be used by a user and correspondingly how the artifact is meant to be handled.

Both sublevels focus on breakdowns as a mismatch between the the artifact aspects and orienting basis of the user in either will cause trouble for the user when using the artifact.

6.2.4 *The importance of artifact ecologies*

In activity theory, artifact ecologies, as described in chapter 3, are sets of artifacts which mediate human activity [26]. Human practice is often formed by these artifacts which build upon the practices formed by other artifacts. The artifacts producing this evolution of human practice form the historical artifact ecology. From a user perspective, both the current and the historical artifact ecology related to a certain activity form the foundation for understanding other artifacts in the ecology [26]. As shown in figure 6.5, this foundation is the accumulation of experiences gathered from using these artifacts and as such, artifacts cannot be analyzed in isolation.

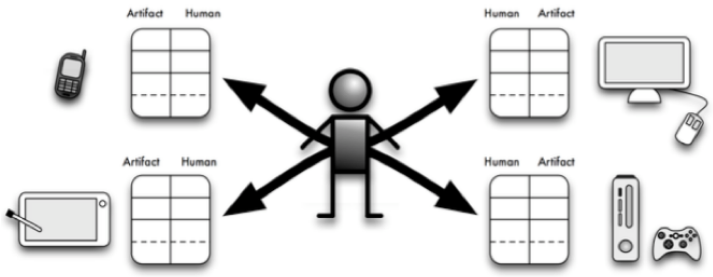


Figure 6.5.: Human being surrounded by artifacts as shown in [26].

7

DESIGN PROCESS

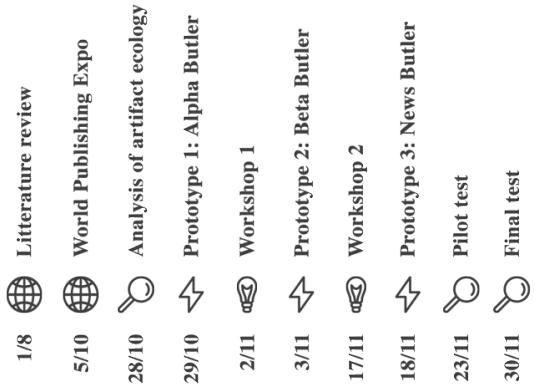


Figure 7.1.: An overview of the design process.

In this chapter we present the design process behind this thesis project. The News Butler application prototype has been developed through an iterative design process taking an offset in a *research through design* approach as described in [112]. Three different prototypes were developed throughout the process: (1) Alpha Butler, (2) Beta Butler, and (3) News Butler.

We started the process by speaking at the World Publishing Expo conference [103] about voice control for interactive audible news based on the survey of research conducted within the areas of voice control (chapter 2), news consumption (chapter 3), and designing for the home (chapter 4). Following this we conducted several user experiments and interviews revolving news consumption through different media with the purpose of analyzing the artifact ecology related to news consumption. We structure and analyze the empirical data by using the Human-Artifact Model presented in [26]. The research survey and the empirical data gathered from the initial user experiments and interviews informed the design of Alpha Butler.

The Alpha Butler news application was presented and discussed in a workshop with Archant Media Group (subsequently referred to as Archant) in Norwich (England). The results of this workshop led to the design of the second prototype, Beta Butler which was used in a remote workshop with participants from both Archant and Cx-

ense, a company working with content recommendation, from Oslo (Norway). The results of the second workshop were used to develop the final application prototype, News Butler. The News Butler prototype was then used to first conduct a pilot test, and later evaluated through a final field test.

The design process is outlined in figure 7.1 and can be divided into four categories:

- **User studies and experiments**: These includes initial user studies of the artifact ecology related to news consumption and user tests conducted with the News Butler prototype.
- **Prototype development**: These include the three different prototypes, each being informed by feedback from the steps prior to the point.
- **Workshops**: These include workshops conducted with professionals from different parts of the news industry. Each workshop was conducted with a specific focus.
- **Other activities**: These include the initial review of literature leading to the design guidelines previously desrcibed and the World Publishing Expo conference [103].

7.1 CONFERENCE: WORLD PUBLISHING EXPO 2015

The World Publishing Expo (WPE) 2015 by WAN-IFRA [103] is the world's biggest conference about the current status of the news industry. The conference has two different foci: press and technological advances. We were invited to speak on two stages each day of the conference on the topic of voice control for nonlinear audible news.

Figure 7.2.: Design process: World Publishing Expo October 5 - 7 2015.

Figure 7.3.: Presenting at WPE (left), discussion with stakeholder at WPE (right)

7.1.1 *Purpose of presenting at WPE*

As the conference was very early in the design process, we used the opportunity to discuss the opportunities for the news industry proposed by a product such as the Amazon Echo. Many different stakeholders from the news industry attended the conference so it was also a good opportunity for us to get to know practices of the news industry related to both publishing and technological innovation. Another focus for us at the conference was to find a research partner to coordinate workshops and field tests.

7.1.2 *Findings from WPE*

After all presentations at the conference, it was possible for anyone to try the Amazon Echo. Many stakeholders from various levels of the news industry were present and some very interested in the project. Most raised the point that a connected service like this, and other connected services, would be able to deliver personalized content and even link to already existing services (e.g. a news publishers website and user model) to form a multi-platform experience for the individual user. This also raised a discussion about the production of news content and how it might have to change to accommodate the needs of future technologies. Some were sceptical based on the fact that a smartphone has the same capabilities and would be able to devliver the same experience to the individual user.

Lastly, Archant Media Group from Norwich (England) and Cxense from Oslo (Norway) joined the research project after the conference, thus providing means for further development of prototypes through workshops, testing, and actual published news content.

7.2 SURVEY OF ARTIFACT ECOLOGY

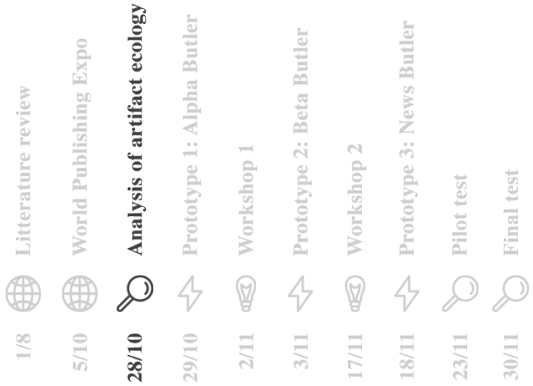


Figure 7.4.: Design process: survey of artifact ecology.

7.2.1 *Purpose of artifact ecology survey*

As defined in the guideline described in section 6.1: design into an already existing artifact ecology, it is important to recognize artifacts that already form practices for human activity. The purpose of analyzing the artifact ecology is to make a foundation for the first prototype (Alpha Butler) by structuring empirical data gathered from interviews and user experiments and build upon the results of analyses.

7.2.2 *Structure of the artifact ecology survey*

Bødker and Klokmose [26] present a theoretical framework named the Human-Artifact Model (dexcribed in detail in chapter 6) used for structuring and analyzing empricial data related to artifacts mediating human activity. To explore practices and experiences associated with news consumption, we investigate the following list of artifacts: TV, radio, newspaper, online (website), smartphone application. The reason for the choice of these five artifacts come from [89] in which an overview of the currently most used news media is provided.

The survey was done with three people of different age with different levels of technological experience. This was chosen to get a broad insight into the use of each specific artifact. Each inquiry cycle included (1) an interview on routines and practices associated with news consumption, (2) observation and video recording of participant performing predefined tasks using each artifact (see appendix A), and (3) interviews on consuming news using each artifact.

7.2.3 *Data collection*

We collected data for the artifact ecology survey with a mix of two methods: interviews and observations. The reason for mixing these two data collection methods is that some data is best uncovered through in-depth interviews, while other data e.g. tacit knowledge is only visible through observations.

7.2.3.1 *Interviews*

As mentioned, we conducted several interviews individually with each of the three participants of the survey. The preliminary interview conducted prior to the participant performing tasks using different artifacts was an open and explorative interview with little to no structure as described by Kvale & Brinkmann [61]. This interview had the sole purpose of covering each user's routines and practices associated with news consumption (see appendix G.1 for transcription of preliminary interviews).

The interviews following the tasks with each artifact were semi-structured and explorative. This was chosen to be able to better structure group data for each artifact (see appendix F.1 for interview guide and appendix G.1 for transcriptions of follow up interviews).

7.2.3.2 *Observations*

Participants of the survey were asked to perform a series of tasks related to each artifact. The performance of each participant was recorded on video to be able to better analyse observations and to be able to do focus-shift analyses as described in [19]. The purpose of this was to uncover details about the use of each artifact in general and related to the specific tasks performed but also to find potential breakdowns in the use of artifacts that we can use in our analysis.

7.2.4 *Results of artifact ecology survey*

We have structured the empirical data collected with the three survey participants using the Human-Artifact Model [26]. The empirical data found in the data collection is used to form the orienting basis of the user which is then analyzed to identify potentials and problems of matches with the artifact. Mismatches between the aspects of an artifact and the orienting basis of the user are denoted by red lines in the models. We analyze the results for each artifact individually below and combine the findings to inform the design of Alpha Butler.

The quotations in the sections below are originally in danish, but translated with the purpose of presenting them.

7.2.4.1 *Newspaper: Jyllands Posten*

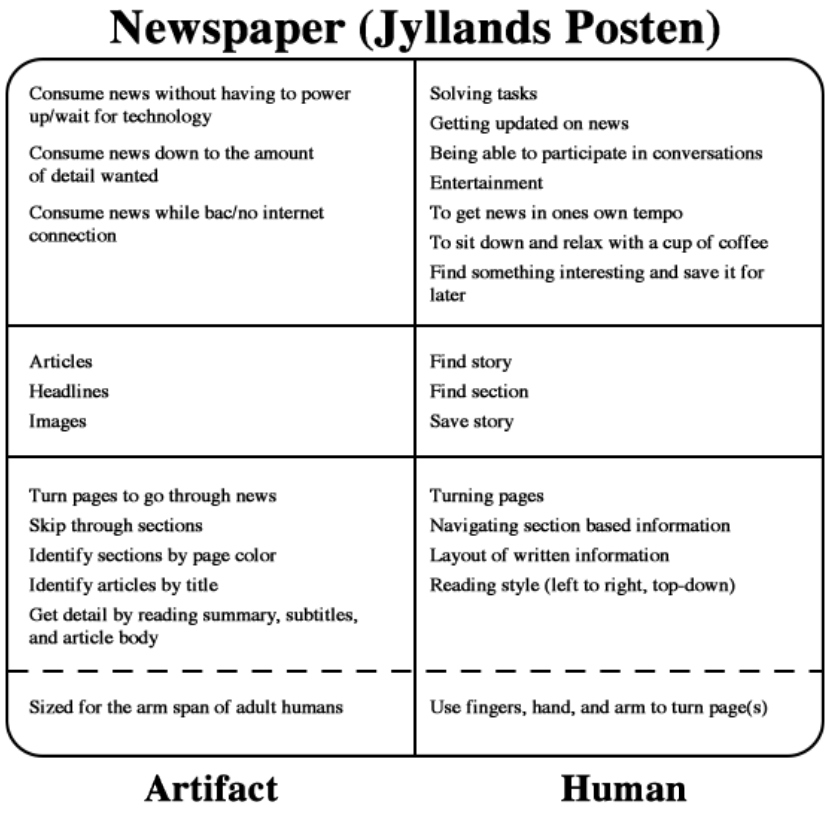


Figure 7.5.: Human-Artifacl Model for a newspaper (Jyllands Posten).

Looking at the Human-Artifact Model for the newspaper we see that the orienting basis of the user and the aspects of the artifact generally fit well together. We found that survey participants had very different reasons for choosing the newspaper as an artifact for news consumption. One participant stated that *"[...] The newspaper on the web, it's... not everything you can read in it."* hinting that that newspapers have better coverage of the news than general news websites and are more in-depth. It was found that another quality of the newspaper is that it is very easy to control how much information you want for a specific story in relation to news on the TV and in the radio. He continues by saying *"On the other hand.. I only ever read it [the newspaper] in the morning actually, because as the day progresses it stops being news as they are not up-to-date."*, identifying that the newspaper has an issue related to delivering content that is up to date, especially later on the day when the newspaper has been out for a while. According to this participant the newspaper gets more and more irrelevant as the day goes on and by then it becomes preferable to consume news through other artifacts. The newspaper was also chosen as an artifact to read in in certain situations e.g. when sitting down and drinking

morning coffee. Another participant usually only read the newspaper in situations where she either got it thrown in her face or in situations with very bad or no internet connection.

One quality of the news paper that according to one participant is very convenient is the fact that it is easy to sit down and find something to read later. This action of saving a story for later reading is supported by the fact that a newspaper is a paper-based artifact with pages and sections that can be taken out and stored seperately. Observations show that there is a difference in how to find a specific story in a newspaper. We observed that one participant, when asked to find a specific story, used the sections to first find the section holding the story was and then the story, whereas another participant simply searched for the article by going through the entire newspaper until she found it starting at the front page. This shows that there are differences related to the handling of the artifact. One user had previous experience navigating newspapers to find stories related to a specific section whereas the other simply used newspapers as a way to pass the time and never actually looked for anything specific.

7.2.4.2 *Website: jp.dk*

The participants unanimously stated that the biggest advantage of online media is that it is always updated and always available. As such, the motivational orientation of the user consists of being able to read and/or watch updated news when wanted. One of the participants also said that the up-to-dateness of news websites could cause him to repeatedly return to get the most recent developments in a case: *"Well, I don't check it that often in that fashion.. That would only be if something big has happened.. 9 / 11 [terrorist attack in New York] or something like that"* Web media content (text, images, and video) was also deemed easily accessible compared to other media forms due to social media integration.

We observed a difference in the way each participant performed the task of finding a specific story. The tasks were performed on Jyllands Posten's website [83]. One participant instinctively identified the category the news story would fit into and found the news story by first finding the section, and afterwards scrolling through the page to find the specific story. Another participant tried to find the search input field. Once found, he searched through the input field. The last participant could not find the search field, thus exiting the website in order to search through a search engine. All methods led to the correct story. One participant described using the *related* section to find all the news she would consume through websites.

All participants were confident in the layout of the website and how websites were used in general. As such, navigating news and exploring different detail levels of news stories was an easy task. The only exception to this was participants not being able to immediately lo-

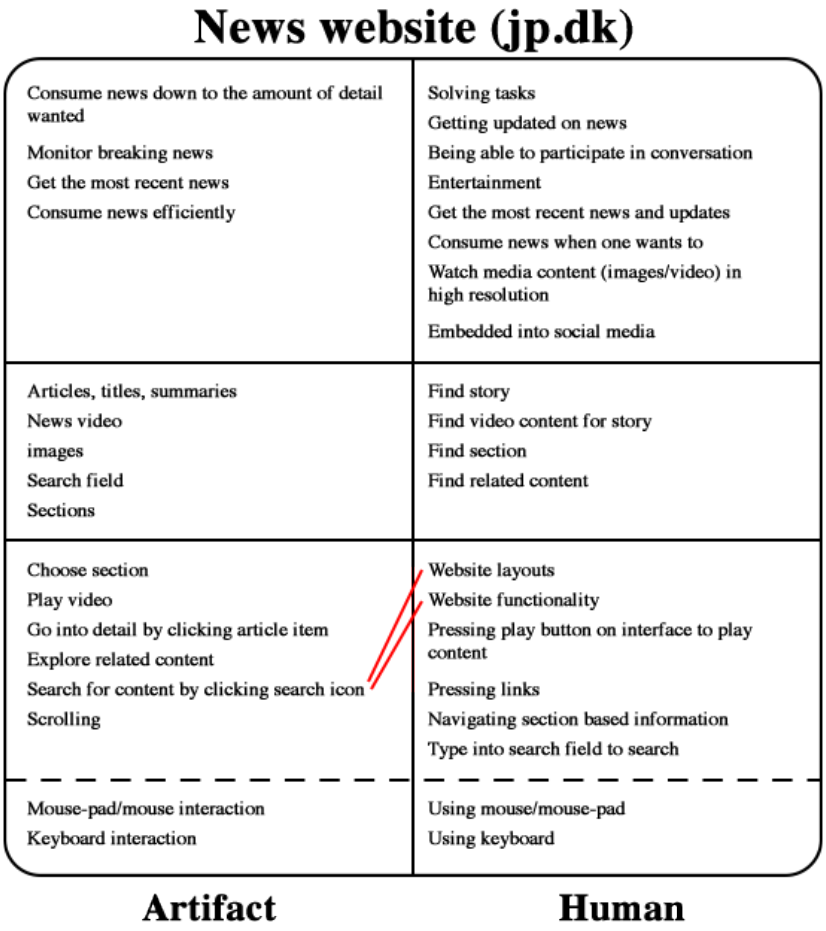


Figure 7.6.: Human-Artifacl Model for a website (jp.dk).

cate the search input field of the website when asked to find a specific news story.

7.2.4.3 *Smartphone application: Jyllands-Posten Nyheder*

Smartphone news applications similar to the Jyllands-Posten Nyheder smartphone application (iPhone version) [56] as artifacts used for news consumption were generally only used by participants in situations where other artifacts where either unavailable or highly impractical to use. One participant stated about the use of smartphone news applications that it is mostly practical in situations where *"[...] you're not near a computer and have some time to spare"* implying that he mostly uses these kinds of applications as a way to pass the time when no other artifacts are available. He mentions that smartphone news applications are especially convenient in the aforementioned situations when he has heard something earlier in the radio that he wants more information about.

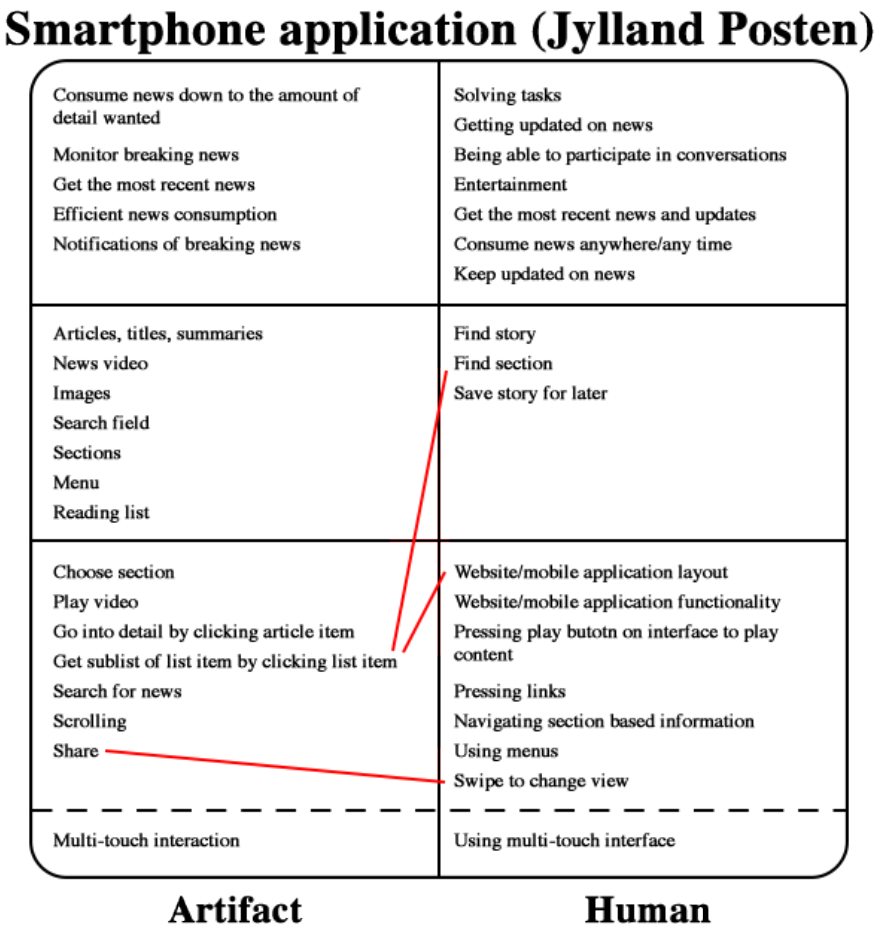


Figure 7.7.: Human-Artifacl Model for a mobile news application (Jyllands-Posten Nyheder).

Observations when performing tasks using the Jyllands-Posten Nyheder application indicate that there are some usability issues related to the interface layout. When asked to find the sports section in the application participants generally struggled. Not one participant was able to quickly identify the sections in the interface of the application. When they finally found the sections and under that the sports section, participants stated that they were not used to smartphone applications featuring lists with expandable lists under different list items. Interestingly, the participant who was quickest at finding the sports section was the one with the least amount of experience using smartphone applications, suggesting that there is a negative correlation between experience and ability to use the Jyllands-Posten Nyheder application for this task. When asked, he stated that he simply clicked in the list item that he thought was most related to sections. One participant tried to swipe left and right in an attempt to find the sections, as he had experience with doing so in other non-related applications e.g. snapchat [92]. This highlights another mismatch in

Jyllands-Posten Nyheder between the learned handling of the user and the handling aspects of the artifact.

7.2.4.4 *Radio*

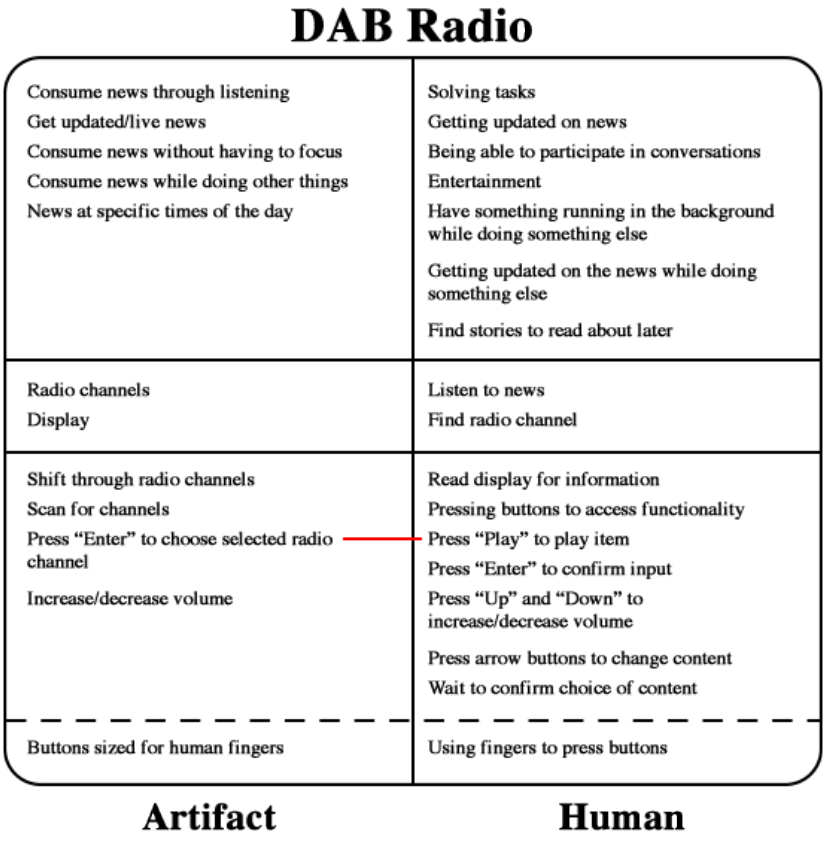


Figure 7.8.: Human-Artifacl Model for a radio.

Only two of the participants used a radio as a source of news stories. As stated by one about the advantages of radio broadcasted news: *"That you can do all sorts of things at the same time. And that its presented in a way where you don't have to look at it as with a TV, but instead you can walk around and do something else."* The two participants both said that radio as a format was ideal for running in the background, thus not being the primary focus of attention. Both radio listening participants also stated that radio is a good way to quickly get updated once an hour with no effort. One would listen for news to research on another media form when on a break at work or having time to do so in the afternoon between other activities.

The experiment tasks were performed on the DAB radio seen in figure 7.9. When participants were asked to find news they would all shuffle through the channels, identifying them by name on the radio display. Two of the participants had to try multiple times and needed

Figure 7.9.: Interface of radio (left), survey participant interacting with radio (right).

help to find the correct way of confirming their choice of channel through the ”enter” button. The last participant identified the button for confirmation, stating that she figured out which button to press from the use of old calculators and computer input. The confusion was mainly caused by the interface featuring two different play buttons with different functionality in addition to the enter button.

7.2.4.5 *Television*

Television

Consume news through listening Get updated/live news Consume news through video Consume news without having to focus Consume news while doing other things News at specific times of the day Read news	Solving tasks Getting updated on news Being able to participate in conversation Entertainment Have something running in the background while doing something else Getting updated on the news while doing something else Socialize Get the news at a specific time of the day
Channels Text-TV Channel overview	Watch news Find channel Read news
Change channel Increase/decrease volume Navigate channel overview	Press arrow buttons on remote to change channel Press “+” and “-” to increase/decrease volume Press navigation buttons to navigate on-screen interface
Button interaction	Pressing buttons
Artifact	**Human**

Figure 7.10.: Human-Artifacl Model for a television.

Looking at the Human-Artifact Model for the TV we find that a motivation for consuming news on the TV can be to socialize. This is unlike any of the other artifacts that we have analyzed (arguments can be made for the radio affording social activity as well, but our data does not indicate that radio is used in this way). One participant stated that *"The advantage would be that getting news over the television is a more social communicative thing. For example if I sat in front of a smartphone or a computer, I take in information alone. As such it won't inspire a debate."* meaning that the TV as an artifact used for news consumption is something that you as a family or group of friends can gather around and enjoy together. In this case the TV, or rather the content being shown on the TV, can act as a catalyst for immediate intellectual debate. Apart from this participants mention that one of the obvious qualities of the TV is that it provides broadcasts with living images. One participant mentioned that *"Sometimes the disadvantage of having access to everything is, that you have to find it yourself. Sometimes it's nice to just get stuff fed to you so you don't have to choose what's relevant."* in relation to consuming news on the TV simply as a way to pass the time, arguing that being able to choose your content specifically is not always preferred; sometimes you just want to sit down and have information fed to you and not have to choose whether that information is relevant to you or not. We also found that the TV, like the radio, is an artifact that is turned on so that it can run in the background while people focus on other activities. Lastly we found that the news broadcasts on the TV is something that (some) people use to structure their day around.

7.2.4.6 *Most relevant findings*

In the motivational orientation level of the Human-Artifact Model lie a users motivation for using an artifact. The corresponding cummulated motivational aspects of the artifacts relate well to the set of practices of news consumption outlined by Meijer and Kormelink in [31]. As previously described, different artifacts have their own purpose within the ecology and while used for the same activity, each artifacts is preferred in specific situations. The practices supported by an artifact, thus forming the motivational aspects of the artifact, help define these situations and identifying the differences between artifacts within the ecology helps describe why artifacts capable of the same are used differently. Following the thought of designing into an artifact ecology, the choice of supported practices within the artifact thus seems critical to its adaptability.

Listening as a news consumption practice is defined as a secondary activity. When looking at the motivational orientation for the DAB radio, i.e. a users motivation for using the radio for news consumption, it corresponds well to the practice of listening. Looking at TV and radio, we see that one of the most advantageous qualities is the

ability to not have to focus on news consumption as the primary activity. The downsides of these are that you are not in control of the amount of detail provided in individual news stories. Looking at news websites and smartphone news applications our data shows that the biggest advantages for these artifacts are their ability to stay up to date and their interactivity in regards to getting the amount of detail wanted. This last quality is also shared with newspapers but newspapers lack the ability to stay up to date. Newspapers, news websites, and smartphone news applications also share the quality of being able to handpick the desired news stories. This is made possible by categorizing news in different sections. On news websites and in smartphone news application there is even more meta-data associated with news stories making it possible to further personalize the content based on other parameters e.g. location.

In multiple of the experiments with artifacts participants expressed the desire to save specific stories for later consumption. We saw that the newspaper affords this quality by having pages and sections that users can physically store seperately. Suprisingly we found that the radio was also used to find and "save" content for later by e.g. remembering the title, writing it down, etc. Saving for later is a practice not covered in [31] but interestingly the desire to save content repeated itself across multiple artifacts including radio, newspaper and smartphone application. Social practices such as sharing resembles saving although having an added layer of social interaction. Saving, on the other hand, is a practice performed with the intention of saving information for later consumption.

The repeated breakdowns outlined in the focus shift analyses (as seen in appendix A) of radio, Jyllands-Posten Nyheder (smartphone application), and jyllands-posten.dk (website) highlight a lack of user guidance in the interface, or simply intransparent design of the artifact. When designing voice user interfaces the need for user guidance becomes more relevant. This is due to a lack of visual feedback communicating application state meaning that users do not know what their possible course of actions are at a given point in the application.

7.3 WORKSHOPS

Over the course of this project, two workshops have been conducted (figure 7.11). These workshops were conducted with several people from the staff of our partners on the project, Archant Media Group in Norwich (UK) and Cxense in Oslo (Norway). The first workshop took place in Norwich at the headquarters of Archant Media Group while the other workshop was held as a remote workshop from Aarhus, Denmark.

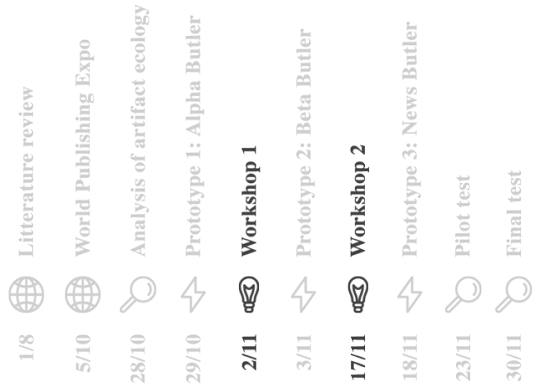


Figure 7.11.: Design proces: workshops.

7.3.1 *Participant selection criteria*

Participants were selected specifically for each workshop based on several factors: (1) experience within the theme of the workshop, (2) familiarity with fellow workshop participants, and (3) familiarity with creative methods and processes. Halskov and Dalsgård [47] mention two characteristics of ideal workshop participants: (1) familiarity with fellow participants and (2) familiarity with creative methods and processes. They argue that workshops establish a forum for creative interchange between participants and that when creating new concepts, participants put themselves on the line and risk failure by presenting ideas that other participants may reject or deride [47]. According to data collected by Halskov and Dalsgård, participants who are well acquainted and who have collaborated in previous projects have an established understanding amongst themselves recognizing that their behaviour is experimental and that this behaviour in a creative setting is not necessarily representative of how they would act in other fora. Likewise, their experience with conducting workshops has also shown that workshops in general are more fruitful when held with participants who have previously worked with creative methods and processes [47].

The workshops were held two weeks apart to allow for iteration on the News Butler prototype in between.

7.3.2 *First workshop*

The first workshop was held in Norwich, United Kingdom on the 2nd of November 2015, with two members from the staff of Archant Digital.

7.3.2.1 *Purpose*

The first workshop was conducted with specific focus on interaction and content format. The purpose of this workshop was to generate ideas revolving the interaction with voice controlled and non-linear audible news along with structure of content for such an application. We had these foci for the first workshop to best build on the expertise of the workshop participants.

7.3.2.2 *Participants*

The participants for the workshop were specifically selected first and foremost based on the expertise and insight into the focus areas of the workshop: interaction and content format while also ensuring that they to some extent fulfilled the selection criterias of familiarity with fellow participants along with familiarity with creative methods and processes. The result of this selection process was two experts from the staff of Archant Media Group working with development of digital media who were well acquainted with both each other as well as creative processes such as workshops. The fact the participants of the workshop work with development of digital media and generation of news content meant that we had a unique opportunity in regards to getting valuable feedback not only from the perspective of news consumption but also from the perspective of generating news.

7.3.2.3 *Method and workshop format*

To conduct the workshop we used a specific method called *future workshop* [69, 17]. As described by Benyon [17], a future workshop comprises three stages:

1. *Critique*: a group brainstorming session that tries different approaches to the activities/problems being addressed by the proposed system. A set of themes arising out of this stage is used in stage 2.

2. *Fantasy*: the emphasis here is on creative solutions/ideas, no matter how unrealistic. From these a number of fantasy themes are generated and these are then used to drive stage 3.

3. *Implementation*: the group works out what would be necessary in order to produce a real solution to some of the fantasy themes generated

To make sure that everyone were familiar with the concept of future workshops and the applications to be investigted we introduced a preparation phase with the purpose of intoducing participants to the workshop format along with two versions of news applications on the Amazon Echo: the default news application (flash briefing) and

Figure 7.12.: Images from the workshop with Archant Digital in Norwich.

our own first iteration prototype, Alpha Butler. As both of the participants from Archant Media Group knew about the Amazon Echo as a device prior to the workshop but had no first hand experience interacting with it we started out setting the theme by first showing the Amazon Echo YouTube commercial [110] to make sure that everyone knew the capabilities and general use context of the product. We then presented and demonstrated the default news application on the Amazon Echo followed by our own news application prototype. To keep the workshop focused on interaction and content format we asked the participants to have questions such as ”how would you want to interact with news on this platform?” and ”how should stories be formatted to best suit this platform?” in mind when iterating over ideas in the different stages of the workshop. Images showcasing the process of the workshop can be seen in figure 7.12.

Because of the massive amount of ideas and implementations being generated in such a workshop coupled with the relative short timespan of this project, we introduced a impact/difficulty of implementation matrix (see figure 7.13 (left)) as a way of grouping concrete implementation in terms of how difficult the implementation/feature was to realistically realize versus how big of an impact the implementation/feature would have.

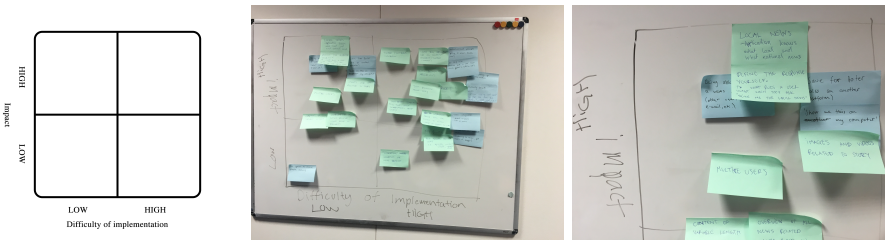


Figure 7.13.: The impact/difficulty of implementation matrix (left), matrix used to group implementations/features from first workshop (middle), and high impact/low difficulty of implementation quadrant from first workshop (right).

7.3.2.4 *Results*

Subsequent to the grouping of implementations on the matrix (see figure 7.13 (middle) we picked the concrete implementations/features to implement in the next prototype iteration from the high impact/low difficulty of implementation quadrant of the matrix shown in figure 7.13 (right).

This resulted in a list of implementations/features to implement in the second prototype iteration complete with necessary steps from both Archant Media Group and ourselves to realize the implementation of each implementation/feature. The list of features to implement consisted of: (1) local news, (2) multi-platform functionality, (3) User profiles, (4) News based on popularity, and lastly (5) content of variable length.

- *Local news*: there was a great expression of desire from all participants towards getting news based on location.
- *Multi-platform functionality*: this has been a recurring theme through the entire design process so far. From the feedback on World Publishing Expo, to the artifact ecology survey and in this workshop. This is what will allow users to save news stories through News Butler and access them on other devices.
- *User profiles*: this should allow multiple users to access their own content through one News Butler application.
- *Popularity-based news*: the participants of the workshop all agreed that news as a topic of discussion between people is an important reason for people to consume news which we also found in the artifact ecology survey. This makes it important for us to implement a way of getting the most popular and most talked-about news at any time.
- *Variable content length*: when presented with the default news application of the Amazon Echo and our own Alpha Butler prototype, one of the major critique points were, that the format of the content did not fit the platform. A concrete implementation of a solution to this problem was to have content of variable length, making it possible for users to choose to get a story in the format of a headline, a summary of the article, or have the entire article made available through other devices e.g. smartphones and computers.

7.3.3 *Second workshop*

The second workshop was held as a remote workshop from Aarhus, Denmark on the 17th of November, 2015 with two Norwich-based Archant Digital employees and two members from Cxense, one based

in London and one based in Oslo. With workshop participants from three different countries, conducting a traditional workshop with everyone in the same place would mean spending a large amount of time and resources on travel not only for us but for participants as well. Because of this it made more sense for us to conduct the workshop remotely. Many different technologies exist that make it possible to hold meetings virtually. We chose to use Google Hangouts [45] because of it's simplicity in use and setup.

7.3.3.1 *Purpose*

The second workshop was conducted with specific focus on personalization. Much like in the case of the first workshop, the purpose of the second workshop was to obtain knowledge and generate ideas of how news should be presented on devices like the Amazon Echo, only this time the focus of the workshop was personalization of news content. Arguably, personalization is an important feature of web-based news content as presented in the literature covered in section 3, and as such it makes a lot of sense for us to focus on personalization to exploit the knowledge of participants working within this specific domain.

7.3.3.2 *Participants*

Participants for the second workshop were again selected based on the criteria decribed in section 7.3.1. The main differences between the selection process of the first workshop and the second were firstly that the focus of the workshop was different, requiring participants with expertise within the area of personalization rather than interaction and content format. Secondly, because of Archant Digitals interest in the project and because of the success of the first workshop, two employees from Archant Digital requested to be able to take part in the second workshop as well. As Archant Digital had already previously been included in the creative process of designing News Butler, we were happy to include them in the second workshop as well.

7.3.3.3 *Method and workshop format*

The second workshop was conducted as a future workshop similarly to the first workshop described in section 7.3.2.3. Once again we started off by showing the Amazon Echo commercial [110] followed by a presentation and demonstration of the default Amazon Echo news application and subsequently our second iteration news application prototype, Beta Butler. To keep the workshop focused on personalization we asked the participants to have questions like ”how would you personalize content for this platform?” in mind when iterating over ideas in the different stages of the workshop. Images

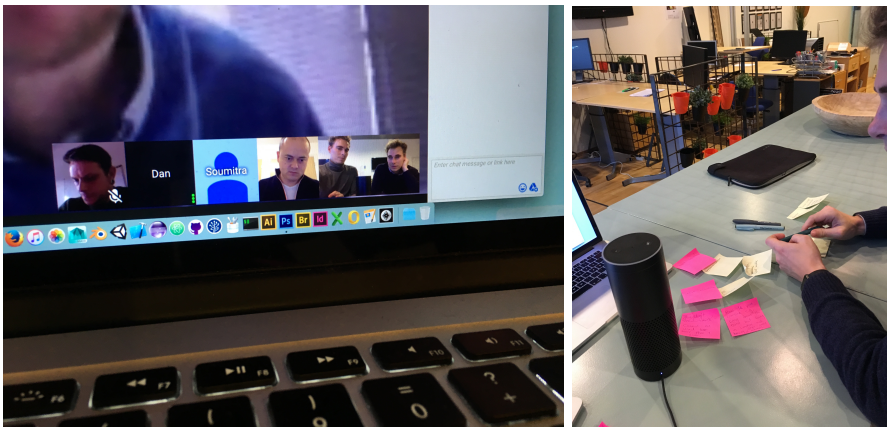


Figure 7.14.: Images from the remote workshop in Aarhus, Denmark with Cxense and Archant Digital.

showing the process of the remote workshop can be seen in figure 7.14.

Because of the success of grouping concrete implementation ideas/features on the impact/difficulty of implementation matrix we once again used this as a tool to help with the selection of implementation ideas/features to implement in the final News Butler application prototype (see figure 7.15).

7.3.3.4 *Results*

Following the grouping of implementations/features on the matrix we once again chose the ideas from the quadrant with low difficulty of implementation and high impact. This resulted in the following list of new features to implement in the third and final prototype iteration: (1) user model, (2) implicit feedback, and (3) explicit feedback.

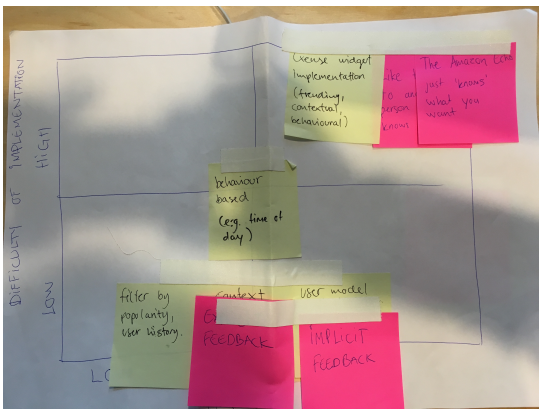


Figure 7.15.: Impact/difficulty of implementation matrix used to group implementations/features of second workshop.

- *User model*: To drive personalization and content recommendation, an application needs to have a user model for storage of data about users.
- *Implicit feedback*: Beta Butler had no support user model support and thus no way of updating such a user model either. The easiest way of seamlessly updating a user model was deemed to be through implementation of *implicit* feedback. This means feedback from general use of the application is used to update the user model without users having to explicitly tell the application that they e.g. want more news from the business category.
- *Explicit feedback*: While implicit feedback is good for continually updating a user model seamlessly little by little, applications utilzing personalization should also make it possible for the user to make radical changes to the user model in situations where users want to radically change the content delivered by the application. The easiest way to support this was found to be through the implementation of *explicit* feedback. This means that users should have to ability to e.g. radically change the amount of news that they get from the business category by explicitly telling the application, that they want more/less news from the business category.

7.4 FIELD TESTS

Throughout this project two field tests have been conducted: A pilot test and a final test, as shown in figure 7.16. In both field tests, participants recieved an Amazon Echo with our News Butler application pre-installed to use for a period of time. The tests were conducted with different purposes, and with a different amount of participants and over different time spans.

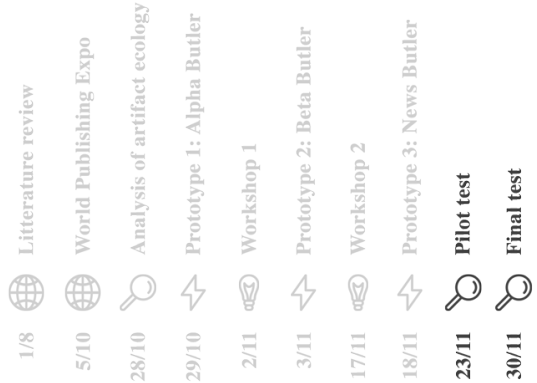


Figure 7.16.: Design proces: field tests.

7.4.1 *Method*

To conduct the field tests, our approach for gathering empirical data was to use data gathering methods which let users log data and give feedback when they had the time and wanted to themselves. As testers for the final field test would be situated in England, we chose not to employ methods such as in-situ interviews and hands-on demonstrations [62] in our testing methodology, due to the amount of travelling required.

As described in [22], it is critical for participants to understand what will be required of them if they participate. To inform the participants, we sent them a document introducing them to the project before any testing began.

7.4.1.1 *Introduction document*

To guide the participants of the tests through the setup process and the test methodology, we sent an introduction to the field test to their e-mail, explaining this. First, the project was briefly described both as text in the document and in a video included as a link in the document. Furthermore, another video was made to give an introduction to News Butler and how to access the functionality of the voice interface. The full document can be seen in appendix D.

Also included in the document was a guide to set up the Amazon Echo on their home wifi along with included contact info in the form of telephone numbers and an e-mail made exclusively for the field test. This was included to overcome any breakdowns experienced by the users related to issues such as setting up, application malfunction, etc.

Finally, the purpose of the field test was briefly described followed by a description of how they should record/log their thoughts in order for us to use them.

7.4.1.2 *Preliminary questionnaire*

Before starting the testing period, we asked users to fill in a questionnaire related to their interest in news of different categories. This was needed to initially form the user model for each participant. As user models develop over time, this would have the purpose of overcoming initial frustration related to the news not being relevant to the individual participant. appendix D shows the preliminary questionnaire.

7.4.1.3 *Diaries*

In line with the work done in [62] and [60], we chose to also incorporate diaries in the test to give participants the possibility of logging

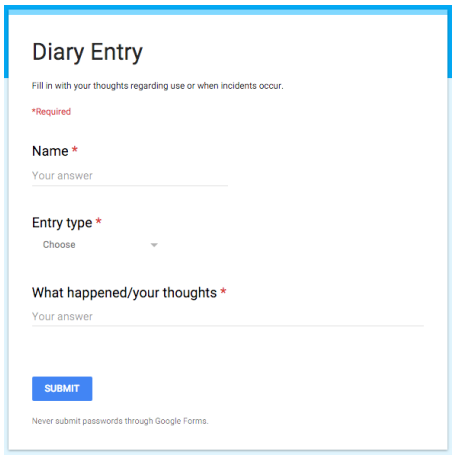


Figure 7.17.: Diary entry interface from the view of participants.

thoughts regarding use and incidents when they occured. As presented by Kjaer et al. in [60] and Hyldegård in [52] some challenges occur when incorporating diaries in a field testing. Diaries should be structured to to be practical and easy to use in order to minimize the potential delay between event occurence and registration. For participants to understand the concept and format of the diary, an introduction to usage of the diary must also be given.

To accommodate the above, we made diary entries accessible through google forms [44]. This allowed us to specify a simple format for the user to document in, as shown in figure 7.17.[1] Annother advantage google forms presents is a concrete answer to a challenge described in [22]: that participant data is kept with access limited only to the people who need to see it, i.e. participants cannot see what others log.

To explain our thoughts behind the usage of diaries and how they should be used for logging thoughts and incidents, we included examples of how they could be filled out within the e-mail introduction. These can be seen in appendix D.

7.4.1.4 *Interaction logging*

In line with the method presented by Lee et al. in [62], we implement a passive logging mechanism in News Butler to be able to monitor use accross participants. Every time a participant interacts with News Butler, a request is sent to a server which logs the interaction. This is done for two reasons: (1) to collect data about use patterns for each participants, and (2) to validate other data, as we want participants to have used the prototype to a certain extent in order to be able to provide valuable data as the test concludes.

1 The format of diary entires can also be seen at `http://goo.gl/forms/1DY8jNHx7V`

7.4.1.5 *Follow-up questionnaire*

To collect data after the test period, we made a questionnaire following the structure of a structured interview (this can be seen in appendix D.5). We did this mainly due to participants being able to fill this out in their own time and because the travel distance would not allow us to make interviews in the context of use. As described in the findings of the pilot test below the questionnaire did not suffice. As a result, video interviewing was incorporated in the final field test to collect data after ended test period. The video interview is described in section 7.4.3.

7.4.2 *Pilot test*

The pilot test was conducted over the span of two days (November 23-24, 2015) with one participants.

7.4.2.1 *Purpose*

We conducted the pilot field test over the relatively short time span of two days because the purpose of the pilot test was not to be able to get results related to the use of our prototype, but rather to verify the validity of our field test format and method. As such, the main purpose of this pilot field test was to gather a relatively small amount of data samples in order to (1) quickly be able to evaluate our choice of method for the field tests and (2) be able to verify that the data provided by the field tests would be usable by us in a later analysis. The reason for this verification of field test format being especially important in this specific case was due to the fact that the final field test was to be conducted in Norwich (UK) with participants from Archant Media Groups user base. As such it was imperative for us to make sure that everything from instructions of use and introduction to the field test, all the way to evaluation and debriefing, was able to be done successfully without us being physically present and without too much intervention from us.

7.4.2.2 *Participants*

In regards to participant selection and participant profile, Brush [22] states that *"Identifying the participants you would like to recruit for your field study depends on the research goals of your study."* and that *"In general, you want to select participants who match the realistic usage of your prototype or the demographic that you are most interested in."* [22] As previously mentioned, this field test was conducted with only one participant. As the purpose of the pilot test was to test the test format and methods beind it, we selected this participant based on the demographic that we were interested in for our final field test. This resulted in the selection of one participant: male, age 55, with a house, wife

and kids. The participant was specifically selected based on being an active consumer of news on a variety of different platforms, and for being a relatively early adopter of new technologies.

7.4.2.3 *Findings*

The results from the pilot test (see appendix E.3 and E.4) suggests that our field test format works for the most part with a few specific methods being subject to change. The knowledge gained from data generated in the pilot test can be grouped into the following four categories: (1) setup and introduction, (2) interaction logging, (3) user feedback, and (4) follow-up.

- **Setup and introduction**: Throughout the entirety of pilot test, we received no errors and no help requests on our support hotline. This was very important to us, because we, as previously mentioned, would not be able to meet the test participants of the final field test in person and give them an introduction to the project. As such we did not deem it necessary to change anything in relation to setup and introduction before the final field test.
- **Interaction logging**: The logging data collected through use provides insight into the use of News Butler. This worked entirely as expected and makes us able to get a detailed overview of how test subjects interact with News Butler. Nothing was changed prior to the final field test in regards to logging of data through the use of the prototype.
- **User feedback**: The data collected through diary entries (see appendix E.3) was of the quality and quantity that we expected. As such we found no reason to change the format of the diary entries before the final test.
- **Follow-up**: As mentioned previously, we chose to collect data following the pilot test through follow-up questionnaires (see appendix E.4). We found the data from the follow-up questionnaire to be lacking in several areas. We got several answers where in-depth questions related to the answers given would be necessary for us to be able to get enough detail to conclude anything meaningful about different aspects of News Butler. Because of this we decided to change our method in regards to follow-up data collection to a more qualitative approach in order to make sure that we got sufficient high quality data.

7.4.3 *Final test*

Based on the findings related to test methodology from the pilot test, we decided to conduct video interviews with participants remotely.

These interviews were conducted following the final field test and were explorative in nature as described in [61] to be able to fully capture the experience each participant had while using News Butler and the Amazon Echo in general. The interviews were based on a semi-structured interview guide which can be found in appendix F.2.

The results of the final field test are structured in section 9 followed by an analysis of the findings in section 10.

7.4.3.1 *Purpose*

In the final field test, we wanted to test the usefulness of News Butler in the context of peoples home and examine the circumstances of use. An important part of the field test was also to identify how News Butler was used in comparison and relation to other artifacts normally used by the participants for news consumption. As described in [84]: *"[...] the way people interact with products in their everyday messy worlds is often different from how they perform on set tasks in a laboratory setting."* As such, it was important for us to conduct a field test instead of a laboratory test. The test structure was also limited to the data collection methodologies described above to avoid implying specific use scenarios but instead focus on monitoring how each participant choose to use it.

7.4.3.2 *Participants*

Through our partnership with Archant Media Group we were able to get test subjects in the Norwich area who were also known to be active consumers of news on a variety of different platforms. Selecting participants for the field test based on these criteria, i.e. being from the local area around Norwich (UK) and being active consumers of news on a variety of different platforms, made a lot of sense for several reasons: First of all, the content being delivered on the News Butler prototype originated from, and focused on, Norwich and the local community surrounding Norwich; secondly, for us to get the best possible feedback on a system which can only be interacted with in English by voice, it made sense that participants were native English speakers (this arguable makes them more capable of commenting on the interaction with the prototype than people who are less used to interacting with their immediate surroundings in English); and lastly, in our design process we put a lot of focus on designing into an existing artifact ecology - as such, it was deemed important for us to test with users who had an already previously established artifact ecology consisting of a variety of different artifacts used for news consumption across multiple platforms.

7.4.3.3 *Limitations*

Length of study: As we want to study how News Butler is adopted into the homes of our test participants, the short time span of the field test is a limitation of concern. As described by Karapanos et al. user experience changes over time for a product, as the user goes through the three different temporal phases outlined in [59]: *orientation, incorporation*, and *identification*.

The orientation phase is dominated by the excitement and frustration experienced by users as they experience novel features of the product as well as encounter learnability flaws. In the incorporation phase, users try to make sense of the product in the context of their daily lives. Long-term usability becomes more important, as users try to incorporate the product into their daily lives and form routines around it. Lastly, the identification phase revolves around communicating the identity of users through the product.

It is easily identifiable from the results of the test, that participants were still in the orientation phase at the end of the test. In the post test interviews, we prioritize questions related to adoption of News Butler as an Amazon Echo application within the home in an attempt to make up for this. As stated in chapter 4, values of importance to the household are related to the identity of the people living in the home. As such, to fully understand the implications of using News Butler in the home, a longer study of use would be required, which is not feasible within the time span of a master's thesis project.

Novelty effect: When conducting field tests it is important to take what Brush [22] describes as the *novelty effect* into account. Brush states that *"Often, when using new technology, people start out very enthusiastically using it and the decrease their usage"* [22]. Speech recognition, and voice control are not new terms or new technologies as explained in chapter 2. But voice user interfaces in consumer products is still relatively new, and the Amazon Echo has been commercially available (in Northern America) for less than 6 months, and thus it must be considered relevant to account for the novelty effect. Our news application prototype, News Butler, both as a news application utilizing voice control to deliver interactive, non-linear, and personalized news content, and as an application running on the Amazon Echo must be expected to be subject to the novelty effect as well.

Demand characteristics: When doing a field study, challenges will present themselves as the result of the methodology of the field study and the mere concept of field study. As participants are well aware of the field study being a test of a product with the purpose of investigating certain matters, behaviour is deemed to change just because of that. An example of this could be participants using functionality otherwise not interesting to them in order to satisfy their expectations

of the needs of the researchers. Brown describe this as *Demand characteristics* and argues that this must be taken into consideration when conducting a field test [21].

We recognize the fact that the results of our field test might not represent how an application such as News Butler would be used when excluded from a field test context. We do believe though, that due to the open nature of our field test methodology, results will be an indication of real world use within the target group represented by the participants. To accommodate the challenge represented by demand characteristics to some extent, we use interaction logging as validation for the qualitative data collected through interviews and diary entries, as these how specific functionality was used to a much higher extent than other.

8

PROTOTYPES

Figure 8.1.: An overview of the prototypes developed throughout the design process.

In this chapter we describe the different prototypes developed through an iterative design process building on experiments and tests conducted with both users and professionals. First we provide an overview of each individual prototype. This is followed by a description of the functionality implemented in News Butler. Lastly, we describe the technical implementation of News Butler.

8.1 OVERVIEW OF PROTOTYPES

The entire design process includes the development of three different prototypes, Alpha Butler, Beta Butler and News Butler. Each prototype is a manifestation of the previous steps of the iterative process leading to the design of News Butler. Prototyping has been a central part of the design process and has been used to facilitate discussion and testing both in workshops conducted and user tests.

8.1.1 *Alpha Butler*

The first prototype built is a result of the knowledge and data collected in the initial literature review, feedback from World Publishing Expo 2015, and user experiments conducted on the artifact ecology

related to news consumption. The application flow was very simple allowing users to either get a compiled feed of news or news specified by a category. On the level of interacting with each news story, user could either get a detailed version of the story, get the next story, or quit the application. Information communicating possible inputs was offered either if users did not continue the interaction within a certain timeframe or if they accessed the help functionality implemented.

As this implementation was done early in the process the stories presented by the application were static wire stories stored within the application structure. Within the design process, Alpha Butler was used in a workshop with Archant and as the foundation for the development of Beta Butler.

8.1.2 *Beta Butler*

The implementation of Beta Butler was a direct result of the collaboration with Archant. The focus of Beta Butler was to implement content provided by a publisher connected to Arhcant with the functionality consisting of the feedback from the workshop conducted with Archant as outlined in section 7.3.2.4.

The application flow was expanded to include a news summary presenting a short non-interactive feed of sentences representing each story. Furthermore, functionality giving the possibility of saving a story to a database through the application was implemented. This would allow users to read the saved stories on a device featuring a screen and internet access. Content provided by asking for an elaborated version of the story was also shortened from the entire body of a news story to a summarized version consisting of only the initial content. Lastly, we implemented a popularity based feed intended to provide the most accessed news stories.

The feedback from the first workshop also included multiple user profiles per device. This was not implemented due to a limitation in Alexa Skills Kit.

Simular to Alpha Butler, Beta Butler served as a topic for discussion and ideation in a remote workshop conducted with Archant and Cxense.

8.1.3 *News Butler*

The final implementation, News Butler, is a manifestation of all previous steps up to and including the remote workshop conducted with Cxense and Archant (outlined in section 7.3.3.4). The functionality of News Butler is described in section 8.2 followed by a description of the technical implementation in section 8.3.

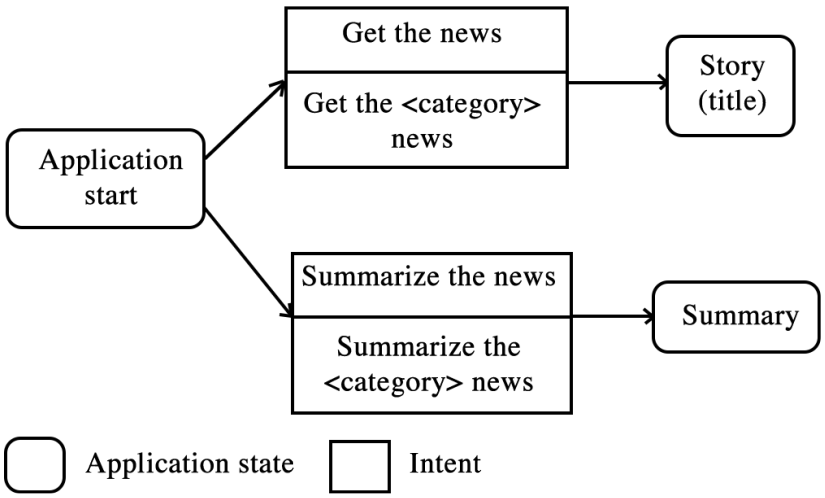


Figure 8.2.: Flow graph of News Butler at application start level

8.2 FUNCTIONALITY OF NEWS BUTLER

Consuming news by using News Butler is done either through an interactive news feed or a non-interactive summary, feeding the *lead* of each story to the user. Both news by a specific category and a personalized news feed modeled by the implemented user model are accessible as an interactive feed and a non-interactive summary (figure 8.2). Our collaboration with Archant made content from Eastern Daily Press [86] available in the categories: *general news*, *sport*, *business*, *entertainment*, and *most read*.

As the prototype has been developed for Amazon Echo using Alexa Skills Kit, the interaction is limited to following a specific command protocol as described in 2.7. This means that the simplest way possible to start the News Butler application is by saying: "Alexa, start News Butler". This starts a session with the application, and as a result the user is acoustically presented with his choices. Along with accessing the interactive news feed or non-interactive news feed, it is always possible to access help functionality or quit the application through the voice interface. At any point it is also possible to interrupt Alexa simply by saying "Alexa" followed by a command such as "next story".

When starting a new session of news consumption through News Butler, the application must either be started as described above, or the execution command must be preceeded by "Alexa, tell News Butler to" or other phrases as specified in [7]. In the description of specific possible inputs offered, the commands are listed from the context of an already existing session, meaning the session of the application has already been initialized by one of the possibilities described

above. All possible *intents*, i.e. inputs, are implemented by multiple execution commands as listed in appendix C.2.

8.2.1 *Interactive news feed*

The interactive news feed of News Butler lets a user consume news down to the level of detail wanted (and offered by the publisher). As described above news content can be accessed either by specifying a category resulting in news only from this segment, or as a personalized feed of stories modeled by individual user models (personalization is described in 8.2.4). A story is represented at three levels: *title, body,* and *full story*. Both title and body are accessible as acoustic output, while the full article is only accessible as text by saving a story through the ”save” intent.

Accessing this functionality is done by saying ”get the news” or ”get the business news” among other. When either utterance is spoken, the user is presented with a list of stories which are read one by one. When a story has been read, the user is presented with a new interaction possibility. This continues untill there are no more stories in the news feed or the user manually quits the feed by asking for a new feed or by quitting the application. The possible inputs offered at the level of the individual story are: *next story, elaborate story, save story* and a way of directly *influencing the user model* resulting in getting either more or less stories from the category related to the story.

8.2.1.1 *Next story*

Next story simply fetches the next story of the feed and presents it to the user. When the story has been played, Alexa waits for input again if there are more stories to be read. The intent is triggered by saying ”next” or ”next story, please” among other phrases.

As the interface is still at the state of having just read a the title of a story, the possible inputs outlined in the previous section also apply here, i.e. next, elaborate, save and user model influence.

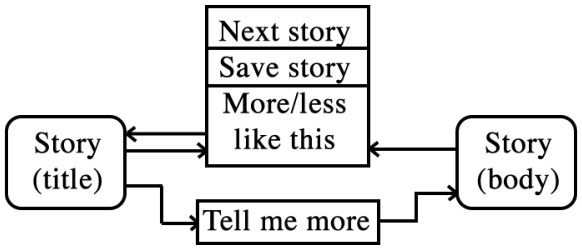


Figure 8.3.: Flow graph of News Butler at story level

8.2.1.2 *Elaborate story*

When choosing to elaborate on a certain story, more detail of the story is presented. This level of stories is accessible at the title level of stories, i.e. when elaborate was not the last input fed to the application. The intent is triggered by saying "elaborate", "tell me more about this", or any other phrase implementing the intent.

When this intent is triggered, the interface state shifts from the title of a story to the body of a story. This means that subsequent inputs are next, save and user model influence. Elaborate functionality is inaccessible in this state as there is nothing to elaborate on. To consume the full article from the publisher, functionality allowing users to save stories for reading is provided, as described below.

8.2.1.3 *Save story*

Saving a story makes the story accessible on any device with a web browser installed through a web application developed specifically for this project (described in 8.2.5) [25]. This allows users to access the full article from the publisher as text. To save a story, application state must be at either level of a story, i.e. title or body (through elaborate). This intent is triggered by saying "save", "save this story for reading", etc.

Subsequently, it is possible to either get the next story, elaborate on the current story, or influence the user model.

8.2.1.4 *Explicit personalization feedback*

Asking for more or less news from a specific category is the individual users way of directly influencing the user model which drives the personalization aspect of News Butler. When the application state is at either the title or body level of a story, these intents are triggered in two ways: If a user wants more news from the category of a story, he could say "More news like this", "I like this type of news", etc. Contrary to this, if a user wants less news from a specific category, instead he would say "Less news like this", "this doesn't interest me", etc. Using this functionality users can influence how the news feed is sorted and how many stories are presented within each category of the news feed.

subsequently, all possible intents related to the story state (story title or story body) of the application are invokable.

8.2.2 *Non-interactive summary*

The non-interactive summary of news lets users consume the news accessible through News Butler without being forced to interact between stories. Summaries of both the personalized feed and of news

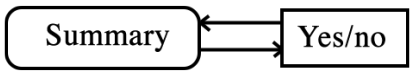


Figure 8.4.: Flow graph of News Butler at summary level

within either of the categories are made available through their individual intent. To get a summary of the personalized news feed, user would say ”summarize the news for me”, ”give me the headlines of the business news”, or other phrases implemented for either intent.

When news are summarized, only the lead sentence of each story is played back to the user. Summarized stories are implemented this way due to the arguments presented in [87], stating that *”the most important information is summarised in the so-called 'lead sentence'”*.

When asking Alexa to summarize the news from a specific category, each story represented by their lead sentence is read continously until the end of the feed. A summary of the personalized news feed prompts the user for input half way through the feed, asking if playback should continue or stop. This implementation is necessary due to technical limitations regarding output size.

8.2.2.1 *Continue or stop summary*

This input possibility is accessible only when asking for a summary of the personalized news feed. In the middle of the news feed, users are prompted to input by Alexa saying ”do you want me to continue?”, to which they can answer ”yes please”, ”no”, ”maybe later”, etc. (as shown in figure 8.4)

Confirming that summary playback should continue causes the summary to resume playing untill the end of the feed.

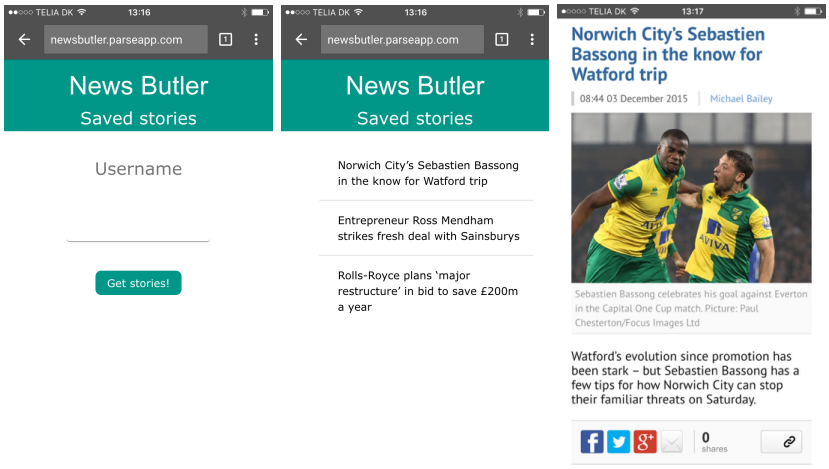
8.2.3 *Help*

We made help functionality available at all application states. This intent is implemented to make the user aware of the state of the application and communicate corresponding input possibilities available at the current application state. To examplify this, invoking help immediately after the application was started and invoking the same command after the title of a news story has just been played results in different output as the application is in a different state.

Help functionality is accessed by saying ”help”, ”what can I do”, etc. and can be invoked at any point in the application structure.

8.2.4 *Personalization*

The personalization aspect of News Butler is a product of the second workshop (described in section 7.3.3.4), which had this specific theme



(a) Login view (b) List of saved stories (c) Article view

Figure 8.5.: The different states of the web interface for accessing stories saved through the News Butler Alexa Skill.

as part of its setting. The personalization of News Butler is driven by a user model representing the interests of individual users of the application. This user model is updated through either *explicit* or *implicit* input from the user in line with the recommendations presented by Thurman and Schifferes in [96]. Explicit input (as described in section 8.2.1.4) allows users to directly influence the user model, while the implicit input continously builds the user model based on user behaviour.

implicit input is fed to the user model through specific intents: elaborate, save, news by category, and summary by category. Once implicit input has been triggered for a category, it is disabled for the remainder of the subsection of the feed belonging to that specific category. This serves to counteract the user model being updated heavily for a category due to a chain of intents such as, "get latest news in entertainment", "tell me more", "save this story".

The individual user model serves two purposes. (1) The personalized feed is sorted by the interest value of each category in descending order, and (2) serves as a popularity filter by playing only the most popular stories in a category otherwise of little interest to the user in line with the work presented in [38].

8.2.5 *Web access to saved stories*

As mentioned previously, saved stories are accessible in a web browser as multimedia output (text, video and images) as shown in figure 8.5[1] [25]. Stories saved are listed as shown in figure 8.5b. Clicking on an item takes the user to the source of the article as examplified

1 Accessible at: http://newsbutler.parseapp.com - user account needed.

in figure 8.5c. This specific functionality was implemented based on findings from the first workshop with Archant (described in section 7.3.2.4) and the initial survey of the artifact ecology related to news consumption (described in section 7.2.4).

8.3 TECHNICAL IMPLEMENTATION OF NEWS BUTLER

This section will provide a condensed overview of the different technical parts making up the prototype of the project. We will not go into detail with the specific programmatic details of the project but will instead outline the structure of all parts and how the interact. For information about development using the Alexa Skills Kit, see [6].

The functionality of News Butler is implemented as a lambda function [6] through Amazon Web Services (AWS) [5], utilizing the Alexa Skills Kit (ASK) [3] provided by amazon. The lambda function is a node.js module executed as an Alexa Skill. The Alexa Skill (News Butler) communicates with a backend API implemented through parse.com [76], which features a storage module. Lastly, the web application is a simple HTML, css and javascript implementation which communicates with the same backend. The full structure of the implementation is seen in figure 8.6

8.3.1 *Alexa Skill*

The Alexa Skill part of News Butler is a node.js module running in the cloud on servers provided by Amazon through AWS. The client software running on the Amazon Echo device is not modifiable by third party developers, and as such the entire application logic is run in the cloud.

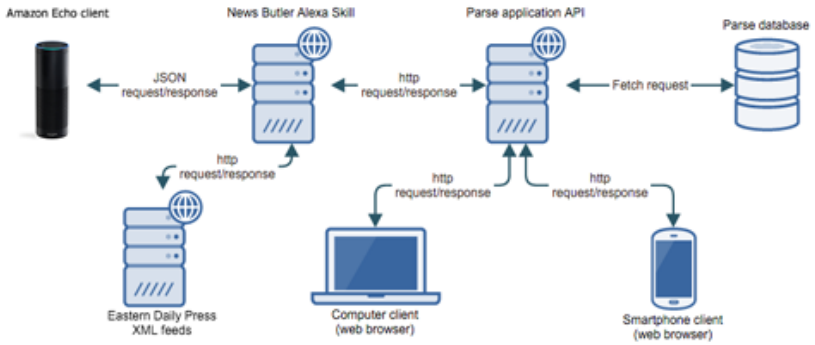


Figure 8.6.: Visual representation of the different parts of News Butler.

8.3.1.1 *JSON communication protocol*

Alexa Skills communicate with the Amazon Echo through JSON objects and HTTP request/response. Developing Alexa Skills as a lambda function, some initial structure is provided by Amazon. The module must correspond to a protocol defined by Amazon. Doing this, the JSON requests are parsed and then fed to the Alexa Skill as request and session objects. The request contains the intent triggered by the Amazon Echo, while the session contains in-memory data and application state.

Processing results in a response, which is formatted to fit the JSON response protocol handled by the lambda function framework in which the Alexa Skill is embedded.

8.3.2 *XML news feeds*

The source of news feeds are stored within the app. As intents requesting news feeds are triggered, these are downloaded from the source defined by the category given in the intent and stored in the memory of the application to minimize the amount of network traffic generated by the application.

8.3.3 *Backend*

The backend of News Butler is implemented through parse.com, which provides a quick and easy storage and API framework.

8.3.3.1 *Application and frontend API*

The parse.com implementation serves as an API for the Alexa skill and for the frontend. The API is a javascript implementation conforming to the cloud code framework [77], which communicates with the storage module, thus serving as a bridge between Alexa Skill/frontend and the storage.

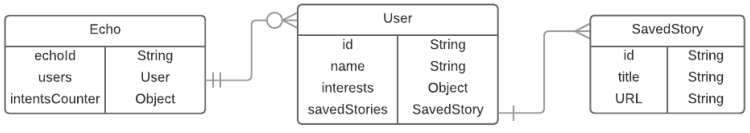


Figure 8.7.: Entity relation diagram of News Butler user model.

8.3.3.2 *Storage*

The storage is implemented to hold the user model which includes persistent data about application use, interest in categories, and saved stories for the individual user (as shown in figure 8.7).

8.3.4 *Frontend*

The frontend [25] is an HTML, css and javacript implementation with the sole purpose of letting users access saved stories to read them. It communicates with the backend through the parse javascript API by the user inputting a username, thus responding with the stories saved through the voice interface provided in the News Butler Alexa Skill for that specific user.

9

DATA

This section presents the data collected from the final field test of the design process. The data presented in this chapter is used as the basis for the findings described in chapter 10.

The data presented in this section has been collected using the following methods:

- **Questionnaires**: Prior to the final field test, the participants were asked to fill out a preliminary field test. Through this we were able to collect quantitative data about the news-related interests of the test participants.
- **Diaries**: Diaries have been used in the field test to be able to collect qualitative data about the usage of the News Butler prototype.
- **Interaction logs**: Quantitative data was collected through interaction logs to be able to objectively monitor usage of the News Butler prototype and to identify patterns in use.
- **Interviews**: A series of interviews were conducted with the participants of the final field test in order to be able to collect qualitative data subsequently to the end of the field test.

Four of five participants in the test provided sufficient logged data. As the fifth participant was inactive through the majority of the testing period , the data collected from this participant has been discarded. The data collected throughout the final field test can be found in the appendices (TO-DO: !X! - !X!).

9.1 QUESTIONNAIRES

The five participants were asked to fill in a questionnaire prior to the field test. The purpose of the questionnaire was to identify the interests related to different news categories of the participants. The data from this has little value in terms of analysis, but greater value in terms of the initial experience provided by News Butlers to the individual participant.

Participants were asked to rank their interest in business, sport, entertainment, and general news. The data was used to build the user model as described in section 8.3, which resulted in the participants being presented with a specific format of the entire collection of news stories personalized to their profile.

9.2 DIARIES

Three out of five participants kept a diary of their use of News Butler throughout the field test period. Due to the format of google forms [44], all participants had access to the diary accross platforms with an internet connection and browser installed.

The diary results are grouped by entry type. These are defined in the diary entry form as: (1) incidents, and (2) thoughts regarding use. Incident entries were used by participants when they experienced News Butler malfunctioning, while entries of thoughts regarding use were used to articulate their experience of using News Butler.

We recorded 3 entries of incidents related to the use of News Butler and 5 entries describing thoughts of use. All diary entries grouped by the individual participant can be seen in appendix E.3. Aside from being concrete data which we can analyse, diary entries also helped create the interview guide.

9.3 INTERACTION LOGS

Throughout the final field data has been been logged automatically whenever participants interacted with the News Butler prototype application. We were able to log all interaction within the News Butler application, resulting in a complete log of the usage of the prototype throughout the entirety of the field test. The News Butler application was launched 61 times and 266 individual interactions with the application was logged.

9.3.1 *Use statistics*

We vizualise the logged data in figures 9.1 - 9.3 to get a better overview of how the News Butler application was used in the final field test. The distribution of news delivery method chosen can be seen in figure 9.1.

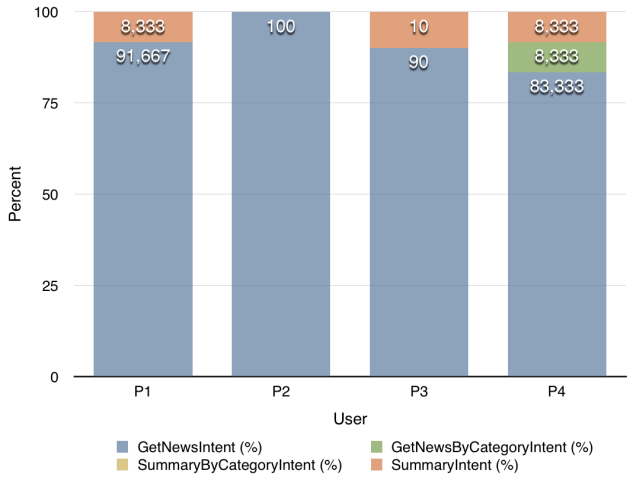


Figure 9.1.: Distribution of news delivery method chosen for each user.

Figure 9.2 shows the average amount of stories played when each user has fetched the news by calling the intent for getting the personalized news feed.

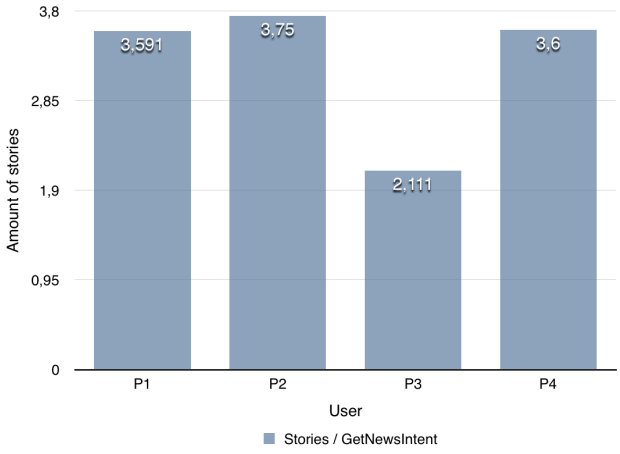


Figure 9.2.: Average amount of stories played pr. get news feed intent for each user.

The amount of intents called pr. individual story played for each user is shown in figure 9.3.

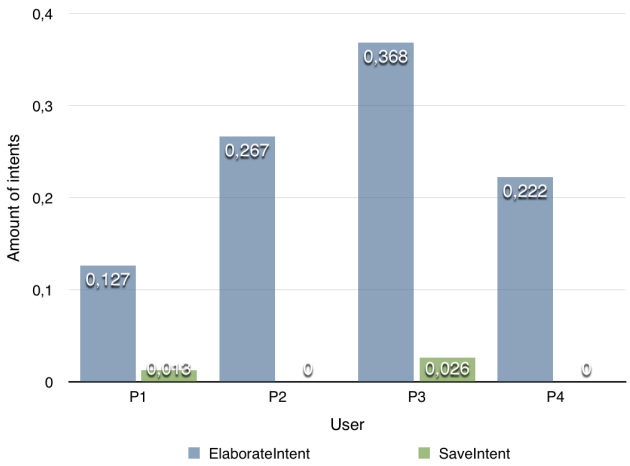


Figure 9.3.: Amount of intents called pr. individual story for each user.

Lastly, figure 9.4 shows how many times each participant explicitly manipulated their individual user model to modify the content and structure of their news feed.

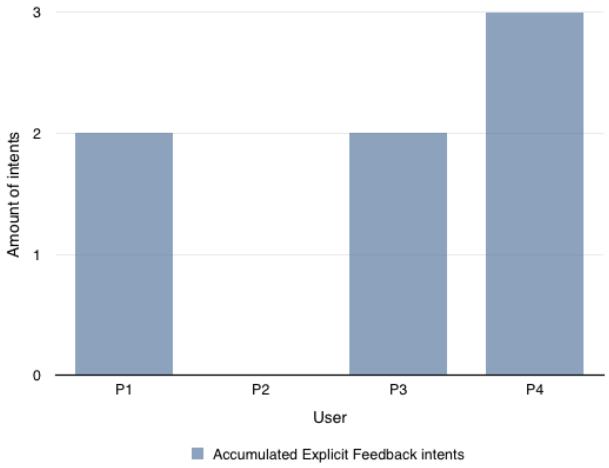


Figure 9.4.: A graph showing the amount of times users explicitly manipulated the user model.

9.4 INTERVIEWS

As the final step in the field test, we conducted video interviews with the participants to collect qualitative data which could support the diary entries and logged interactions. The interviews were based on a semi-structured interview guide, aiming at covering four main themes: (1) Experience of using Amazon Echo, (2) Experience of interacting with News Butler, (3) news content of News Butler, and (4)

using News Butler in relation to other media used for news consumption. The interview guide can be seen in appendix F.2

The interviews ranged from 16 to 23 minutes in length and five people were interviewed (three were interviewed individually and two, who had been testing the application together, preferred to be interviewed together as well). Data in the form of interview transcriptions are available in appendix G.2.

Data from the interviews conducted along with other data collected is thoroughly analyzed in chapter 10.

10

FINDINGS

In this chapter we analyse the empirical data collected in the final field test and generate findings. We examine the qualitative data from the post test interviews and diary entries collected in the field test and structure this using the analytical technique of *open coding* [30, 61] used in the qualitative research approach called *grounded theory* [43, 30, 61]. We do not code the data with the purpose of inductively developing a theory, as is the purpose of grounded theory [61], but rather apply the technique of open coding to be able to examine, analyse, compare, categorize, and conceptualize the data collected throughout our field test.

Using the statistical data collected through interaction logging we are able to better validate the qualitative data through comparison of data as described in [22].

10.1 USAGE

In this section we analyze data related to the general usage of News Butler. Doing this we seek to find information about how test subjects have used News Butler, and how they have integrated it into their households and lifestyles.

10.1.1 *Placement*

The test participants chose a few different places to place the Amazon Echo inside their homes. Two participants chose to place the Amazon Echo in the kitchen, one put it on a shelf in the dining room, and one placed it in his home office. The reasoning behind the placement of the Amazon Echo was mostly the same though. The reasoning of one participant behind putting the Amazon Echo in the kitchen was:

> *"[The kitchen] is kind of the hub of my house. It's where I come in and leave, so it's kind of just always there." [P1]*

The reason for another participant to place it in the kitchen was simply

> *"That's where I make my breakfast, haha." [P2]*

As mentioned, another participant chose to put it on his bookshelf in his dining room. When asked about the reason for this positioning, he stated that

> *"Just because it's kind of in the middle of the house, I walk past it a lot, I can hear it from my kitchen.. And it's kind of a power point." [P4]*

One thing to note about the statements of all the participants is that when they talk about the placement of the Amazon Echo in their homes they all mention that they place it in what can be called *activity hubs*. It seems important for the participants that the Amazon Echo and News Butler is placed so that it is usable while performing other activities.

10.1.2 *Use patterns*

When asked about how, and at what times of the day they primarily used News Butler we found that participants used it in a few different ways. One participant stated that

> *"For my breakfast i usually get in the kitchen and grab a cup of coffee and it takes me 15-20 minutes to get my whole morning sorted out. So I used it as a background activity because I don't want to waste time in the morning, just do the stuff I need to do and then go." [P2]*

Other participants mention similar uses of the application stating that it's used as a background activity, though we found that it was used at different times of the day, centered around the morning and the afternoon. One participant, who liked to keep updated on the news throughout the entire day stated that he always used News Butler first thing in the morning and then again later in the evening. Another participant told us he used it

> *"[...] in the evening.. So when I came back from work.. Just to get the headlines." [P4]*

10.1.2.1 *News modalities and functionalities*

Looking at the charts presented in chapter 9, we see that the modality most used to get the news (seen in figure 9.1) is by far the interactive news feed (called through the get news feed intent of News Butler). This is well supported in the statements from the test participants. When asked about use of the different modalities for getting the news one participant said

> *"I didn't use the categories that much. [...] just the regular news function." [P4]*

Figure 9.2 shows the average amount of stories played for users when getting the news through the interactive news feed. The average amount of stories played through the interactive news for all users is 3.1. With a total amount of stories for each personalized news feed ranging from 5-10 (dependant on the preferences of the user stored in the user model), one must remember that users have interacted with the application multiple times every day, and have the option of quitting the news feed at any point. The average amount of stories suggests that users quit at some point before the news feed has completed, possibly when they are played a story which they have already previously heard. All of the test participants found the ability to elaborate on content by choice really good, as it allowed them to simply navigate through the news feed and get elaborated versions of whichever stories they found interesting. Figure 9.3 shows the amount of intents called for each story played. The logs show that just over one in every five stories were elaborated on by News Butler on average. This supports the statements of the participants regarding their use of the News Butler prototype application. One participant mentioned the following about the use of the different functionality:

> *"I started out.. You know initially by just getting the headlines but then later I started getting elaborated versions of the stories. But I think that was more a matter of the content, whether or not I would elaborate on the story. If it wasn't something that was relevant, it was just, you know... Skip to the next story." [P1]*

This type of use for the elaborate functionality implemented in News Butler shows across the logs and statements of all participants.

10.1.3 *Web application*

The News Butler web application [25] was only used by one participant, and he only used it to a small extent. The one participant mentioned that the experience of using the News Butler web application was good:

> *"Yeah, that was great. I tried to save a few stories just to test, and had those delivered to me on there." [P1]*

Closely related to the use of the web application, figure 9.3 shows that the mount of stories saved is very low, supporting findings related to the use of the web application. One participant was aware of the ability to save stories, and tried doing so for the sake of testing the functionality, but was never aware of the News Butler web application. This participant mentioned though, how he listened to a really interesting story and wanted to read it:

> *"[...] the story was good, and also sounded really good on Alexa once she read it out. And then after that while you know.. I want more of this story, so I would log on to the Eastern Daily Press website[1] or look at the paper today." [P4]*

The one issue here was simply, that he didn't notice in the introduction, that the web application used to access saved content existed. When we presented him with the web application, he expressed that this was the exact experience he was looking for.

The one participant who used the web application, went even further and hooked it up to an online service called ifttt [54] (if this then that)[2]. This allowed him to get his saved stories delivered directly to his e-mail. He also extended the functionality further linking it to home automation functionality of his home:

> *"When I saved my stories, I could then get them delivered at say... Seven o'clock in the evening to an email, and link it with my home automation stuff to flash my living room lamp.. And that means that I got stories, which is quite nice." [P1]*

10.1.4 *News Butler among other forms of media*

Participants found the News Butler application to be a good service, both used with as a complimentary service together with other forms of media and on its own. One participant said that

> *"You don't have to log on to a site, turn on a TV or go get a paper. It's already there and always on.. All you have to do is ask for it. And it gives you the news when you want it on command. I don't think it replaces other forms of media, I think it's almost a way to tease stories in its present form." [P4]*

This statement suggests that News Butler works great as a service complementing already existing media used for news consumption i.e. websites, newspapers, etc. Another participant states that he mostly thinks of News Butler as a complementary service initially, but sees news applications and services like this evolve into something greater:

> *"[...] I think that over time it will kind of learn what kind of content you consume. And then it will become something that is much more useful and usable than a newspaper and a radio bulletin." [P1]*

1 Eastern Daily Press [86] provided the feeds used in the News Butler prototype application.

2 If this then that is a web-based service that allows users to create chains of simple conditional statements, called "recipes", which are triggered based on changes to other web services. [105]

Other participants saw News Butler more as a standalone service, highlighting the features that differentiate News Butler from other types of media that they use for news consumption. One participant says that News Butler fills a very specific spot in his daily life:

> *"You know, for me personally, I can't read the paper while I'm making breakfast, that doesn't really work, and the local media isn't available on radio, so this gives me the ability to have a handsfree experience without having to listen to the whole thing even if I'm bored shitless by it." [P2]*

This is supported by other participants with varying examples where express the desire a handsfree news experience with interactive content relevant to their specific use context.

10.1.5 *Summary of usage findings*

We found that participants mostly used News Butler in situations where the hands-free experience would mean that they would be able to consume news while performing another activity. As such it makes great sense that the participants chose to place their Amazon Echo whereever most of their activities inside the house take place. Participants really enjoyed the interactive news feed of News Butler to an extent where it was almost the only news modality used in the field test. This suggests that the focus of applications like News Butler should above all else be to make this experience as good as possible. The data also suggests that these kinds of services would could work well both as standalone services, and complementary services. The web application developed specifically for News Butler was not a huge success, but the data shows that cross-platform functionality makes a lot of sense with these kinds of applications, making their function as complementary services even more relevant.

10.2 INTERACTION

The findings described in this section focus on reported thoughts on the interactivity of News Butler. These are limited to thoughts on interacting with News Butler specifically and not Amazon Echo as a product. Findings in this section are divided into three areas: interaction feel, vocabulary, and interaction incidents.

10.2.1 *Interaction feel*

Interaction feel relates to how well the participants were able interact and in which way they used the voice interface implemented in News Butler.

All participants interacted with the interface through the short commands. Three participants thought the command style interaction didn't feel natural but all participants liked the efficiency of interacting through one word commands, as described by one participant:

> *"Well.. You sort of gave it one word commands so yeah it's quite hard to say, you know you would say 'elaborate', 'next story' and so on. But yeah it always did what I asked it to do, which for me was the most important thing. But yeah obviously it doesn't feel completely natural when you give it one word commands." [P4]*

Another participant was perfectly fine with using short commands to interact with News Butler:

> *"Uhm, I used the short commands, the one word commands, once you got used to them I found that absolutely fine, so.. 'next', 'elaborate'.. that worked fine.. And I don't have a problem with having command lines like that, seems to work fine. I found it perfectly fine to work with." [P2]*

Participants also described difficulty in learning the interface, which was expected in an application interface with no visual feedback. To help participants get started with News Butler we included a vidoe introduction to the interface in the introduction document sent to each participants e-mail prior to the beginning of the test.

> *"Initally [navigating the interface] was a bit difficult, because I didn't really know how to get the different stories. But over time it just became natural." [P1]*

10.2.1.1 *Help and guidance*

To help participants overcome the lack of visual feedback in the interface, help functionality was implemented to always be accessible and participants were also made explicitly aware when the application was expecting input through prompts.

Two participants state they used the help functionality with positive effect. One participant reports:

> *"[...] I often forget to ask for the next story.. So I get the prompt from the Echo [...] And I liked the fact that if I didn't ask for anything, then I would be prompted for a response." [P1]*

Another participant explicitly asked News Butler for help when setting up the Amazon Echo in his home:

> *"It informed me of all the different things I could do, so [...] [it provided sufficient guidance] for the very basic stuff, yea. I would say that it didn't on stuff like categories and what not. It just said the actual words I needed to use to elaborate, or read the news, or something. It was very basic, but it did what I needed it to do when I first set it up." [P3]*

10.2.2 *Vocabulary*

The vocabulary of the voice interface relates to how well it understands the intention of spoken phrases and translate these to specific inputs, i.e. intents (using the terminology of Alexa Skills Kit). All three participants stating that the one word commands did not feel like a natural way to interact with the implemented voice interface, related this to the vocabulary of News Butler:

> *"[...] if you could say: "what's happening in Norwich this evening"? already there it would feel more natural. Or: "are there any crashes in Norfolk at the moment" and it would respond by telling you about the traffic and the sorts [...] So it can definitely be more humanized." [P4]*

Participants also reported incidents related to no support of phrases they felt natural for a certain intent, and that some commands didn't feel natural for them because of the words possible to express the specific intent. As one participant reports:

> *"Elaborate is not a natural word for me, 'expand' would be better." [P3]*

10.2.3 *Interaction incidents*

Throughout the testing period, participants recorded incidents happening while interacting with News Butler. Many of these happened due to the limited vocabulary of the application, i.e. the application not understanding the intention of the user, while the rest occured due to participants requesting unimplemented functionality. One particularly requested interaction form was the ability to navigate to the previous story, as recorded multiple times in both the diary and interviews. As an example one participant simply reports:

> *"[...] 'previous Story' - doesn't result in expected story." [P3]*

10.2.4 *Summary of interaction findings*

In general, participants did not find the interaction with the voice interface to be natural, but did find it efficient to use when navigating

the voice interface of News Butler. For the interaction to feel more natural, the participants agreed that a larger vocabulary needed to be implemented for the interface to use. Lastly, participants found a lack in functionality in regards to navigation of the interface (ability to navigate to the previous story).

10.3 OUTPUT

In this section, findings related to the output of News Butler is described. First we present the thoughts of participants related to content length and phrasing of in-story sentences. This is followed by a description of findings related to the personalization aspects and user model of News Butler. Lastly, thoughts on the output modality of text-to-speech (TTS) is described.

10.3.1 *Content*

Elaborating on the format of the content provided by News Butler, it was made apparent by all participants that the content provided through the structured text format of our partner was not feasible for presentation on a device such as the Amazon Echo, and thus through News Butler. One participant states:

> *"So that's probably the thing i dislike most about it. You mentioned it already, but in terms of the story, the disadvantage of taking the RSS feed, is that it's not tailored to news butler. Its written for someone to read and then when you hear someone reading it out it sounds a bit silly. There's like a headline which was like 'hoop hoop hurray, rare bird spotted in Norfolk'" [P4]*

Unanumously another participant states:

> *"I think it was too long. The content didn't really feel appropriate to the Amazon device at the moment. I think it was just too much. And it doesn't.. The content doesn't read well for a human, I realised." [P3]*

One aspect of content format which split participants into two groups was the length of the elaborated version of a story. Two participants found the elaborated version too short:

> *"Okay, the summary length was fine, I think the elaborate length was too short. So I think if you're going into the elaborate, you kind of want the whole article. If you get bored you can always tell it to stop. I sort of got to the end of elaborate and wanted it to elaborate some more to get the whole article. So personally if I commit to the story then i want to get the whole story, otherwise I wouldn't have committed to it." [P2]*

Opposite to this, another participant states how he believes the content is not consumable if it gets too long on an application such as News Butler:

> *"[...] the way she was playing it quite stuttered, so yeah.. You didn't want to sort of listen to her reading out a whole story. It's fine with the headline, but it's quite hard to follow it when they're not reading it in a very engaging way." [P4]*

This is supported by the opinion of another participant, stating that the summary of a story would probably suit elaborate better than a full story segment:

> *"I think that in most cases it was okay. It might be beneficial to have a specifically spoken headline element and then a summary story. Most of the stories that I consumed were relatively short.. I think that entire stories would be too long. Although they could be interesting, I think that a summary version would be better." [P1]*

10.3.2 *Output modality*

Generally the participants agreed that the TTS output modality provided by Alexa was not optimal for listening to news to due news content normally being embedded with the multimedia content. As such, they found that TTS as an output modality lacked the ability of keeping the focus of the participants.

> *"[...] if you want serious content, like if there's been a crash or a crime, you want to concentrate, and when it's being spoken to you, I think it's harder to get all of the details." [P3]*

Another participant also stated that:

> *"[...] It's quite dull to listen to Alexa just reading out the news. You don't get quotes from other people or you know.. dramatic eye witness accounts or hear gun fire from a warzone or whatever it is. It's just Alexa reading out the story." [P4]*

When asked whether content needed to be transformed to fit the output modalities made possible in News Butler, the participants all agreed that the content in its current form did not fit the TTS output modality.

10.3.3 *Personalization*

The personalization aspect of News Butler was implemented to tailor the news feed to the interests of the individual participant. As seen

from figure 9.4 from chapter 9, three participants used the explicit form of personalization, while all participants used the implicit form through other intents such as elaborate.

The three participants all confirmed that the personalization worked for them, although initially they were unsure of the impact and use of it.

> *"Yeah I think I only got one story, is that right? I don't know.. Yeah I noticed that it was short." [P1]*

One participant wanted more customizability of the personalization aspect of News Butler:

> *"[...] then after a while, being able to ask for more of that [news from a specific category], that was really good. But yea, being able to configure a little more [would be nice]." [P1]*

Another benefit of working on the project along with Archant Media Group was, that it allowed the project to be implemented with personalization on a geographical level as well. All participants enjoyed the fact that local content was presented to them. One participant reported that he would want to have more control of the local aspects of news stories to be presented:

> *"[...] But yeah when it develops you'd obviously want more local control over it. Like just play me Norwich stories or just play me Norfolk or stories near me or stories from my whole county. So that you can sort of have more control of what it's giving you." [P4]*

10.3.4 *Summary of output findings*

The findings presented in this section suggest that news content should be formatted to specifically suit acoustic output. In regards to content length, the findings are ambigous, as half the participants think the content should be as long as possible to allow for users to get into as much detail with the content as they want. The other half thinks acoustic output does not suit long content and should present short content in the form of story summaries.

The personalization aspect of News Butler is found to work, but findings also suggest that it could be improved by allowing for more customizability and allow users to navigate and find geographically tagged content relevant to their immediate context and proximity.

10.4 ADVANTAGES

The findings described in this section revolve around the advantages of News Butler and the Amazon Echo used as an artifact for news consumption.

10.4.1 *Advantages of Amazon Echo*

The advantages related to using the Amazon Echo mainly revolved around availability and accessibility. Everyone mentioned that the ability to be able to consume news while doing something else is a really powerful feature. The statements of the participants were unanimous in regard to this:

> *"I think the fact that you don't have to be engaged in it. The fact that you can be going about your business, doing other tasks and just speaking to it. So you can use it while doing what you wanted to do. Whether that be around the house or on the laptop." [P3]*

Reflecting on the advantages of the Amazon Echo for news consumption and Comparing the experience to consuming news on his phone, another test participant says:

> *"[...] I can access it at any point, I can access it at any time, and at any place, which is really useful. And it's also much easier than consuming news on my phone, because I can actually do other things while listening to the news." [P1]*

10.4.2 *Advantages of News Butler*

Even though a lot of the advantages of using the Amazon Echo for news consumption logically also automatically get applied to News Butler, i.e. availability and accessibility, participants mentioned several advantages specific to News Butler. One thing that participants found to be a big advantage of News Butler specifically was its ability to take in more of the use context to get relevant news. One participant said that his favourite feature of the News Butler application was

> *"[...] the fact that it's local news, and the fact that it's configured as such. It's relevant to me." [P1]*

Another participant thinks this is a big advantage as well saying

> *"[...] it can personalize it to you both from your interests and your geography. And the [default news application] from Amazon didn't sort of come from a range of different sources. Like it was all done directly through that particular media outlet. It was just the AOL headlines or NPR headlines, where News Butler will give you exactly what you want. And potentially from different sources." [P4]*

Another really well-liked feature of News Butler was its high level of interactivity with the news content. This was the favourite part of News Butler for one user.

> *"I liked that you could elaborate on the [stories] you were interested in and just say next if you weren't interested in entertainment news for example. You could also just say show me less of this, which was cool. So yeah it was pretty intelligent so obviously it could do that without you having to lift a finger. That was really nice." [P4]*

All of the other participants supported these statements, saying that these features were the biggest advantages specific to News Butler.

10.4.3 *Summary of findings related to advantages*

The field test has shown, that the biggest advantages and most liked features of the News Butler application was accessibility of a hands-free voice controlled device, coupled with the availability of being an internet news service. The fact that content is chosen based on use context and user preferences was also found to be important, along with the high level of interactivity with the aforementioned content.

10.5 LIMITATIONS

In this section, the findings related to limitations of both News Butler and Amazon Echo used for news consumption are presented.

10.5.1 *Limitations of Amazon Echo*

The Amazon Echo did not meet much critique among the participants, as they all saw the possibilities. Mostly they all like the possibilities it offered for delivering news. One participant reported about another Alexa Skill though that:

> *"I think, in terms of things like tune-in news [another Alexa Skill] it's a single bulletin news.. It's not always.. relevant. I'm not always sure when that latest bulletin has been updated. There are no timestamps, so I have no idea whether I'm getting the updated version, or if I should wait ten minutes for the updated version." [P1]*

Other points made related to Amazon Echo revolved entirely around the cloud software making up Alexa, the TTS output modality being clunky and sometimes hard to understand, and lastly Alexa misunderstanding their speech.

10.5.2 *Limitations of News Butler*

In all the previous sections of this chapter, critique points have been presented within the respective areas of usage, interaction and content. To briefly summarize these, participants did not find much use of the web application while agreeing that some type of multiplatform functionality would suit the application. Furthermore participants did not find the interaction to be natural and also found the vocabulary of the voice interface to be insufficient for going beyond short commands, as incidents would appear as a result. Lastly, participants thought the content provided through the feed of the Eastern Daily Press [86] did not fit the format of News Butler and Amazon Echo.

Participants reported another two points of critique, which had an impact on their feeling of how successful News Butler was for voice controlled news consumption.

One participant pointed out that saying next when in the news feed got tedious:

> *"[...] I like also how it just continues on to the next story each time on NPR and AOL, although I noticed it didn't do that in News Butler. [...] If you just want a summary of what happened in your area then I would want the short headline and sentence and you want it to move on automatically to the next headline." [P4]*

Two participants reported being frustrated when the application shut down while being in the middle of a news feed:

> *"With the News Butler application specifically, I found it quite frustrating if I got to the fourth story, and if I didn't ask it quick enough or if it misunderstood what I said it would quit. [...] And to go back in [and start from the beginning]. I would worry that people would be annoyed by this after a couple of uses, and then wouldn't use the application." [P3]*

The set of limitations outlined in this section along with all previous sections form the grounds for the functionality desired by the participants, which has not been implemented or tested yet. Below is a brief description of these.

10.5.2.1 *Desired functionality*

In the qualitative data collected, we found reportings of functionality desired through limitations pointed out or functionality specifically requested by participants. All of these can be divided into four functionalities: ability to get previous story, a more detailed elaborated

story, remembering application state between sessions, and contextually relevant content.

Previous story: Multiple reportings of trying to navigate to the previous story in the news feed were collected through the diary entries specifically. As an example one participant simply reports:

> *"[...] 'previous Story' - doesn't result in expected story." [P3]*

More detailed elaborate: Two participants requested that the elaborated version of a story would contain the whole story and not just the summary while the possibility of skipping parts of a story remains by telling News Butler to fetch the next story in line, thus interrupting the playback, as described by one participant:

> *"[...] I think the elaborate length was too short. So I think if you're going into the elaborate, you kind of want the whole article. If you get bored you can always tell it to stop." [P2]*

Persistent application state: Building on the frustration described by the two participants experiencing shut downs in the middle of the feed if not fast enough in interacting with news butler, they described the desire for News Butler to remember the state of the application across sessions, meaning if the feed is left at one point, when you return to News Butler an option to continue were it stopped could be implemented:

> *"After short period of silence (30secs), it sleeps. I expect that something 'continue with news butler' or 'continue with news' should awaken device and allow me to hear the news again from where I left it." [P3]*

Contextually relevant content: Lastly, participants were positive towards the content presented being local to the geographic location of their homes. Two participants reported the desire for having control over how local the news were:

> *"You know if you could say: 'whats happening in Norwich this evening?' [...] Or: 'are there any crashes in Norfolk at the moment?' and it would respond by telling you about the traffic and the sorts." [P4]*

10.5.3 *Summary of findings related to limitations*

The findings presented in this section indicate in which areas the Amazon Echo and News Butler as a news application could lack functionality and usability, and lastly which changes could be made to the

application to incorporate the feedback from each participant. Participants wanted more navigational control by being able to navigate backwards in the news feed as well as forward. Participants also reported that due to the repetitive nature of the application when used multiple times each day, they would be forced to listen to the same stories multiple times or be forced to skip stories. As a result, they would want to continue from the point in the news feed where they quit the application at the last time of use. Lastly, participants wanted more control over the content they were presented, specifically in terms of location and proximity, while two participants also reported that the content of elaborated stories was too short and should just feature the whole story, in their opinion.

11

EVALUATING NEWS BUTLER USING THE HUMAN-ARTIFACT MODEL

To evaluate News Butler, we structure the findings presented in the last chapter using the Human-Artifact Model, a theoretical framework presented in chapter 6 and used in chapter 7 to gain an insight into the artifact ecology related to news consumption represented in the three people who participated in the user experiments.

As described in [85], structuring findings in a theoretical framework can lead to additional insights on the subject investigated. To structure the findings we first identify the motivational aspects of News Butler and the motivational orientation of the user, followed by the instrumental aspects of News Butler and the goal orientation of the user. Lastly, the handling and adaptive aspects of News Butler are identified along with the corresponding learned handling and adaption of the user.

The Human-Artifact Model for News Butler is presented initially in the last section of the chapter followed by an evaluation of News Butler based on the findings as presented in through Human-Artifact Model.

11.1 MOTIVATIONAL ASPECTS AND ORIENTATION

The motivational aspects of News Butler and the motivational orientation of the user relate to why a user chooses to consume news through News Butler. As identified in [31], the practices of news consumption, as described in section 3.3 evovle as time passes, and interactive media increases in popularity as a different set of practices are made available in these media forms compared to traditional media such as TV and radio. Most of the test participants' motives for using News Butler can be described through these practices and some of the motivational aspects of News Butler can correspondingly be described as the set of practices made available through News Butler.

11.1.1 *Motivational aspects of News Butler*

As the output method is acoustic, listening as a practice is supported, giving users the possibility of consuming news as a background activity. Snacking, refering to getting a sense of which news are currently

relevant, is also made available through the title format of stories, but also in a more efficient manner through the summary functionality.

In line with other interactive media forms, scanning and clicking are implemented to give users control over the content they consume through direct interaction with the application. Content is accessible through categories, giving users the possibility of getting updated on a specific category of interest. Users can also control the amount of detail presented through clicking, or in this case elaborating on a story. The amount of detail is limited to a format tailored to the acoustic output. Users can also save stories of particular interest to them, if they want to read the news story embedded with images, video, etc.

As the application is connected and features a user model, users can consume news that are updated and relevant to their individual personal preferences whenever they want.

11.1.2 *Motivational orientation of the user*

The findings presented in the previous chapter outline the motivational orientation of the test participants. Of the practices articulated in [31], listening, snacking, scanning, and clicking are represented to some extent. While scanning was found to not be as frequently expressed as useful practices as the other listening, it still represented a small amount of the data collected from two of the test participants.

The findings indicated that the implementation of listening, snacking and clicking as practices all formed part of the motivation for using News Butler.

11.2 INSTRUMENTAL ASPECTS AND GOAL ORIENTATION

The instrumental aspects of News Butler and the corresponding goal orientations of the test participants relate to the actions performed by users and what the artifact is used for. The post test interviews, diaries, and interaction logging data along with the functionality and content of News Butler form this level of the Human-Artifact Model.

11.2.1 *Instrumental aspects of News Butler*

The instrumental aspects of News Butler related to content presentation derive from that of both radio/TV as news media also implementing listening as a practice. Furthermore, the format of the content presented is defined by the intent inputted by the user, resulting in either an interactive or non-interactive feed of news stories.

11.2.2 *Goal orientation of the user*

From the data logged by the test participants and the post test interviews, it was found that content was only accessed once by a single participant by asking to get news from a specific category. As such, News Butler was used by participants mostly for the interacrtive personalized news feed and on rare occasions for a summary of the personalized news feed.

11.3 OPERATIONAL ASPECTS AND ORIENTATION

This level of analysis addresses the tension between how the users use the artifact and the assumptions in the artifact regarding how it should be handled. The operational aspects and orientation are further divided into *learned handling* and *adaption*. Learned handling focuses on the learned routines of the user and the action possibilities offered by the artifact related to learned handling, whereas adaption describes low-level responses, i.e. the adaptive operational routines of the user and the action possibilities offered by the artifact related to adaptive operational handling.

11.3.1 *Handling aspects of News Butler*

The handling aspects of News Butler are the different possibilities offered in regards to interaction. The different interaction possibilities of News Butler are expressions of the intents, i.e. input possibilities, of the News Butler prototype.

11.3.2 *Learned handling of the user*

As previously mentioned, Learned handling of the user focuses on the learned routines of the user. As such we look at our findings for clues about these learned routines in use. The field test and follow-up interviews have shown that users expect to be able to interact with News Butler in certain ways. These assumptions of how the artifact can be used are products of experiences with artifact and other artifacts. It was found that the internal prompts and help function of News Butler was helpful, when users either forgot to interact, or did not know how to. Navigating sequentially presented content is also a learned handling of the user utilized when navigating the news feed of News Butler along with general interaction with voice user interfaces.

11.3.3 *Adaptive aspects of News Butler*

In regards to News Butler, we look at the immediate possibilities offered in terms of input modality, i.e. how are users able to actually interact with News Butler. In the case of News Butler, the application platform (Amazon Echo) enables it to understand human speech and use this as input.

11.3.4 *Adaption of the user*

When a user utters words, sentences, or commands they expect a certain response. The adaption of the user is thus our ability to speak, our understanding of speech, and the meaning of words, normally used for human-human dialogue.

11.4 EVALUATION OF NEWS BUTLER

Looking at the Human-Artifact Model for News Butler (figure 11.1) we can see that a lot of the orienting basis of the user is well supported in the aspects of the artifact. It is however apparant that there are mismatches present between the orienting basis of the user and the aspects of News Butler across different levels of the Human-Artifact Model. Similarly to the Human-Artifact Models used in the survey of the artifact ecology related to news consumption, Mismatches between the aspects of an artifact and the orienting basis of the user are denoted by red lines in the models. Additionally, unnecessary features in the aspects of the artifact and unsupported needs and desires of the orienting basis of the user are marked in the model as red text.

11.4.1 *Get news that have not been heard before*

News Butler currently does not in any way keep track of which stories the user has already heard. This means that users can potentially get the same exact news feed read to them multiple times in a row instead of only getting news when actual new stories have come out. The results from the final field test showed that this was an annoyance to some, especially in situations where the application crashed as this meant that they would have to go through all of the old stories which they had already listened to prior to the application crashing in order to get to the new stories.

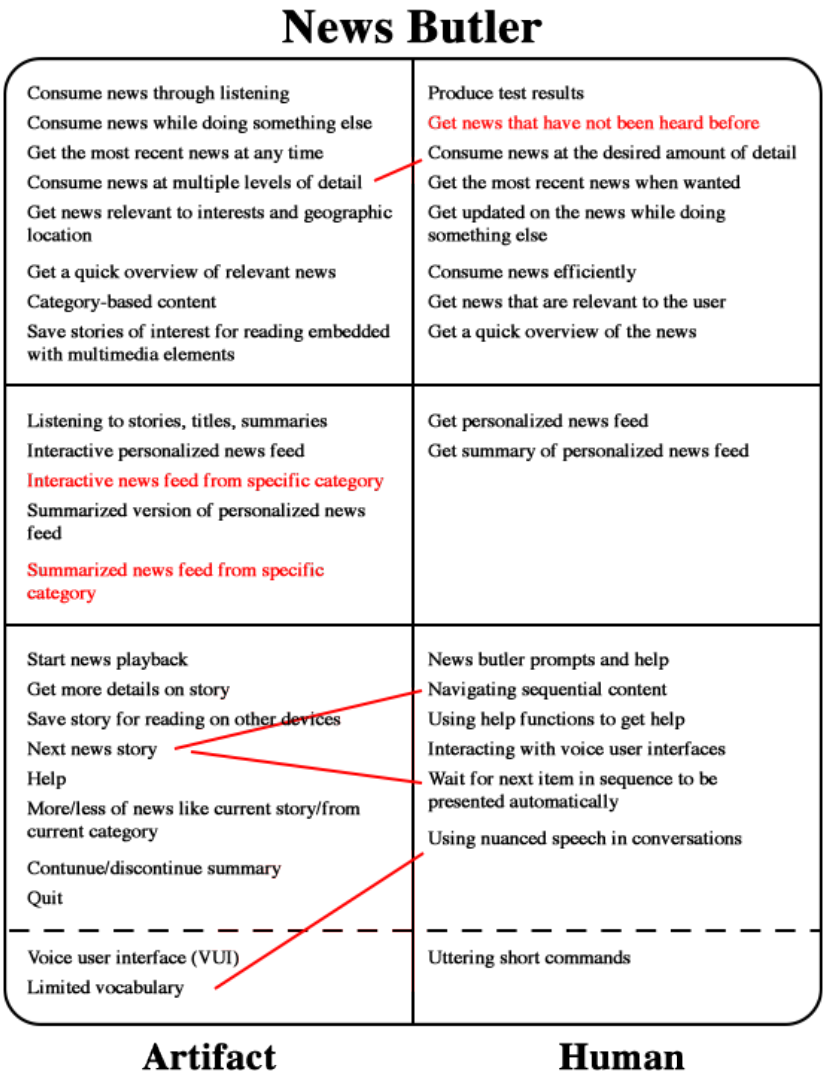


Figure 11.1.: Human-Artifacl Model for News Butler.

11.4.2 *Consume news at the desired amount of detail*

News Butler currently supports story delivery in two levels of detail directly on the Amazon Echo: (1) title, which very briefly introduces the story; and (2) summary which delivers a more detailed version of the story. It is possible to get the story in its entire length directly from the source of the content by saving the story in News Butler and later accessing it through the News Butler web application. As the findings presented in chapter 10 suggests that some users desired a way of being able to consume the entire story, or at least a more detailed version than the summary, directly through News Butler.

11.4.3 *Category based news feeds*

As seen in figure 11.1 in the instrumental/goal level, it is indicated that the functionality giving access to content by a specific category is obsolete, as this is not what News Butler has been used for by any of the participants in the testing period.

11.4.4 *Navigating sequential content*

From multimedia players, users are accustomed to an interface offering navigation of lists of content in a specific manner. This includes next item, play, pause (also related to news butler keeping track of which stories have been heard and resuming from that point), and previous item among others. In line with this, test participants expressed a desire to be able to navigate backwards in content by asking for the previous story. For navigation in News Butler, only accessing the next story of the feed is implemented, which indicates a mismatch.

Furthermore, the learned handling level of figure 11.1 also shows a mismatch in subsequent content in the feed is accessed. Users were frustrated with News Butler not automatically playing the next news story in the feed, which is also the norm when looking at audio players going through sequential content.

11.4.5 *Using nuanced human speech to navigate interface with limited vocabulary*

As seen in the operational levels of figure 11.1, there is a mismatch in the adaptive aspects of the artifact and the learned handling of the user. This mismatch is between the limited vocabulary of News Butler and the way in which test participants spoke to the device. In the findings it shows that most participants found the interaction with News Butler to not be as natural as it could have been, indicating that the vocabulary of the application could be widened.

12

DISCUSSION

In this thesis we have set out to research the area of voice control for interactive news in the home. This chapter discusses the different aspects of the final News Butler application prototype. First, we discuss the functionality of News Butler and the content used by the application. We then reflect on the design process and the usage of the Human-Artifact Model both as a tool used initally in the design process and as a tool for evaluation of our final prototype. Lastly, we discuss the design guidelines presented in chapter 5 and the findings related to these.

12.1 FUNCTIONALITY OF NEWS BUTLER

Looking at the findings related to the functionality aspects of News Butler and the Human-Artifact Model from the previous chapter, it is apparent that mismatches between the implementation of News Butler and the expected functionality and envisioned functionality of the test participants occur.

There was a clear mismatch in the provided means for navigation in News Butler and how test participants wanted to navigate the news content presented. In both diary entires and post test interviews, participants expressed their frustration towards lack of an option for navigating backwards in content, as it meant they would have to start the feed from the beginning to re-listen to a news item previously presented. Another desire expressed towards the navigation of content was that sequential story content would iterated be through automatically by the application. As automatic playback of a sequence of items is a feature unavailable in the Alexa Skills Kit (ASK), this could not be implemented in the prototype.

Automatic playback of news stories was a feature we initially wanted to implement, as this is in line the mental model [28] of news content presented through radio and television, which both support listening as a news practice as also implemented in News Butler. The interactive aspects of News Butler employs the mental model of news content presented on interactive news media such as web sites.

What is interesting about the mismatches described, is their point of inheritance. Both these features are represented in any device playing audio content such as CD players, iPods, Spotify, etc. As

described by Bødker and Klokmose in [26], the historical artifact ecology becomes important when looking at mismatches in the different levels of the Human-Artifact Model. Audio players is not necessarily a part of an artifact ecology related to news, but is part of one related to audio playback, which is also done by News Butler. Looking at audio players, they all have a distinct set of functionality available to them which has not been implemented in News Butler such as play/-pause, repeat, previous, among other. Not being able to quit News Butler and resume from the point of exit was another frustration expressed by the test participants. This might also translate to the pause functionality implemented in audio players.

Reflecting on the above, it becomes clear that News Butler not only is defined as an application playing news content, but also as an application playing audio content. As such, it would be helpful to investigate the mental model designed for products with similar content, as argued by Chhatpar and Pérez-Quiñones in [28]. In the case of voice controlled audible news, this means a set of applications including voice control applications, interactive news applications, and audio players.

Another mismatch outlined in the Human-Artifact Model for News Butler is its limited vocabulary not matching the expectations of native english speakers represented by the test participants interacting with a voice interface. As presented in [57], commercial voice interfaces need a large vocabulary to be robust. Smaller applications can employ a limited vocabulary if users are guided through the application with clear listings of input possibilities available. Our findings indicate that although participants were able to navigate the voice interface, it did not feel natural to them. As described in chapter 4 designing applictions with the values of the household in mind is important when the application domain is the household. The expressive nature of natural human speech was not met with the limited vocabulary of News Butler which was to be expected.

12.2 NEWS BUTLER CONTENT AND OUTPUT

The findings related to the content presented on News Butler has shown that test participants were split into two groups regarding content length. Half of the participants thought that the content was too short and would prefer having the entire story available directly on News Butler, while the other half preferred the current implementation where you get a summary of the story when asking News Butler to elaborate. If longer content were to be incorporated in News Butler, we see two possible ways of doing so: (1) by simply just delivering the entire story when users tell News Butler to elaborate on a given story; or (2) by adding another level of elaborate on each story. Both ways come with its own set of opportunities and issues. If the entire story

is delivered on the first elaborate intent, we are likely to maintain status quo, only this time it will be the group preferring longer content that is satisfied while the group preferring the summary format are most likely to be annoyed by the extensive amount of information. Adding another level of interactivity to each story might seem like a way of solving this issue; the summary version of a story would be available through the first elaborate intent along with the entire story through a second elaborate intent. One could say that this solution hypothetically lives up to the demands of all test participants, but this also means that users who want the entire story will have to tell News Butler to elaborate on a given story twice before getting the amount of coverage that they desire. An argument for this approach is that it follows the classical form of presenting news visualized in the inverted pyramid discussed by [87] (see figure 3.3) by applying a lead-and-body structure to the information for each news story. To be able to finally make conclusions on which solution regarding content length is better, further testing will need to be conducted.

The feedback on the very simple form of personalization implemented in News Butler was generally positive. Because of the limited timespan of this project and due to the focus of this thesis, it did not make sense for us to implement a more advanced content recommendation algorithm leading to more sophisticated personalization. News Butler in its current implementation only matches user interests with category related meta data of articles and geographical use context with content, but because the News Butler is a service connected to the internet due to the Amazon Echo arguably being a very smart device, it would make sense for News Butler to utilize ever-expanding information about its users and the increasing amount of meta data in order to deliver an even better and more personalized news experience. This would of course raise privacy issues, which we are not going to discuss because that is out of the scope of News Butler in its current implementation.

It is clear from the data and findings that the preferred news modality of News Butler is the interactive news feed and that getting news from a specific category (both in its interactive form and summarized) were the least used modalities. This is made clear in the Human-Artifact Model in chapter 11 as well. arguments can be made for not supporting the ability to get news by a specific category in applications like News Butler, as our data and findings suggests that this feature does very little in terms of improving the experience of using the application, but our findings do not suggest that supporting the ability to get news by specific categories is negative either. As such, it is hard to conclude that querying for news by category should be left out, as it does not limit the application nor does it seem to have a negative impact on the experience of using News Butler.

In terms of output modality, News Butler in its current implementation utilizes TTS. The findings presented suggest that the content does not fit the current output modality. As explained in [57], human speech is generally preferred over speech synthesis. Currently, there is no interactive content available in human speech nor is it possible to play audio clips from native Amazon Echo application, but if the need for interactive human speech news content was to increase in the future it would be relatively easy to produce. If such content was to become accessible along with Amazon making it possible for third party developers to play/stream audio from inside native applications, a comparative study of TTS and human speech as output modalities for these kinds of application would have to be made. The result would most likely be, as shown by [57], that human speech would be preferred over TTS.

12.3 DESIGN PROCESS

Throughout the design process of News Butler, a variety of design and testing methodology have been employed to inform the design of the final prototype. Using these have not been without its complications. Most of these are in line with the concerns presented in literature related to the different methods as described in the design process methodology in chapter 7.

An example of this is the use of diaries through the user tests. As seen in the data presentation of the diary entries made through the final test, the collected data was sparse. Hyldegård describe concerns related to incorporating diaries in user testing in [52], stating that diaries should be easily accessible and easy to use. We believe the complications we had regarding using diaries have their roots in the way participants were introduced to the test. In the pilot test, the participant made entries in line with the expectations presented through the diary entry examples, but in the final field test they were not. The two tests were different in a few ways: duration and number of participants. The limitation of one test participant in the pilot test was due to only having one Amazon Echo device available for testing at the time of the test. We limited the duration of the pilot test to two days due to the purpose of the pilot test: to test the methodology incorporated as opposed to collecting data about prototype use. Doing this, we would have time to refine the test by analyzing the quality of the data.

Duration might have had an impact on why entries were made every day by the participant of the pilot test, and why the data representation of the final test was smaller. As described in [22], it is critical to the success of the test that participants fully understand the requirements of the test. Incorporating a semi-structured interview of participants after the test made this problem less of a factor

related to the success of the user test, as this supplied qualitative data in line with the data from diary entries. The data might be different as with diary entries users report incidents and thoughts regarding use much closer to the point of time they experience them where as in a post test interview they have had the time to reflect but also forget experiences had when using the prototype.

In our the findings from the final test, it is indicated that news being local is appreciated, a point also made by Gebremeskel et al. in [42]. It is worth to notice that our choice of participants favor this opinion, as Archant Media Group works mainly with local news in all of England. The participants of the user test were chosen by Archant from their existing user base. Another choice of participants might have produced different results both with regards to the issue of the importance of locality of news and the other data, as Archant user is a common denominator between all test participants.

Reflecting on the rest of the design process preceeding the user tests, the remote workshop described in section 7.3.3 was interesting. Building on the experience gained from the first workshop, a new set of unrelated challenges presented themselves. Due to the unorthodox format of a remote workshop, we experienced challenges related to communication between both us and participants as well as among the participants themselves. Compared to the first workshop, participants had a hard time following the points being made by other participants. This might have been due to the people present not having a shared physical workshop space which is otherwise normal. The remote workshop produced little material compared to the future workshop held in Norwich at the offices of Archant. Another difference between the two workshops were the participants themselves. In the first workshop, all participants were from Archant and were acquainted prior to the workshop taking place. In the remote workshop, participants came from both Archant and Cxense. As Halskov and Dalgård point out in [47], this might influence both the quality and quantity of material produced by the participants.

Looking at the findings from the final test and the analysis of the Human-Artifact Model of News Butler, it is clear that the application has certain usability issues reflected in the mismatches occuring at the operational (handling and adaption) levels of the human-artifact model shown in the previous chapter. Including a test such as a heuristics analysis in our design process could have helped avoid these in the final test. This might have moved the focus in the qualitative data towards more reflection on the quality of implemented functionality as opposed to missing functionality and incidents experienced when using News Butler.

12.4 USING THE HUMAN-ARTIFACT MODEL

In our design process we have used the Human-Artifact Model framework both to structure empirical findings related to a survey of the artifact ecology of news consumption and to structure and analyze the findings of the final user test of News Butler.

The survey of the artifact ecology was conducted through experiements in line with what is described by Bødker and Klokmose themselves in [26]. None of the empirical findings from the final user test stem from observational data, which is recommended for making an analysis of artifacts on the operational levels, meaning that we have had to rely on data in form of interviews, diary entries and interaction logs to make our analysis. As such, some aspects of the use of News Butler by the test participants might be lost and the analysis might not be adequate. As Bødker and Klokmose describe, focus in the operational level is on the operations performed to carry out actions. Observational data can help identify breakdowns in this area, and more importantly identify the mismatch occuring, causing the interaction to fail or otherwise be unsatisfactory to the user.

When analyzing the Human-Artifact Model for News Butler, it proved useful to reflect on the mismatches outlined. Our initial approach towards identifying the artifact ecology related to News Butler was artifacts used for news consumption, as the artifacts handle the same type of content, i.e. news stories. By using the Human-Artifact Model in our analysis of the findings, we found that the output modality would also affect the mental model of the test participants, as data indicated that users would want to navigate the content as done in other applications handling sequential audio content, e.g. audio players. As described above, observational data might reveal other mismatches in the interaction design of News Butler, potentially also revealing more of the historical artifact ecology. Bødker and klokmose themselves describe that the Human-Artifact Model can be used to inform the design of artifacts. We find this to be true, as handling the issue of the interaction with news content through News Butler not only as interaction with news, but also interaction with sequential audio content opens up for a new set of inspiration sources.

In our use of the Human-Artifact Model in the design process, we found the framework to mostly highlight the negative correlations between the orienting basis of the user and the aspects of the artifact. Because of the focus in the framework lying on the tension between the different aspects of the artifact and the orienting basis of the user, breakdowns and mismatches become the focus, which is also of great relevance when designing iteratively and analyzing an artifact. We found it harder to use the framework to evaluate the quality of matches between the empirical data on the artifact and user

side. As such, we found it hard to properly present findings deriving from positive feedback using the Human-Artifact Model, as these findings are present only in the form of a match with corresponding artifact aspects. This makes it hard to distinguingish between high quality features and mediocre ones, such as the interactive news feed and the summarized news feed of News Butler.

12.5 DESIGN GUIDELINES

As explained in chapter 8 we used the set of design guidelines presented in chapter 5 to inform the design of the initial prototype, Alpha Butler. We tried as much as possible to design our application so that it followed these guidelines as closely as possible.

12.5.1 *Design into already existing artifact ecologies*

Based on the findings from our preliminary study of artifact ecologies, News Butler was from the very beginning designed with this in mind but it was not until the introduction of Beta Butler that this became visible in the design. The introduction of saved stories and the News Butler web application allowed for News Butler to be a complementary service as well as a standalone news service. Because of our initial study of the artifact ecology revolving news consumption News Butler was designed as a service that would allow for a multi-platform news experience, rather than it simply being another standalone news application. This was well-received by our test participants as they found News Butler in its current implementation to be best used as a complementary service alongside other media forms.

12.5.2 *Design for fun and pleasure, not efficiency and productivity*

In the design of News Butler, we implemented a vocabulary featuring semi-conversation style commands, in the hope that this would make the experience of interacting with News Butler feel more natural and playful. Our findings suggest that the vocabulary was not large enough, and test participants reported that the interaction felt clunky and unnatural. This is possibly due to the fact that no preliminary study was conducted exploring what kind of vocabulary would be necessary to support natural and playful interaction for these kinds of services.

12.5.3 *Think about use context and ownership of space*

Much like the radio, News Butler was mostly used in situations where the user was already doing something else, i.e. listening and interacting with News Butler was a secondary activity. Because of this, we implemented a way of getting news through News Butler more or less passively, along with the interactive news feed. We found that this functionality was used much less than the interactive news feed but almost all of the test participants did use News Butler to consume both interactive and non-interactive news content. Non-interactive news content might be preferable in situations where you just want something running in the background or when you are feeling lazy and just want to be fed news without having to do anything as one test participant suggested.

12.5.4 *Provide initial user guidance*

As mentioned in chapter 5 this is definately important due to the fact that a purely acoustic interface lacking the posibility of showing application state through the interface itself. As such we had to implement a dynamic help function, explaining the possible courses of action at a given state in the application. In the same way, users will have no way of initially knowing what they are able to do in the application initially. Because of this we chose to give an introductory explanation initial interaction possibilities upon application start. Test participants complained that input related errors resulted in the application quitting rather than providing help or giving them the possibility of trying again. We completely aggree that intercepting errors and handling them by providing helpful feedback would be the best way of handling input errors but currently it not possible to intercept errors, as errors are handled by the alexa cloud software.

12.5.5 *Offer both simple and complex input methods*

In News Butler, we implemented a simple way to launch the application, which would guide users as they accessed the application. Content was also accessible by giving News Butler a more complex command, launching the application and giving it the command to play a news feed in either of its forms, either category based or the full feed and interactive or non-interactive. As previously mentioned, the findings suggest that a larger vocabulary would suit News Butler and improve usability. A larger vocabulary could also open the possibilities of more complex input methods, as more input parameters could be implemented into a single input command. As suggested by one test participant, proximity could be an interesting parameter to work with when incorporating local news into the application. Other

examples could include searching for news related to a certain subject or obtaining news from a specific date or day of the week.

12.5.6 *Choose an output modality based on your content*

As mentioned in section 12.2, news services like News Butler are likely best implemented using human speech as the output modality. Kamm et al. states that human speech is preferred over text-to-speech synthesesis, but that large scale applications requiring very dynamic output capabilities are best implemented using TTS as the output mode [57]. Our findings suggest that TTS does not fit very well as an output modality for news content. We have not had the possibility of conducting tests with human speech content, so we are not able to finally conclude upon which output modality is better. It might still be possible that TTS fits very well as the output mode for some news applications, but our findings do not in any way support that claim.

13

FUTURE WORK

Throughout the thesis project, the dominant themes have been voice interaction with news content, and the format of news content for applications such as News Butler. The findings and analyses reflect this and indicate directions for further research within the area.

13.1 INTERACTING WITH NEWS CONTENT THROUGH VOICE

A critique point of News Butler was that the interaction did not feel natural. The feedback from the final field test suggests that this is largely due to the rather limited vocabulary of News Butler in its current implementation. One obvious way of addressing the need for natural interaction would thus be to increase the vocabulary of News Butler, enabling it to interpret and understand more commands. In order to successfully do this one could conduct studies of human-human dialogue as described in chapter 2. This would open up for the possibility of making complex interaction with underlying structure feel natural to the user.

As seen in chapter 11 interaction related to navigation in the news feeds within the News Butler application was lacking. A natural next step to take in an attempt to solve these navigation issues would be to study the historical artifact ecology that makes users interact with sequential content in certain ways. An example of an artifact to study from the historical artifact ecology related to this could be an audio player.

The current implementation of News Butler is only usable by one user per Amazon Echo. As described in section 4.5, when artifacts implementing technology are placed in homes they are used by various members of the household. As a large part of News Butler is the personalization of content to the specific context of the user using the application, it seems obvious that News Butler should be able to support multiple users as well.

13.1.1 *Multiplatform experience*

Throughout the design process, multiplatform news experiences has been a recurring theme. We have tried to implement a very simple

version of a multiplatform news experience through the accompanying News Butler web application. This meant that stories could be saved through the News Butler prototype on the Amazon Echo and then be readable directly from the source through by accessing the stories through the web application. To be able to make a better version of this multiplatform news experience further studies will have to be conducted specifically on this topic.

13.2 FORMATTING NEWS CONTENT FOR INTERACTIVE AUDIBLE APPLICATIONS

In the user test of News Butler, we found the format of the news to be a major concern for the participants when listening to the news. While this is not a surprise as news presented through TV and radio differ from news presented in written media, the format of news presented through News Butler has not been the primary focus of this thesis project. Going through the design process, we have altered the length of the content presented.

13.2.1 *Fitting content to the acoustic output modality*

In addition to content length, a concern shared by all test participants was how the content was written and more importantly how it sounded when presented through News Butler. Some titles and story content were found to not work well for the acoustic output modality, indicating that an application such as News Butler would benefit greatly by having content produced or reproduced to fit the platform, a concern also described in [64] and [62] which explore concepts similar to News Butler with prototypes reminiscent of TV, thus employing video content as output modality. It would be interesting to investigate how different forms of content is experienced when played back in the interactive format employed by News Butler. To investigate this, content formats such as text written with the purpose of being read aloud and recordings of spoken news reminiscent of what is heard through radio news could be tested on the platform.

Futhermore, while the web platform accompanying the Alexa Skill (the software accessed through interaction with Amazon Echo) aspect of News Butler was not a huge success, all participants showed interest in the possibilities offered in a multi-platform approach to news content. It might also be worth to investigate which media platforms best support applications such as News Butler in a multi-platform perspective. As News Butler is defined by the acoustic output modality, stories could benefit from being embedded with content such as images, video, etc.

13.2.2 *Explore the possibilities of rich meta data*

As the mental model of News Butler borrows from the mental model of interactive written news applications, it would be interesting to explore the possibilities offered in content embedded with rich meta data as currently done on websites to allow users to navigate related content. The news presented by News Butler is, at its current state, not tagged with meta data, making it difficult to further categorize content and relate it to other content. In addition to this, test data also indicates a desire to control the news presented through parameters such as proximity and categorization on a level more detailed than top level categories such as ”business” and ”sports”, which can be made possible through more extensive tagging of content.

14

CONCLUSION

In this thesis project we have looked at the potentials and limitations of using voice control for audible news consumption in the home.

Grounded in research and theory presented, a set of guidelines are formed. We use these guidelines along with a survey of the artifact ecology related to news consumption to inform the design of an initial news application prototype. The survey was conducted through use of the Human-Artifact Model, a theoretical framework used to structure and analyze empirical data.

Through an iterative design process, we have developed News Butler, a news application prototype for Amazon Echo, in collaboration with a major media group based in the United Kingdom. We tested this in the homes of five active news consumers from the user base of the aforementioned media group. To evaluate the empirical data collected through testing and follow-up interviews, we use the Human-Artifact Model as a tool to structure and analyze findings.

By having people use News Butler as their primary source of news we have found a variety of challenges related to news on devices like the Amazon Echo both in terms of production and consumption of content. Our findings point to a need for news content to be produced specifically to fit applications like News Butler, and that functionality has to be shaped around the interactive and personalized news experience. But in these challenges, opportunities also exist for the news industry and news in general to evolve with the technology to be more relevant for its consumers and to be better represented accross the devices defining the connected home of the future.

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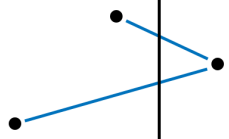
A

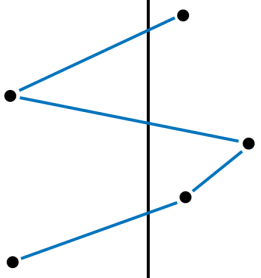
ANALYSIS OF VIDEO DATA FROM ARTIFACT ECOLOGY SURVEY

In this appendix, focus shift analysis of video data collected in the survey of the artifact ecology related to news consumption is presented. The data is sorted by the artifact investigated. Section A.1 shows data for experiments conducted with the Jyllands-Posten newspaper. Section A.2 shows data for experiments conducted with television. Section A.3 shows data for experiments conducted with a DAB radio. Section A.4 shows data for experiments conducted with the website of Jyllands-Posten. Finally, section A.5 shows data for experiments conducted with Jyllands-Posten Nyheder's smartphone application.

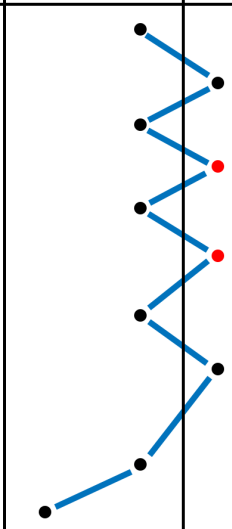
A.1 NEWSPAPER: JYLLANDS-POSTEN

Context		What Instrumental Aspects Headline Section title	How Learned Handling Skip section	How Adaption
"Well then I would probably go to the business section."	Lars looks at the pages to identify section.			
"It's these pages with the funny color."	Lars grabs a specific number of pages until he can see the color of the business section and turns them all at once.			
"Actually, it's this exact article. Here we are."	Lars looks at the headline of the article.			

A.2 TELEVISION

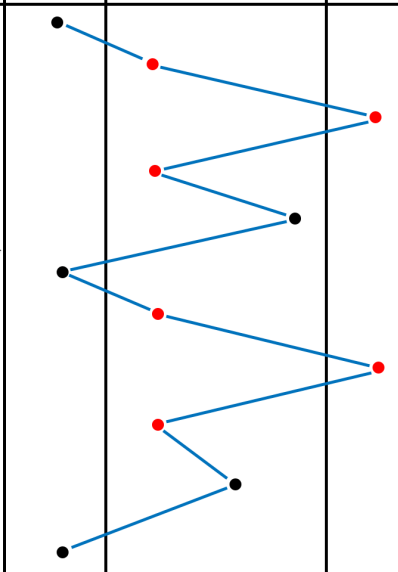
Context		What Instrumental Aspects TV screen	How Learned Handling Remote Interface	How Adaption
"Normally I would press a button to get an overview of the different channels and then navigate around this interface but I don't really know how to"	Cecilie looks down at the remote control looking for a button that provides an overview of the channels.			
"Or else you just have to go through the channels."	Cecilie pushes a button and looks up at the television to see if she has found the overview.			
"Whoops.. Yes, it is this one!"	Cecilie looks at navigational user interface which pops up on the screen.			
Cecilie: "Should I just pick the first channel I see?" Søren: "Sure - that's fine." Cecilie: "Okay - we'll take this one then."	Cecilie looks at the remote to find the 'OK' button.			
"There we go."	Cecilie looks up at the TV to watch the news.			

A.3 DAB RADIO

Context		What Instrumental Aspects Channel Display	How Learned Handling UI	How Adaption
"Well, a DAB radio often shows in the display what is playing."	Bo looks at the display to identify the channel.			
"So we just need to search through them to find something related to news."	Bo tries to figure out the interface of the radio.			
"Folk music... Pop music... There we go, news channel!"	Bo reads each channel represented on the display.			
"Now we just push this button.. Play... or what? Now i messed up I think."	Bo looks at the interface again to find a different solution to the incorrect button press.			
"Oh well.. there was something called news around here."	Bo starts searching for the same new channel again.			
"Now I just need a way to confirm my choice..."	Bo looks for another button indicating a way to confirm channel tune-in.			
"Did I do it right this time?"	Bo checks the display of the radio confirmation of channel switch.			
Søren: No.. You just missed the button, it's right underneath the one you pushed." Bo: "Oh... Ok, let's try that one then."	Bo looks to the interface during instructions to identify the correct button.			
"Yes, there we go. That's the channel"	Bo checks the interface for visual confirmation.			
"And now, we can listen to the news."	Bo listens to the audio broadcast.			

A.4 WEBSITE: JYLLANDS-POSTEN

Context		What Instrumental Aspects News stories	How Learned Handling General UI	Search field	Sections	How Adaption Touch pad
	Cecilie looks around on the front page of the news website.					
"I'm going to look for a search field. I'm not really on this site much but.."	Cecilie looks on the website for something reminiscent of a search field but can't find it.					
"Oh! I'm used to the computer scrolling the opposite way."	Cecilie gets confused about the scrolling setting on the computer because her own is the opposite way around.					
"Is there not a search field in here? There really ought to be one somewhere."	Cecilie again looks for a place to find a search field. But she still can't find it.					
"Oh well. Leets look under the international section then."	Cecilie finds the international section under the sections in the top menu on the website.					
Kasper: "It might not be there anymore. We found it there yesterday."	Cecilie quickly scans the list of news titltes to see if anything fits the description.					
Cecilie: "Okay.. Well then where is the search field??"	Cecilie can not find the search story and starts looking for the search field once again.					
Søren: "Try going all the way to the top." Cecilie: "Whoops. wrong way again."	Cecilie tries to scroll, but scrolls in the wrong direction again.					
	Cecilie looks around on the screen searching the interface.					
Søren: "It's actually right there." Cecilie: "No, really? I couldn't see that at all!"	Søren points at the top of the interface on the website. Cecilie presses in the search field and starts typing 'Ukraine'					
"Hmm.. Election in Poland.. Uro! There it is."	Cecilie scrolls the right direction (seemingly instinctively this time) and scans the headlines quickly untill she finds the story.					



A.5 SMARTPHONE APPLICATION: JYLLANDS-POSTEN NYHEDER

Context		What Instrumental Aspects News stories	How Learned Handling Interface Menu items Sections	How Adaption Swipe gesture
"Then I'll go to the menu back here and have a look. Here we have something call 'reading list'"	Bo clicks the menu button to get into the menu. Bo clicks the menu item called 'reading list'.			
No.. Maybe front page instead.	Bo clicks the front page menu item.			
"Hmm.. I can't really see where I'm supposed to find this..."	Bo goes back to the menu to search for the sections.			
"Maybe if I check the front page again.."	Bo checks the front page again.			
"I'll try to swipe towards the edge of the application.. Maybe that'll work."	Bo swipes on the screen in different directions.			
"I don't know really then... What does this eye icon do?"	Bo clicks an icon in the upper right corner of the application looking like an eye.			
"No... that's not it either.."	Bo goes back to the front page again.			
"I must really say, I have no clue then..."	Bo goes back to the menu items in search of sections.			
Søren: "Try clicking the arrow next to the 'PREMIUM' menu item." Bo: "Oh... that's kind of hidden."	Bo clicks the arrow icon next to the menu item called 'PREMIUM' and sees the sections.			
"Well.. here we are.. business news."	Bo clicks on the section item called business and the news stories appear.			

B

WORKSHOP AGENDAS

This appendix shows data in the form of images from both workshops held. In section B.1, data collected in the first workshop held in Norwich, England at the offices of Archant Media Group is presented. In section B.2, data from the remote workshop held in Aarhus, Denmark with participants from both Archant and Cxense is presented.

Workshop agendas are written in Danish as participants are not meant to see these.

B.1 FUTURE WORKSHOP WITH ARCHANT MEDIA GROUP IN NORWICH, ENGLAND

Workshop with Archant

What we need:

- Post-its
- News paper

First things first

We are Kasper and Søren. We're currently writing our master's thesis at Aarhus University in Denmark together with Stibo Accelerator (which is part of Stibo Systems, CCI, Escenic).

We've come here to do a workshop with you guys revolving around voice control for interactive news.

Preparation phase

the method, its rules and the scheduled course of the workshop (in accordance with the participants) is introduced.

1. Critique phase: The problem is investigated critically and thoroughly. A set of themes arises from this, which is used in phase 2.
    1. We bring a prototype to the workshop to show an example of an implementation solving the problem. Participants are asked to come up with alternate solutions.
    2. Ideas on post its
        1. Ideas are grouped on board.
2. Fantasy or visionary phase: All participants try to work out an utopia, to draw an exaggerated picture of future possibilities. These are used in phase 3.
    1. No critique
    2. Ideas on post its
    3.
3. Implementation phase: The ideas found are checked and evaluated in regard to their practicability.
    1. Ideas are ranked on a impact vs. difficulty of implementation matrix

Setting the theme

Set the theme by first showing the Amazon Echo youtube commercial. Then present the implementation of Amazon News Service on Amazon Echo and lastly our own prototype.

With this in mind, try to have domain specific questions in mind when iterating over ideas in the different phases.

- How would you want to interact with news on this platform?
- How should the news stories be formatted to best suit this platform?
- Is it possible to draw on existing implementations on other media platforms?

Demonstrate Amazon Echo and the news application (both our own and the default).

Critique phase

- Group mapping of critique points from group discussion.
    - Critique points could be e.g. not very interactive, it takes a long time to get through all the news content.
- At the end: grouping of critique points in themes.

Fantasy/visionary phase

- 5 minute group brainstorm on each theme on how to solve the dominant problems of the theme.
    - Ideas can be anything you can imagine. Ideas are utopia-based and there's no critique in this phase. Do not think about concrete implementations of visions - these are just wild ideas - anything goes!
        - An example of an idea from this phase could be e.g. that the application reads your mind and based on that knows what you want to hear.
        - A lot of times the crazy ideas are the ones that lead to the best implementation.
    - Write your ideas on post its so we can group them later.

Implementation phase

- Concrete implementations based on ideas from last phase.
    - As an example an implementation of the mind reading news application we could for example make a helmet which reads brainwaves (this technology actually exists somehow) and uses this as input for the Amazon Echo.
- Mapping of ideas on difficulty of implementation / impact matrix
    - The mind reading news application would be extremely difficult to implement, and the impact would probably not be big enough for it to be worth it.
- Choose the best ideas based on the matrix
- Try to plan activities necessary to realise implementations.

    - To take the mind reading news application as the example, these would be some (but not all) of the activities needed to realise the implementation
        - Convince Amazon that they need to support brainwaves (or the input that is generated from our helmet) as input for the Amazon Echo.
        - Aquire brainwave reading technology.

B.2 REMOTE WORKSHOP WITH ARCHANT AND CXENSE IN AARHUS, DENMARK

Workshop Cxense + Archant

What we need

- Post it's
- Echo
- Pens

Preparation phase

the method, its rules and the scheduled course of the workshop (in accordance with the participants) is introduced.

1. Preparation phase (10 min max): This is where we introduce you to the workshop concept and present the prototype as a result from the previous iteration. Last iteration was mainly about interactivity, this one will be about personalisation mainly.
2. Critique phase (20 min max): The problem is investigated critically and thoroughly. A set of themes arises from this, which is used in phase 2.
    1. We bring a prototype to the workshop to show an example of an implementation solving the problem. Participants are asked to come up with alternate solutions.
    2. Ideas on post its
        1. Ideas are grouped on board.
3. Fantasy or visionary phase (30 min max): All participants try to work out an utopia, to draw an exaggerated picture of future possibilities. These are used in phase 3.
    1. No critique
    2. Ideas on post its
4. Implementation phase (30 min max): The ideas found are checked and evaluated in regard to their practicability.
    1. Ideas are ranked on a impact vs. difficulty of implementation matrix

Setting the theme

Set the theme by first showing the Amazon Echo youtube commercial. Then present the implementation of Amazon News Service on Amazon Echo and lastly our own prototype.

With this in mind, try to have domain specific questions in mind when iterating over ideas in the different phases.

- How would you want your content presented on this platform?
- How would you personalize content for this platform? (Filtering, sorting...)
- Is it possible to draw on existing implementations on other media platforms?

Demonstrate Amazon Echo and the news application (both our own and the default).

Critique phase

- Group mapping of critique points from group discussion.
    - Critique points could be e.g. on the default application you have to go to a website to personalise.
- At the end: grouping of critique points in themes.

Fantasy/visionary phase

- 5 minute group brainstorm on each theme on how to solve the dominant problems of the theme.
    - Ideas can be anything you can imagine. Ideas are utopia-based and there's no critique in this phase. Do not think about concrete implementations of visions - these are just wild ideas - anything goes!
        - An example of an idea from this phase could be e.g. that the application reads your mind and based on that knows what you want to hear.
        - A lot of times the crazy ideas are the ones that lead to the best implementation.
    - Write your ideas on post its so we can group them later.

Implementation phase

- Concrete implementations based on ideas from last phase.
    - As an example an implementation of the mind reading news application we could for example make a helmet which reads brainwaves (this technology actually exists somehow) and uses this as input for the Amazon Echo.
- Mapping of ideas on difficulty of implementation / impact matrix
    - The mind reading news application would be extremely difficult to implement, and the impact would probably not be big enough for it to be worth it.
- Choose the best ideas based on the matrix
- Try to plan activities necessary to realise implementations.
    - To take the mind reading news application as the example, these would be some (but not all) of the activities needed to realise the implementation
        - Convince Amazon that they need to support brainwaves (or the input that is generated from our helmet) as input for the Amazon Echo.
        - Aquire brainwave reading technology.

C

INTERACTION MODEL

This appendix shows the interaction model as implemented on the developer account used for News Butler. In section C.1, the interaction schema is shown. Section C.2 shows the utterances understood by News Butler.

C.1 INTENT SCHEMA

```
{
  "intents": [
    {
      "intent": "GetNewsIntent",
      "slots": []
    },
    {
      "intent": "GetNewsByCategoryIntent",
      "slots": [
        {
          "name": "Category",
          "type": "LITERAL"
        }
      ]
    },
    {
      "intent": "ElaborateStoryIntent",
      "slots": []
    },
    {
      "intent": "NextStoryIntent",
      "slots": []
    },
    {
      "intent": "SaveStoryIntent",
      "slots": []
    },
    {
      "intent": "SummaryIntent",
      "slots": []
    },
    {
      "intent": "SummaryByCategoryIntent",
      "slots": [
        {
          "name": "Category",
          "type": "LITERAL"
        }
      ]
    },
```

```
    {
      "intent": "ContinueSummaryIntent",
      "slots": []
    },
    {
      "intent": "DiscontinueSummaryIntent",
      "slots": []
    },
    {
      "intent": "LessFeedbackIntent",
      "slots": []
    },
    {
      "intent": "MoreFeedbackIntent",
      "slots": []
    },
    {
      "intent": "HelpIntent",
      "slots": []
    },
    {
      "intent": "SetupIntent",
      "slots": []
    },
    {
      "intent": "QuitIntent",
      "slots": []
    }
  ]
}
```

C.2 UTTERANCES UNDERSTOOD BY NEWS BUTLER

GetNewsIntent get the news
GetNewsIntent get the latest news
GetNewsIntent get me the latest news
GetNewsIntent fetch the latest news
GetNewsIntent fetch me the latest news
GetNewsIntent give me the latest news
GetNewsIntent tell me the latest news
GetNewsByCategoryIntent get the latest news in business — Category
GetNewsByCategoryIntent get the latest business — Category news
GetNewsByCategoryIntent fetch the latest news in business — Category
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GetNewsByCategoryIntent fetch the breaking — Category news
GetNewsByCategoryIntent fetch me the breaking — Category news
GetNewsByCategoryIntent give me the breaking — Category news
ElaborateStoryIntent Elaborate
ElaborateStoryIntent Tell me more
ElaborateStoryIntent Elaborate on this
ElaborateStoryIntent Elaborate on this story
ElaborateStoryIntent I want to hear more
ElaborateStoryIntent Tell me more about this
ElaborateStoryIntent Elaborate this story
ElaborateStoryIntent Please elaborate
ElaborateStoryIntent Please tell me more about this
NextStoryIntent next story
NextStoryIntent next
NextStoryIntent skip
NextStoryIntent skip this
NextStoryIntent skip this story
NextStoryIntent skip story
NextStoryIntent not interested
NextStoryIntent boring

NextStoryIntent this is boring
SaveStoryIntent save
SaveStoryIntent save story
SaveStoryIntent save this story
SaveStoryIntent save for later
SaveStoryIntent save story for later
SaveStoryIntent save this story for later
SummaryIntent summarize the news
SummaryIntent summarize the latest news
SummaryIntent give me the headlines of the news
SummaryIntent fetch me the headlines of the news
SummaryIntent get me the headlines of the news
SummaryIntent summarize the news for me
SummaryByCategoryIntent summarize the business — Category news
SummaryByCategoryIntent summarize the latest business — Category news
SummaryByCategoryIntent give me the headlines of the business — Category news
SummaryByCategoryIntent fetch me the headlines of the business — Category news
SummaryByCategoryIntent get me the headlines of the business — Category news
SummaryByCategoryIntent summarize the business — Category news for me
SummaryByCategoryIntent get the business — Category news for me
SummaryByCategoryIntent get the business — Category headlines
SummaryByCategoryIntent summarize the sport — Category news
SummaryByCategoryIntent summarize the latest sport — Category news
SummaryByCategoryIntent give me the headlines of the sport — Category news
SummaryByCategoryIntent fetch me the headlines of the sport — Category news
SummaryByCategoryIntent get me the headlines of the sport — Category news
SummaryByCategoryIntent summarize the sport — Category news for me
SummaryByCategoryIntent get the sport — Category news for me
SummaryByCategoryIntent get the sport — Category headlines
SummaryByCategoryIntent summarize the entertainment — Category news
SummaryByCategoryIntent summarize the latest entertainment — Category news
SummaryByCategoryIntent give me the headlines of the entertainment — Category news
SummaryByCategoryIntent fetch me the headlines of the entertain-

ment — Category news
SummaryByCategoryIntent get me the headlines of the entertainment — Category news
SummaryByCategoryIntent summarize the entertainment — Category news for me
SummaryByCategoryIntent get the entertainment — Category news for me
SummaryByCategoryIntent get the entertainment — Category headlines
SummaryByCategoryIntent summarize the general — Category news
SummaryByCategoryIntent summarize the latest general — Category news
SummaryByCategoryIntent give me the headlines of the general — Category news
SummaryByCategoryIntent fetch me the headlines of the general — Category news
SummaryByCategoryIntent get me the headlines of the general — Category news
SummaryByCategoryIntent summarize the general — Category news
SummaryByCategoryIntent get the general — Category news for me
SummaryByCategoryIntent get the general — Category news headlines
SummaryByCategoryIntent summarize the breaking — Category news
SummaryByCategoryIntent summarize the latest breaking — Category news
SummaryByCategoryIntent give me the headlines of the breaking — Category news
SummaryByCategoryIntent fetch me the headlines of the breaking — Category news
SummaryByCategoryIntent get me the headlines of the breaking — Category news
SummaryByCategoryIntent summarize the breaking — Category news for me
ContinueSummaryIntent yes
ContinueSummaryIntent yes please
ContinueSummaryIntent yep
ContinueSummaryIntent sure
ContinueSummaryIntent go ahead
ContinueSummaryIntent go for it
DiscontinueSummaryIntent no
DiscontinueSummaryIntent no please
DiscontinueSummaryIntent god no
DiscontinueSummaryIntent god please no
DiscontinueSummaryIntent nope
DiscontinueSummaryIntent nah
DiscontinueSummaryIntent maybe another time

DiscontinueSummaryIntent not now
DiscontinueSummaryIntent maybe later
LessFeedbackIntent less like this
LessFeedbackIntent less news like this
LessFeedbackIntent less of this
LessFeedbackIntent I don't like this
LessFeedbackIntent this doesn't interest me
LessFeedbackIntent this does not interest me
LessFeedbackIntent I dislike this
LessFeedbackIntent I dislike this type of news
LessFeedbackIntent dislike
MoreFeedbackIntent more like this
MoreFeedbackIntent more news like this
MoreFeedbackIntent more of this
MoreFeedbackIntent I like this
MoreFeedbackIntent like
MoreFeedbackIntent this interests me
MoreFeedbackIntent I like this type of news
HelpIntent help
HelpIntent help me
HelpIntent what can I ask you
HelpIntent get help
HelpIntent to help
HelpIntent to help me
HelpIntent what commands can I ask
HelpIntent what commands can I say
HelpIntent what can I do
HelpIntent what can I use this for
HelpIntent what questions can I ask
HelpIntent what can you do
HelpIntent what do you do
HelpIntent how do I use you
HelpIntent how can I use you
HelpIntent what can you tell me
SetupIntent setup
QuitIntent I have to go
QuitIntent I'm done
QuitIntent That's enough
QuitIntent Stop
QuitIntent Tell me later

D

FIELD TEST GUIDE

In this appendix, the different elements part of the introduction to the field test are outlined. In section D.1, the introduction document sent to each participant is shown. In section D.2, the form used for the preliminary questionnaire. In section D.3, diary examples explaining our thoughts regarding diary entry use are shown. In section D.4, the form used for diary entries is shown. In section D.5, the form used for the post test questionnaire used in the pilot field test is shown. Lastly, section D.6 conatins a link to a video instruction of the functionality of News Butler.

D.1 INTRODUCTION DOCUMENT

Field test guide

Introduction

We are writing our master's thesis on voice control for interactive audible news. This means news delivered through the sound medium that you can interact with by voice. As a part of this project we are conducting a field test with the purpose of testing our news application prototype called **News Butler**. The prototype we have developed runs on the Amazon Echo (see https://www.youtube.com/watch?v=KkOCeAtKHIc for a video introduction to the product).

For an introduction to our news application, News Butler including how to use it, please see this video: https://youtu.be/Muru3uAzyr8

Link to web application (saved stories): http://newsbutler.parseapp.com username: **Test5**

Setting up your Amazon Echo

1. Plug the included power adapter into Amazon Echo and then into a power outlet. The light ring on Amazon Echo turns blue, and then greets you.
2. Go to https://alexa.amazon.com
    a. Log in with the following credentials:
        i. username: **newsbutlertest5@gmail.com**
        ii. password: **Alexa1234**
    b. Set your Echo up on your wifi:
        i. On the web page, click "**Settings**" from the menu on the left side.
        ii. At the top of the page, click "**Test Echo**".
        iii. Click "**Update Wifi**".
        iv. Follow the on-screen instructions.
        v. If anything fails, try amazon's setup guide: https://www.amazon.com/gp/help/customer/display.html?nodeId=201549640
3. You can now use your Amazon Echo. To get started, say "Alexa" and then speak naturally to your Amazon Echo.
    a. For example you can ask Alexa to tell you a joke by saying "Alexa, tell me a joke".

If you have any questions regarding setting the Amazon Echo up on your local network or anything else please do not hesitate to contact us. We are available at:

E-mail: newsbutlerhelp@gmail.com

Phone (we live in Denmark, hence the +45):

- Søren Bruus Frank: **+45 61 26 19 13**
- Kasper Bruus Frank **+45 28 15 63 36**

Purpose of the field test

The focus of this field test is to:

- Test format of news stories on this medium.
- Test how to best interact with news by voice.
- Explore needed functionality of the News Butler application.
- Identify lacks and shortcomings of the current implementation.

We are also very interested in your general thoughts regarding the news application prototype and the project in general.

What you should do

When participating in the field test we ask that you actively use the News Butler application for news consumption and make diary entries of use and about your thoughts of using News Butler.

- Before doing anything else, we ask that you fill out this **preliminary user study** as soon as possible: http://goo.gl/forms/QWh71NCAvn
- You can make diary entries here: http://goo.gl/forms/1DY8jNHx7V
- Diary entries can be about when you prefer to use it, how you use it, incidents, and other thoughts regarding the use of News Butler.
- You don't have to make entries every single day of the test, if you feel like you have nothing new to say.
- If you think of something particularly interesting regarding use of the News Butler application please take the time to explain in detail why it caught your attention and why you think this is interesting. This would be very helpful for us.

After the test we would very much like for you to participate in a short debriefing interview. If you are not able to do this for any reason please let us know.

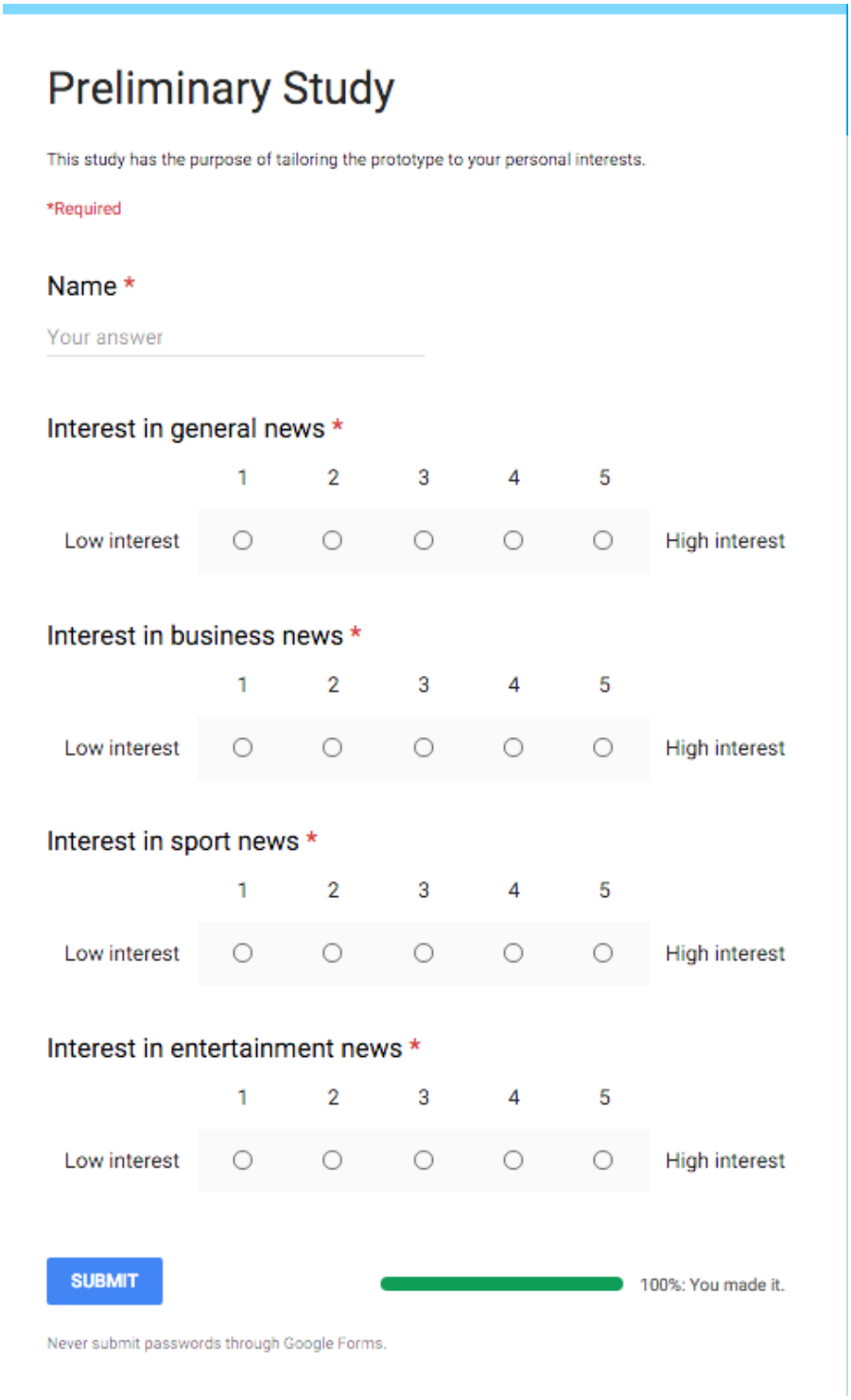
Lastly, please feel free to play around with the Amazon Echo for other purposes than testing our application as well - it is a pretty cool device that can be used for a lot of different purposes.

Thanks a lot for your help, and enjoy the Echo :-)

Sincerely,

Kasper & Søren

D.2 PRELIMINARY QUESTIONNAIRE FORM



Preliminary Study

This study has the purpose of tailoring the prototype to your personal interests.

*Required

Name *

Your answer

Interest in general news *

	1	2	3	4	5	
Low interest	○	○	○	○	○	High interest

Interest in business news *

	1	2	3	4	5	
Low interest	○	○	○	○	○	High interest

Interest in sport news *

	1	2	3	4	5	
Low interest	○	○	○	○	○	High interest

Interest in entertainment news *

	1	2	3	4	5	
Low interest	○	○	○	○	○	High interest

SUBMIT

100%: You made it.

Never submit passwords through Google Forms.

D.3 DIARY EXAMPLES

Example 1

Name
Kasper

Type
Thoughts regarding use

What happened/your thoughts

Today is the first day where I felt like the interaction with "Alexa" felt natural. I am beginning to really enjoy interacting with "Alexa" and find myself using it for more and more stuff on a daily basis.

I got my news from the News Butler application this morning while preparing my breakfast and it worked really well. There was a follow-up story on something related to the Paris attacks which caught my interest, so I saved that so I would be able to read more about it later. The simple News Butler web application is good. It works well and is very easy to use.

Later in the afternoon I remembered that a local football match had taken place so I asked News Butler for the sport news and it told me that Norwich had won 2-1 which of course was great news!

One critique point is that I wish the elaborated stories were a bit longer than they are currently.

Example 2

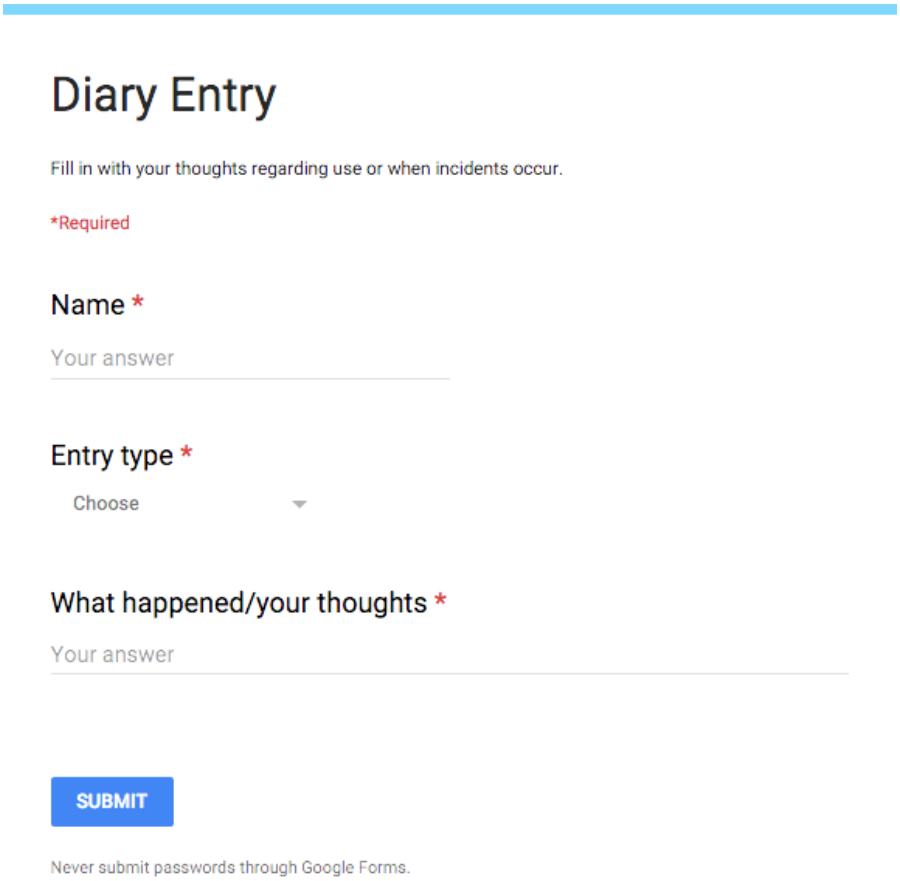
Name
Kasper

Type
Incident

What happened/your thoughts

I had some issues earlier today with saving a story that I wanted to save so that I could read it later. When i said 'save this for later', Alexa responded 'there was a problem with the requested skills response' or something like that. I checked the News Butler web application and couldn't find the story there either. I then tried saving the story through again using News Butler and this time it worked. There must be some kind of bug in your application.

D.4 DIARY ENTRY FORM



Diary Entry

Fill in with your thoughts regarding use or when incidents occur.

*Required

Name *

Your answer

Entry type *

Choose

What happened/your thoughts *

Your answer

SUBMIT

Never submit passwords through Google Forms.

D.5 POST TEST QUESTIONNAIRE FORM

Post Test Questionnaire

*Required

Name *

Your answer

Have you had previous experience with voice control? *

- Yes
- No

Where did you place the Amazon Echo in your home and why this location? *

Your answer

How was your experience using the Amazon Echo? *

Your answer

How was your experience using the News Butler application? *

Your answer

What did you most like about using News Butler? *

Your answer

What did you dislike the most about using News Butler? *

Your answer

Did you use the News Butler web application? *

- ○ Yes
- ○ No

Why/why not? *

Your answer

In regards to using the Amazon Echo for news consumption. What do you see as the biggest advantages and disadvantages? *

Your answer

SUBMIT

Never submit passwords through Google Forms.

D.6 VIDEO DEMONSTRATIONS

https://www.youtube.com/watch?v=Muru3uAzyr8&feature=youtu.be

E

DATA FROM FIELD TESTS

In this appendix, data from the field test excluding interview data is presented. In section E.1, the data collected from the preliminary user study related to interests of test participants is shown. In section E.2, data logged from test participants interacting with News Butler is presented. In section E.3, the diary entries written by test participants is presented. Lastly, section E.4 shows the data collected in the post test questionnaire only part of the pilot test.

Data from the pilot test is presented in Danish, as the test participant was from Denmark and thus wrote in his native language.

E.1 PRELIMINARY QUESTIONNAIRE

Timestamp	Name	Interest in general news	Interest in business news	Interest in sport news	Interest in entertainment news
22/11/2015	Lars	4	2	5	1
30/11/2015	Nick Schiller	5	3	1	3
30/11/2015	Dan Norton	3	2	2	3

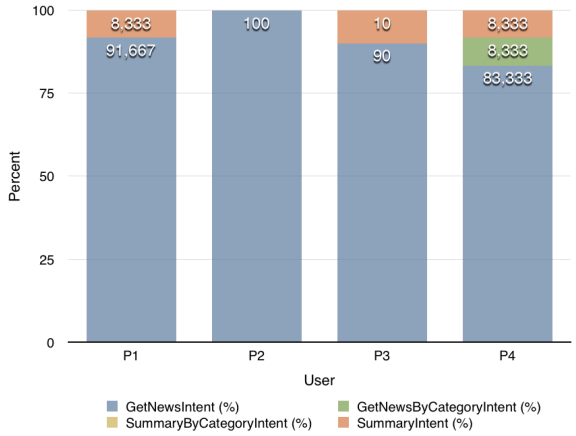
E.2 LOGGED DATA

News Butler Intents Table

	P1	P2	P3	P4	P5
ContinueSummaryIntent	1	0	2	1	0
DiscontinueSummaryIntent	1	0	0	0	0
ElaborateStoryIntent	10	4	14	8	1
GetNewsByCategoryIntent	0	0	0	1	0
GetNewsIntent	22	4	18	10	1
HelpIntent	4	1	8	9	0
LessFeedbackIntent	1	0	2	3	0
MoreFeedbackIntent	1	0	0	0	0
NextStoryIntent	57	11	20	26	0
QuitIntent	9	1	6	1	1
SaveStoryIntent	1	0	1	0	0
SummaryByCategoryIntent	0	0	0	0	0
SummaryIntent	2	0	2	1	0

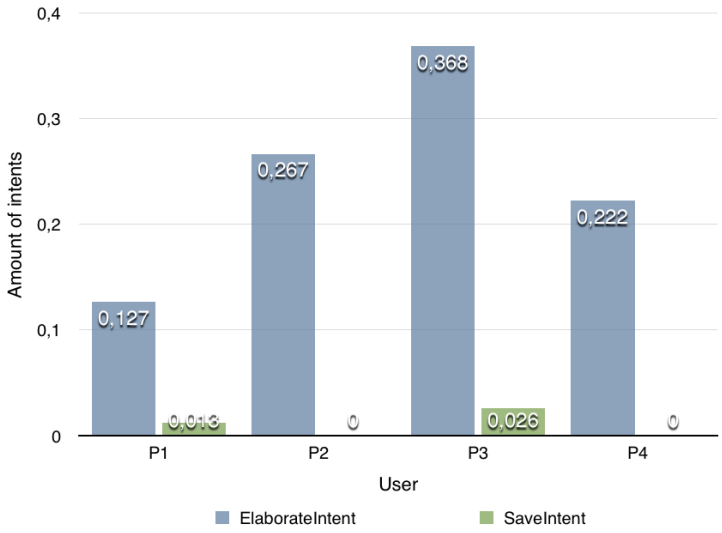
Choice of news feed for each participant

	P1	P2	P3	P4
GetNewsIntent (%)	91,6666666666667	100	90	83,3333333333333
GetNewsByCategoryIntent (%)	0	0	0	8,33333333333333
SummaryByCategoryIntent (%)	0	0	0	0
SummaryIntent (%)	8,33333333333333	0	10	8,33333333333333



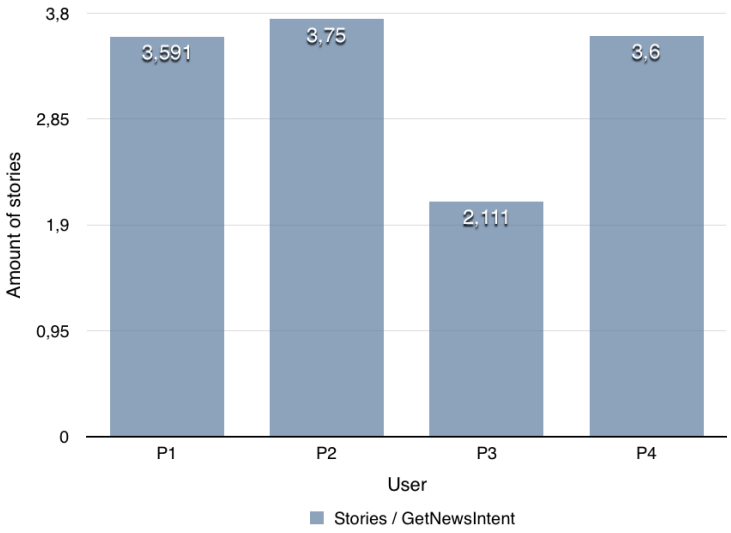
Elaborate/save intents pr. story

	P1	P2	P3	P4
ElaborateIntent	0,126582278481013	0,266666666666667	0,368421052631579	0,222222222222222
SaveIntent	0,012658227848101	0	0,026315789473684	0



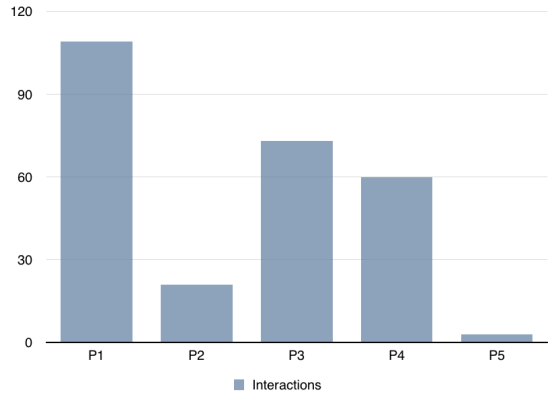
Amount of stories played pr. news feed

	P1	P2	P3	P4
Stories / GetNewsIntent	3,59090909090909	3,75	2,11111111111111	3,6



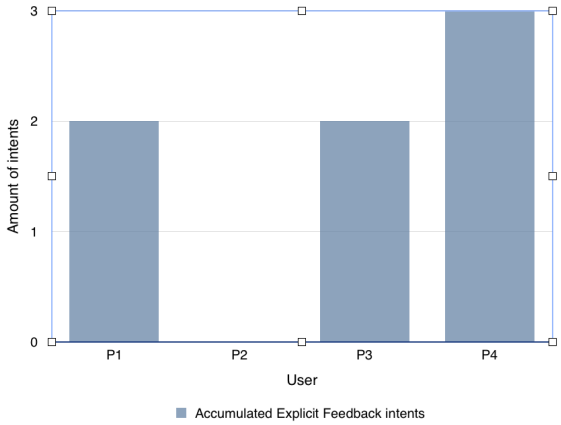
News Butler Amount of interactions pr. user

	P1	P2	P3	P4	P5
Interactions	109	21	73	60	3



News Butler Explicit Feedback Intents

	P1	P2	P3	P4	P5
LessFeedbackIntent	1	0	2	3	0
MoreFeedbackIntent	1	0	0	0	0
Accumulated Explicit Feedback intents	2	0	2	3	0



E.3 DIARY ENTRIES

Diary Entries

Lars

November 23, 2015

Idag modtog jeg min Amazon Echo. Efter jeg havde sat den op prøvede jeg at bruge den til lidt forskellige ting - det gik meget smertefrit. Jeg prøvede at sætte en tidstagning til risene på tolv minutter, og det meget sjovt og rart at bare sige ting. Jeg ville dog ønske, at den kunne forstå dansk. Jeg fik også prøvet News Butler. Jeg spurgte efter nyheder og det fik jeg. Det var lidt omstændigt hele tiden at skulle sige next for at komme videre.

November 24, 2015

Her til morgen prøvede jeg at få den til at opsummere nyhederne. Det gjorde jeg hovedsageligt for ikke at behøve at sige next hele tiden, i det jeg var igang med at smøre madpakke. Det virkede sådan set fint, men det er nogle gange lidt svært at forstå hvad Alexa siger. Det kan selvfølgelig være fordi jeg ikke er så vant til at høre en på en computerstemme.

Nathan

December 3, 2015

In general using News Butler felt quite clunky, having to repeat commands and ensuring you are clear in voice. Commands mid-story such as "next story" or "elaborate" often ended with "have a nice day" and exiting News Butler.
When going "next story", "previous story" and then "next story" I think it's moving forward two stories. Either way it's not the story you'd expect.
On a personal note, the voice still feels very synthesised on reading the stories, but yet the usual echo commands are relatively "human", this is linked to our grammar.

December 8, 2015

- "open news butler and get the news" seems most effective way to get local news . After short period of silence (30secs), it sleeps. I expect that something "continue with news butler" or "continue with news" should awaken device and allow me to hear the news again.
- After "open news butler and get the news", then "more in entertainment" it results in "ok Have a nice day". (I think I might be trying for functionality that is not present)
- "open news butler and get the news", "get more news from Sport" - went to sleep. (I think I might be trying for functionality that is not present)
- "open news butler and get the news", "tell me more" - works

- "open news butler and get the news", "tell me more" - "next story" - works
- "open news butler and get the news", "tell me more" - "next story" "Previous Story" - doesn't result in expected story.
- Whilst in News Butler asked "Will it rain tomorrow" resulted in "You will get less news in the future".

Chris

December 1, 2015

This seems to be ok now but for a while all headlines were being read without a pause to allow elaboration

December 1, 2015

Although getting more by using 'elaborate'. This doesn't seem to read the full story in some cases. Could there be an option to read the full story?

December 1, 2015

For me, I get entertainment stories first. It would be useful to be able to choose a category to be read - e.g. General or sport and then for Alex's to skip to those stories

December 2, 2015

I'm getting a 'there was a problem with the requested skill' message when asking News Butler to get the news.

Dan

December 3, 2015

No "previous story" functionality on News Butler. No "show me more stories from this category" on News Butler. American voice cannot pronounce local towns correctly. Our content is not appropriate yet for this device, our grammar is not well suited to be read out like this yet. Some content that is image focused does not have a lot to read. It's hard to open news butler and read news in one command. Elaborate is not a natural word for me, "expand" would be better. Trying to interrupt Alexa while reading leads to errors, she sometimes quits due to misunderstanding commands - this may be user error by not saying Alexa in front of every command. News butler cannot take a command like "give me latest news from entertainment". I am concerned that if Alexa quits while reading the 4th story, a user wouldn't reuse the app and say "next story" 4 times.

December 3, 2015

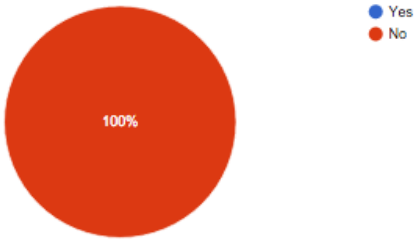
Using command "tell me more" did not work initially, and rather than Alexa saying "i can't do that" or "please repeat that", instead Alexa shut down. I asked Alexa to give me less stories from business, which she confirmed but then immediately read me a business story.

E.4 POST TEST QUESTIONNAIRE

Name (1 response)

Lars

Have you had previous experience with voice control? (1 response)



Where did you place the Amazon Echo in your home and why this location?
(1 response)

I køkkenet. Det er der jeg bruger mest tid når jeg er hjemme og der jeg synes den gav mest mening at have.

How was your experience using the Amazon Echo? (1 response)

Den var egentlig fin overordnet set. Det var træls at skulle tale engelsk til den, men jeg kunne godt se meningen i det man kan bruge den til.

How was your experience using the News Butler application? (1 response)

Det er lidt irriterende at man skal sige next hele tiden. Det er dog smart at man ikke skal trykke på ting, men at man bare kan snakke ud i rummet og så få nyheder. Nyhederne var desværre ikke så relevante for mig. Det er desuden også lidt svært at huske på alle kommandoerne, men det var rart at man altid kunne spørge efter hjælp.

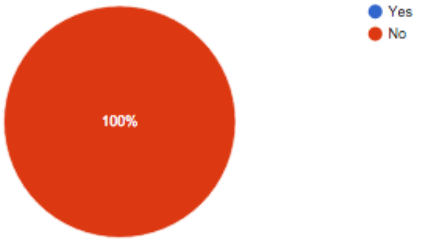
What did you most like about using News Butler? (1 response)

At man hurtigt kunne få en opsummering af nyheder.

What did you dislike the most about using News Butler? (1 response)

At man hele tiden skal sige next når man får nyhederne i ikke opsummeret format.

Did you use the News Butler web application? (1 response)



Why/why not? (1 response)

Jeg fik aldrig gemt nogen historie.

In regards to using the Amazon Echo for news consumption. What do you see as the biggest advantages and disadvantages?
(1 response)

Det er smart at man selv kan bestemme hvordan man vil have sine nyheder. Det er dog nogle gange svært at forstå computerstemmen.

F

INTERVIEW GUIDES

In this appendix, the interview guides used for interviews in the survey of artifact ecology related to news consumption and after the final field test was concluded with each test participant. In section F.1, the interview guide used for the different parts of the artifact ecology survey is shown. Section F.2 shows the interview guide used for the post test interviews of the final field test.

F.1 ARTIFACT ECOLOGY USER EXPERIMENTS

Artifact Empirics Gathering

Preliminary interview (before any tasks)

open interview

- Why do you consume news?
  - Motivation in this case is deeper than a goal (e.g. to get the news) - a motivation could be e.g. to educate yourself because you want to study journalism.
- Which technologies or objects of any kind do you normally use for news consumption?
  - Ask questions related to the usage of previously mentioned artifacts.

During tasks

When participants perform the tasks with an artifact, do the following:

- Videotape everything, especially the interaction.
- Observe closely.
- *Unstructured in-situ interview*: Ask questions related to the task being performed. This is to get them to articulate their actions. Examples:
  - What are you trying to accomplish when you do this?
  - Why do you do this (related to how they interact with the artifact)
  - What went wrong there?

Post artifact test interview

Semi-structured

- Do you use this medium yourself?
  - How often would you say you use it?
  - When do you normally use this medium to get news?
  - Why this medium instead of others?
  - IF NO: why not?
- Can you see any advantages to using this medium for news acquisition?

Tasks

Generelt

- Find nyheder omhandlende sport
- Prøv at skabe dig et overblik over nyhederne i mediet.

Avis

- Find nyhed om "medicinalskaberne scorer kassen i USA".
    - Find noget om "lobbyisme" i artiklen.

Web

- Find nyhed om uro i østukraine.
    - Find noget om "hvem den nye kandidat til posten som Kievs borgmester" er.

JP nyheder (news app)

- Find nyhed om "new component of milky way".
    - Find ud af hvilket teleskop der blev brugt til opdagelsen

Radio

- Find nyhed omhandlende uro i Østukraine.
    - Find noget om "hvem den nye kandidat til posten som Kievs borgmester" er.

TV

- Find nyhed omhandlende uro i Østukraine.
    - Find noget om "hvem den nye kandidat til posten som Kievs borgmester" er.

F.2 POST FIELD TEST

Final Interview Guide

Amazon Echo

- Have you had any previous experience with voice control?
- Where did you place the Amazon Echo?
    - Why this place?
- How was your experience using the Amazon Echo in general?
- In regards to using the Amazon Echo for news consumption. What do you see as the biggest advantages and disadvantages?

Experience using News Butler

General use

- How often would you estimate you've used it?
- When did you primarily use it?
- How did you use it? (background when doing other stuff, as a way of quickly getting news, etc.)
- What did you most like?
- What did you dislike the most?
- Were you the only person to use it (whereever you placed it)?

Interaction/input

- How did interacting with News Butler feel?
    - Fluent, clunky?
    - Did you use mostly short commands or descriptive phrases?
        - How would you elaborate a story? (elaborate or tell me more about this)
- How did you get news mostly? (summary, news feed, category based?)
    - Has this changed from the start of the test towards the end?
- Did you use the help function?
    - Did it provide sufficient guidance?

Content/output

- How was the length of the content (elaborate of story, summary, etc.)

- We implemented a very simple form of personalization, where you got either one story from a section or all of them. Did you notice this?
- Did you actively modify your feed by saying telling the application to give you more or less content from a specific category?

In relation to other media

- Aside from being part of a test, why use this medium compared to others?
    - How did News Butler fit inside your home among these other devices used for news consumption?

Web application

- Did you use the News Butler web application?
    - Why/why not?

G

TRANSCRIPTION OF INTERVIEWS

In this appendix, transcribed data of interviews conducted in both the survey of the artifact ecology related to news consumption and after concluding the final field test is presented. Section G.1, data from the artifact ecology survey is presented. Data for each participant is presented and sorted by artifact and including a preliminary interview with the purpose of getting to know their habits of using different artifacts for consuming news. In section G.2, interview data related to the final field test is presented, also sorted by participant.

The data from the artifact ecology survey is presented in Danish, as participants in the user experiments were all from Denmark.

G.1 ARTIFACT ECOLOGY USER EXPERIMENTS

G.1.1 *Bo*

G.1.1.1 *Preliminary interview*

S: Det der skal ske, det er at vi vil se hvordan du forbruger nyheder igennem forskellige medier. Og de medier vi har har tænkt os at udsætte dig for, det er en avis som så er i form af det her helvedes blad her. Og så er det en hjemmeside fra en publisher og et TV. Har I egentlig det?
B: Nej.. vi kan se det via DR.
S: Og så igennem telefon.. applikationer på telefonen.
K: Ja.
B: Okay.
S: Og så DAB Radio. Nå, jamen først vil vi gerne høre lidt generelt om dit forbrug af nyheder. Bruger du forskellige medier til at konsumere nyheder og hvilke bruger du?
B: Ja, som jeg nævnte før så har vi ikke TV. Jeg har en computer og der ser jeg alle mine nyheder. Selvfølgelig både på telefon og computer, det er lidt for mig samme ting efterhånden. Men ja, forskellige hjemmesider og forskellige interessegrupper. F.eks. interesserer jeg mig meget for hardware. Så har jeg forskellige applikationer på telefonen og hjemmesider jeg besøger, men selvfølgelig også generelle nyheder ude på nettet. Men det foregår på computer stort set 100
S: Hvorfor vil du sige at du kan lide at forbruge nyheder?
B: Jamen det er jo fordi jeg er en person der godt kan lide at holde mig opdateret. Selvfølgelig både om hvad der sker indenfor verden, men også indenfor de interesseområder jeg har. Man kan sige indenfor hardware, der er gårsdagens nyheder jo ikke så meget værd. Altså nyheder skal være nye for at de er interessante, så det er jo hele tiden et sprøgsmål om hvor man kan gå hen for at være opdateret.
S: Ja.
B: Men selvfølgelig det er rart at holde sig opdateret for at vide hvad der sker i verden.
S: Ja, hvad med radio?
B: Eneste tidspunkt når jeg hører radio er for at høre musik når jeg for eksempel.. Ja.. Nu har vi en radio ude på badeværelset som jeg faktisk ikke så tit bruger. Nadia har den til at høre musik på når hun er derude. Men ellers så når jeg kører i bil og når jeg er på farten.. så hører jeg radio. Men ellers i min daglige hverdag, så hører jeg faktisk ikke så tit radio. Bruger mest spotify til at høre musik.. der kommer der selvfølgelig også reklamer igennem men...
S: Ja. Så nævnte du at du havde forskellige apps på din telefon du bruger. Er det sådan nogle applikationer der aggregerer nyheder, som tager nyheder fra en masse forskellige kilder, så du får en personaliseret feed af ting du gerne vil se på eller?

B: Sådan nogle har jeg haft nogen af, men i min situation så er det nogle apps hvor der kommer nyheder fra de steder hvor jeg ved kvaliteten af nyheder er høj. De apps der bare miner nyheder, så bliver kvaliteten af nyhederne meget forskellig.
S: Ja.
B: Så har jeg f.eks. nogle forskellige sites, f.eks. med hardware, så har jeg nogle apps eller sites jeg besøger hvor de har en høj kvalitet. Men nogen af dem samler jo også nyheder fra andre og.. Reformulerer dem og linker videre til dem, så det er lidt blandet. Men helst direkte fra kilden.
K: Fedt. Hvornår får du mest nyheder på forskellige ting? F.eks. på computeren, er det bare tilfældigt mens man sidder der bare sådan lige?
B: For det meste gør jeg det faktisk før jeg går i seng eller når jeg står op, altså kigger efter nyheder fordi når jeg kommer ind så ligger jeg som regel lige og læser nyheder før jeg går i seng. Tit så står jeg også op og så tjekker jeg nyheder.
S: Hvorfor?
B: Det er måske bare mest vane. Nu er det på smartphonen. Hvis det nu er en større nyhed så siger jeg super, så tager jeg den på computeren senere. Det sker tit når jeg sidder og spiser frokost mht. computeren. Så sidder jeg ved computeren og surfer nyheder imens jeg spiser.

G.1.1.2 *Post website interview*

S: Nu ved jeg godt, at vi brugte Jyllands Posten som medie her, men jeg går ikke ud fra, at du læser Jyllands Posten på nettet?
B: Nej ikke så tit, det skulle være, hvis der var nogen via facebook der linker til det, så man derigennem ser en nyhed.
S: Har du nogen andre webbaserede aviser du læser?
B: Rockerposten
Alle: ¡griner¿
B: Ej, jeg læser, jamen den læser jeg også, men det er jo ligesom mest satire. Men jeg læser TV2's hjemmeside. Øh, webbaserede aviser.. Så læser jeg også politiken mere end andre tror jeg, via nettet. Men ellers så er det meget lige, hvad der bliver linket til fra forskellige andre instanser. Så, hvor jeg går ind og kigger specifikt på, der tror jeg kun det er TV2.
S
K: Ja okay.
S: Hvornår på dagen, eller hvor ofte gør du typisk det vil du sige?
B: Altså det er ikke så tit jeg går ind og tjekker på den måde der. Det skulle være, hvis der er et eller andet vigtigt, 9 / 11 eller sådan noget. Men ellers så er det måske en gang om dagen ved frokosttid eller sådan noget. Der omkring.
K: Okay.

B: Jeg gider ikke som regel sent om aftenen at sidde og læse inde på sådan et site.
S: Hvorfor ville du bruge TV2 i stedet for for eksempel, at bruge, altså nu tænker jeg ikke andre hjemmesider, men andre medier som aviser og radio og TV og smartphone og sådan noget.
B: Altså nu har jeg for eksempel TV2 appen her på min smartphone. Den bruger jeg også. Det er jo de samme nyheder de streamer ud. De sender nyhederne - altså når de uploader den på hjemmesiden - så bliver de sendt her også. Men jeg bruger de medier fordi, øh. Jamen af alle mulige grunde. Aviser er jo, for det første skal man have en avis for at få den. Vi har ikke bestilt, men hvis vi havde bestilt avis så ville jeg få en avis som var allerede 12 timer forældet i nyheder, nede i min postkasse, som jeg så kunne gå ned at hente og betale nogle penge for at få, gå herop og sidde og bladre i den og sidde under en lampe og lyse. Eller jeg kunne bare tage min smartphone op og få nogle nyheder som er endnu nyere. Så jeg vil sige, at computeren har overhalet avisen som medie i relevans. Der er selvfølgelig nogen ting, altså en god artikel kan man jo læse i en avis. Men nyheder i forhold til, hvor nye de er.
K: Ja der kan de jo selvfølgelig ikke følge med.
B: Der kan de nemlig ikke følge med. Og så synes jeg også det er spild af regnskov, med alle de aviser der bliver fyret rundt.
S: Ja det er jeg nok rimeligt enig i.. Okay, men kan du så se nogen fordele ved internetplatformen som nyhedsmedie?
B: Jamen det var jo så det med hastigheden, men også at internettet kan man sige, er jo den helt store vidensdelingsplatform i det 20. og 21. århundrede. Altså der er ingen tvivl om, at al form for vidensdeling, uanset om det er bomber man skal lave eller om det er frihed eller hvad det er man gerne vil dele, så er det jo internettet.
S: Ja.
B: Og det er jo det samme med nyheder.
K: Hvad med sådan noget som at bruge din computer til at tjekke det i forhold til din smartphone? Hvad er sådan fordelene, øh, hvad synes du er de væsentligste forskelle ved de to?
B: Altså man kan sige. Det smarte ved smartphonen er, at man har den jo med sig overalt. Så hvis det er kan man jo få en.. Jeg tror nok man kan sætte den til at sende en notifikation, hvis der er en breaking news, eller en ekstraordinær nyhed som man skal have at vide. Så kan man få den pushet, men ellers så kan man bare gå ind og kigge, hvad er der af nyheder lige meget hvor man er og hvornår. Computeren det er jo. I min situation så er det sådan lidt.. Altså selvfølgelig, hvis man har en bærbar kan man jo også tage den med sig, men man skal stadig sådan hen og tænde. Så det er noget hurtigere tilgængeligt på smartphonen, men igen - hvis man skal læse større artikler og se billeder og grafer og interaktive ting, som er begyndt at komme

i større grad i artikler, så foregår det meget bedre på computerskærm. Større skræm.

G.1.1.3 *Post DAB radio interview*

K: Du sagde selv, at du ikke rigtig bruger det her medie som sådan.
B: Øh, radio? Ja?
K: Er der nogen speciel grund til, at du ikke gør det?
B: Jamen det er jo et meget analogt output. Altså det er meget, hvad kan man sige, det er meget konsekvent. Det sender noget live ud til mig, hvor at.. Der er så mange måder. Man kan streame live på nettet også - det kan man også. Men hvis jeg gerne vil have en nyhed, så vil jeg gerne have starten af nyheden og slutningen af nyheden når jeg gerne vil have den. Ved radioen der vælger man ikke selv det her, hvad kan man sige, framework. Du vælger ikke selv, hvor og hvornår kan man sige. Man er lidt en slave af, at man har. Altså selvfølgelig, hvis man går og hører radio hele dagen, så får man jo det hele med.
K: Ja.
B: Men jeg skulle høre en specifik nyhed eller se, læse, en specifik nyheds så ville det jo være træls hvis jeg missede den. Så skulle jeg jo vente en time - så kan det være at de nævner den, måske, eller det kan være at de bare nævner den i korte perioder, eller venter til timen efter, hvor de nævner nyheden. Så det er mere bare sådan en 'hey hør lige, hvad der er sket i dag' og så kan man finde noget videre.
S
K: Ja
B: Det er ikke de dybe nyheder mere.

G.1.1.4 *Post TV interview*

S: Hvor ofte vil du sådan sige du bruger det her?
B: Det her?
K: Ja altså sådan bruger TV'et til at konsumere nyheder?
B: Det gør jeg ikke så tit. Det er kun i kraft af at der er den her funktion, men den er ikke ekstensiv, så derfor får jeg ikke.. Når jeg gerne vil have nyheder, så vil jeg gerne have det fulde billede af hvad der er sket og 100
S: Ja. Så det er måske mere for at blive.. sådan... det er ikke så meget for up-to-dateness du bruger det her?
B: nej, det er mere hvis jeg vidste der var en spændende talk eller dokumentar om noget vidensstof at jeg går herind. Det kunne være hvis der var en TED-talk om noget bestemt, så kan man så få uddybet information om nogle ting og emner.
K og S: Ja
B: Men nej det er ikke sådan nyhedsnyheder.. Det er der ikke på det her
K: Nej.. nej. Hvis du sådan skulle tænke over hvornår du typisk på

dagen eller... hvilke nogle situationer befinder du dig typisk i hvis du skulle bruge sådan noget her?
B: Det skulle være hvis jeg bare stener maks. Hvis jeg virkelig.. er for doven til at rejse mig og gå ind til min computer. Det er meget sjældent jeg ville foretrække det her frem for noget andet. Så skulle det være ren og skær for sjov for at se, er der et eller andet spændende jeg ikke har set. Nogle gange så er ulempen ved at have adgang til alt at man selv skal finde ting. Nogle gange er det også rart bare at blive fodret ting og information så man ikke selv skal vælge hvad der er relevant. Det kan man selvfølgelig bruge streaming tjenester til men også bare noget hvor man siger: okay, det kunne måske være meget spændende. For ikke altid at skulle tage stilling til hvad det præcist er man gerne vil vide noget om.
S: Ja. Så kan man også blive overrasket og tænke, det var måske spændende nok.
B: nu kan i jo selvfølgelig spørge mig: hvad interesserer du dig for. Og det ville så være computere og sådan nogle ting. Hvis jeg så skulle sætte op så jeg fik at vide hvad jeg ville have af nyheder, så ville det selvfølgelig være sådan noget. Måske også hvad der sker i landet, men så vil jeg højst sandsynligt glemme nogle ting.. Jeg ville måske gerne høre noget om hvordan uddannelsesbeskæringer påvirker børnehaven og sådan.
S: Hvad er nogle af de største fordele ved at få nyheder igennem fjernsynet ved f.eks. at få nyheder igennem fjernsynet ift. f.eks. en smartphone eller sådan noget.
K: Og det kan også godt være sådan noget som at det er mere afslappende.
B: Fordelen skulle være igennem TV, synes jeg, at TV er en lidt mere social og kommunikativ ting. F.eks. hvis jeg sad foran en smartphone eller computer er det mig selv der tager nogle informationer. Så byder det ikke rigtigt op til debat. Hvis jeg sidder og ser TV med f.eks. Nadia, så er det en social ting, men så gør det også at man diskuterer ting. Hvor det andet er meget mere... Det lægger bare op til at man får informationen, beholder den og så bruger den i en anden situation, i stedet for at debatere den og vende den.

G.1.1.5 *Post smartphone news application interview*

S: Du sagde før at du brugte din mobiltelefon og applikationer på den til at tjekke nyheder vedr. ting du interesserer dig for.
B: Ja, også det, ja.
S: Hvornår vil du definere de tidspunkter som værende, sådan groft.. gør du det sådan ca..
B: Ja det kommer meget an på hvad man laver, hvis man f.eks. sidder i en bus og keder sig, så kan man tjekke telefonen. Hvis man sidder i bilen så, og man ikke kører bilen, så kan man også sidde og tjekke nyheder. Men ellers sådan fast, så tjekker jeg nyheder lige når jeg står

op og lige er vågnet. Så ligger jeg og sunder mig ved at få nyhederne.
S: Ja.
B: Så gør jeg det også lige før jeg går i seng og sådan. Ellers så plejer jeg at gøre det sådan midt på dagen. Og så gør jeg det egentlig ikke mere. Så gider jeg heller ikke og gå at tjekke nye nyheder hele tiden.
S: Nej.. Bruger du det som du selv beskrev som at få pushet nyheder ud til dig, sådan hvis du vil holde dig opdateret indenfor et emne du interesserer dig specielt for?
B: på et tidspunkt havde jeg det sådan at jeg havde push notifikationer på, men det skal jeg ærligt indrømme, det er simpelthen for meget med alle de push notifkationer. Så får du det fra det ene og det andet. Jeg tror det eneste jeg får push fra lige nu er når folk skriver til mig over messenger, men det er simpelthen også fordi at.. ja, det har overtaget sms funktioner. Men ellers nyhedsapps, nej der får jeg ikke notifikationer. Fordi der er jeg så bevidst om hvad jeg gerne vil se..
S: Ja.
B: Så der går jeg bare ind og ser det jeg gerne vil se. Så kan jeg også selv få lov at bestemme hvornår jeg gerne vil se det. Det er sådan en hårfin grænse imellem at man kan få det man gerne vil have, lige når man gerne vil have det, i stedet for at man... man kan selvfølgelig også vælge at få det lige når det sker, men det er ikke ensbetydende med når man gerne vil have det.
S: Nu tænker jeg det kan have noget at gøre med når man gerne selv vil definere de tidsrammer hvor man faktisk har tid til det, og det ikke bliver et eller andet irritationsmoment når man alligevel er igang med at lave noget andet. Men som du selv siger så hvis man f.eks. er igang med at køre i bus, der er sådan nogle perioder..
B: Ja.
S: Hvor man alligevel skal fordrive tiden med et eller andet.
B: Ja det er jo en hårfin grænse.. hvis man lader en smartphone styre sit liv med push notifikationer fra højre og venstre, så kan man ikke lade være med at gå og kigge hvad der sker og med alle mulige forskellige typer information.
S: Nej.
B: Så jeg tror, det var for mig,. vil jeg gerne vælge hvornår jeg kan tilgå den information. Jeg kan få den når jeg gerne vil, men jeg vælger selv hvornår jeg gerne vil have den. Og sådan er det også når det er med nyheder. Altså jeg vil gerne have nyhederne, men jeg vil også gerne selv vælge hvornår jeg får dem. Jeg gider ikke, som med radio, at sidde og vente en time og spilde min tid, hvor jeg pludseligt skal gå ind, eller sætte en timer for at huske det. Det gider jeg ikke, jeg vil gerne have mulighed for at sige, nu vil jeg gerne ind og se. Men omvendt vil jeg heller ikke have at vide være gang breaking news: Barn er faldet på gynge i hirtshals og brækket to ribben.
S: Nej, det kan jeg godt forstå.

G.1.2 *Cecilie*

G.1.2.1 *preliminary interview*

K: Hvorfor vil du sige, at du konsumerer nyheder?
C: Hvorfor jeg konsumerer nyheder?
K: Ja.
C: For at holde mig opdateret. Både i forhold til, hvad der sker i verden, men også i forhold til min uddannelse fordi jeg læser kommunikation og der er det på en eller anden måde ret vigtigt at vide, hvad der sker.
K: Ja.
C: Så hvorfor? Ja, for at få information om verden.
K: Ja.
C: Ja.
S: Når du forbruger nyheder, hvad bruger du så til det? Altså hvilke teknologier? Nu snakkede du selv om, at du ser fjernsyn..
C: Ja altså da jeg havde et fjernsyn, der var jeg meget sådan morgennyheder. Og det er jo også fordi jeg er sådan en go' morgen danmark type. Så jeg havde lige sådan en masse korte nyheder ind i mellem. De der lange nyheder i TV Avisen, der mister jeg fuldstændig fokus. Ellers, radio..
S: mmh
C: Og så følger jeg nyheder inde på Facebook. Der følger jeg Finans, Berlinske, Politiken, whatever - så det bare kommer op. Så skal jeg ikke selv sådan finde det.. Det er jeg ikke sådan super god til. Jeg vil gerne have, at det bare kommer.
K: Ja. Så du er aldrig inde på deciderede nyhedshjemmesider for lige at?
C: Altså, det kan jeg godt gøre, men hvis det er sådan en helt normal hverdag, hvor jeg ikke har super meget tid, så vil jeg hellere have, at det ligesom bare kommer sådan kort. Hvor der kommer sådan breaking eller... Så kommer der sådan store nyheder.
K: Okay.. Så du bruger mere sociale medier til at lede dig ind på...
C: Ja. Altså jeg kan godt gå ind på det og finde det, men det kræver bare lidt en anden form for tid som jeg ikke normalt bruger. Det er mere sådan en weekend-ting.
S: Dengang du så TV. Nu snakker du selv om, at det var meget go'morgen danmark.
C: Ja?
S: Var det sådan noget, du kunne for eksempel strukturere din dag efter, hvis der kom et eller andet program?
C: Altså, hvis der kom et nyhedsprogram?
S: Ja.
C: Tæller Kontant (programmet) i sådan noget?
S: Ja, det kan man vel godt sige.
C: Altså, Kontant kunne jeg godt finde på, hvis jeg vidste der kom

noget spændende. Altså at vente på, at det kom. Altså.. Nu kan man selvfølgelig også bare streame det inde på DR, så pointen ryger lidt, men ja. Altså jeg ville nok vente en time med at tage i skole for at se noget. Så skulle det mere være fordi det bare lige er der.
S: Ja. Nu tænker jeg mere. Nu ved jeg for eksempel, at vores far har det sådan med aftennyhederne klokken... halv ti må det være - der skulle han gerne være færdig med alt, og så var det sådan hver dag, at det bare var rutine. Det er sådan noget vores forældre for eksempel bruger som et strukturelement i dagligdagen.
C: Ja?
S: Så strukturerer de deres dag så andre ting passer ind. Så har de noget tid til at lave alt muligt, og så kan de sætte sig ned.
C: Ja okay
S: Altså jeg havde det sådan lidt om morgenen.. I forhold til, at jeg godt kunne finde på, at stå en time tidligere op. Og sådan lige ligge og se go' morgen danmark. Men ikke om aftenen.
K: Nej
C: Jeg er ikke en aftennyhedsperson.
K: Hvad med aviser?
C: Fysiske aviser?
K: Ja
C: Altså jeg abonnerer ikke på nogen. Jeg får vel en Metro Express i ny og næ, men det ved jeg ikke om man kan kalde nyheder.
K: ¡Griner¿
C: Det er som om, det kan man lige sidde ned og... Nej.. Ikke rigtig fysiske aviser.
K: Smartphones eller?
C: Om jeg har en nyhedsapp?
K: Nej altså bare om du.
C: Altså, jeg kører radio på min smartphone.
K: Okay
C: Hov, altså jeg følger også nyheder på instagram, hvor man kan få nyhederne sammen med et billede.
K: Er det sådan noget, hvor der bliver linket til en nyhed?
C: Ja, eller hvor der er et billede, og så står der lige noget kort.
K S: Okay
K: Så det er noget man på en eller anden måde kan bruge, hvor man kigger inde på instagram, se en eller anden nyhedsting, og så tænke 'hov, det skal jeg lige læse om senere'.
C: Ja lidt, eller hvis det er noget man har hørt kan man tænke sådan 'nåååh ja - det var det der igen.'
K: Okay, cool!

G.1.2.2 *Post newspaper interview*

S: Du sagde selv, at du engang imellem lige faldt over en metro express. Hvornår ville du så sige, at du finder dig selv i en situation

hvor du sidder med en avis?
C: Jamen metro express.. Det er jo sådan noget 'on the go'. Så det er i busser, i tog, ved uni fordi der står de der irriterende mennesker der blokerer. Man kan ikke komme igennem uden at få en avis.
¡alle griner¿
S: Så det er mest til transport?
C: Mest til transport. 'on the go'.. Ja. Når man har ventetid. For eksempel i tog.
S: Hvorfor det medie i stedet for andre?
C: Fordi det er det, som bliver smidt i hovedet på én. Og så plus fordi jeg har rigtig dårlig forbindelse på min telefon når jeg rejser i tog.
S: ¡griner¿
S: Ja - jamen det har jeg også på min.
C: Så det er bare som om, at.. Så ligger der bare lige en metro express.
K: Så det er lidt i mangel på bedre?
C: Ja.. Det er det, jeg læser også ud at se med DSB.
¡alle griner¿
K: Okay, fedt.
C: Ja.
K: En avis som medie. Kan du se nogen fordele ved den i forhold til nogen andre medier?
C: Vi snakker stadig om fysiske aviser, ikke?
K: Jo. Alle ting, som man sådan synes er lækkert ved en avis i forhold til andet.
C: Det ved jeg ikke, det tror jeg hører en anden generation til. Det tror jeg simpelthen, at jeg er for ung til at værdsætte.
K: Okay
C: På en eller anden måde er det da meget hyggeligt at sidde med den, bevares. Men det er da også super upraktisk. Så skal jeg igennem alt det jeg ikke gider at læse om for at komme om til det jeg gerne vil.
S: Men jeg synes faktisk, at du havde en sindssygt god pointe som vi ikke har fået fra nogen andre i det med telefonen og dens ringe til tider ringe internetforbindelse. Heldigvis har vi jo her et medie som ingen forbindelse kræver, fordi det er trykt for dig.
C: Ja
S: Så, hvis alt andet ligesom fejler - så kan man jo ikke rigtigt..
C: Back to basic
S: Ja, præcis. Vi går helt back to basic med det her. Det synes jeg i hvert fald godt man kan se som en fordel ved det.
C: Ja ja, det er pålideligt kan man sige.

G.1.2.3 *Post website interview*

S: Nu sagde du selv i starten at du ikke så meget brugte aviser på internettet til at få nyheder, men, at du mere fik linksene igennem sociale medier for eksempel. Kommer du nogensinde ind på de her

sites eller? Lad os sige, at du finder et link.
C: Ja.
S: Kunne du så finde på, at kigge rundt på mediet bagefter?
C: Kun hvis det er sådan nogle relaterede nyheder eller, hvis der popper noget op ude i siden. Jeg ville ikke gå ud på forsiden og se hvad der ellers er i dag. For det ville jeg højst sandsynlig have fået igennem mit facebook feed allerede.
S: Ja.
C: Så kun, hvis det er noget med om jeg vil læse mere om sagen. Altså nu bruger jeg det jo også som research i forbindelse med opgaver. Men det er bare lidt noget helt andet. Men nej - jeg ville ikke gå ind og opsøge og se om der er mere spændende for idag. Det skal helst sådan lige komme ude i siden.
K: Okay
K: Når du sådan kommer ind på de her sider, er det så sådan noget overspringshandlings-agtigt noget?
C: Tja..
K: Eller er det også sådan, hvis du bare sidder og hygger dig?
C: Jamen det er da også nogle gange, hvor jeg bare sidder og hygger mig, men bare det, at jeg kommer igennem det på facebook siger vel et eller andet om, hvordan jeg bruger det. Det er jo lidt i forelæsninger når man ikke hører efter. Så.
¡alle griner¿
C: Det er lidt det samme som facebook. For bare at blive underholdt. Det er ikke fordi jeg skal ind og 'enlightenes' eller have info.
K: Ja, ja, ja.
C: Så mere bare underholdning, hygge, og overspringshandling.
K: Kan du se nogen fordele ved for eksempel at bruge en nyhedshjemmeside til at få sine nyheder i stedet for at få dem igennem en avis eller igennem en radio eller TV.
S: Det er bare de fordele du sådan personligt kan se.
C: Nu har jeg jo haft et fag om lige præcis det her.
S: Nå, men så må du jo være ekstremt kvalificeret!
C: Haha, ja, men det er jo lidt et problem når det er på facebook fordi medierne kæmper om at få mest breaking eller sådan noget. Så kan man nogle gange måske godt få alle de der 'breaking' nyheder, som måske ikke alligevel er helt så 'breaking' og lidt overse det, der måske egentlig er vigtigt.
S: Så det er lidt en ulempe?
C: Ja, at man måske lidt mister fokus. At man bare tager de sager, som er populære - fordi det de lægger op på facebook i stedet for måske at få nogle af dem som er lidt vigtige, for eksempel dem om fremdriftsreformen eller sådan noget. Så hører jeg om flygtninge fordi der er et eller andet billede af en død dreng, ikke?
K S: Ja
C: Fordi det er mega hypet, og så er det bare breaking.

K: Men hvad så inde på en decideret nyhedshjemmeside? For eksempel Jyllands Posten
S: Ja det er du jo så ikke rigtigt på, eller?
C: Nej, eller jo, altså finans.dk kunne jeg godt finde på at gå ind på.
K: Hvad er fordelene for dig der i forhold til f.eks. finanssektionen i en avis?
C: Jamen det er vel at der bare er meget mere range. Avisen er trykt, så der kan sagtens ske noget efter, og så er den måske ikke opdateret.
K: Ja
C: Her får man det nyeste, men så er der jo så også flere man kan vælge imellem.
K: Ja det er lidt træls, hvis man for eksempel sidder og handler aktier på nyheder fra klokken syv i går..
¡alle griner¿
C: Det er også lidt træls, hvis man sidder og er igang med en eller anden case eller opgave om krisekommunikation.. Hvis det er en igangværende krise så holder det jo ikke rigtigt, at du har en kilde, som er en avis fordi der måske lige er sket noget efter. Altså, det føles mere aktuelt på nettet.

G.1.2.4 *Post DAB radio interview*

S: Du sagde selv.. Altså, jeg ved ikke om vi kan trække på lidt af det omkring smartphone fordi det er sådan lidt hvis du ikke hører det.
C: Altså jeg hører radio når jeg er hjemme ved min mor og i bad ¡griner¿.
S: Okay! Ja! Hvornår bruger du radio? Nu siger du når du er i bad.
C: Ja, altså nu har jeg jo ikke nogen radio selv, men når jeg er hjemme i Esbjerg ved min mor.. Der står der en radio på badeværelset, hvilket er super rart om morgenen. Fordi hun ikke lige har en højtaler, hvor man kan sætte telefonen i når man er i bad.
K: Okay.. Hvad synes du der er en fordel ved at få nyhederne igennem en radio?
C: At man kan lave alt muligt på samme tid. Og at det er lavet sådan at man ikke behøver at kigge på det ligesom på TV, men man kan bare gå rundt og lave alt muligt.
S: Ja. Det er en klar fordel kan man siger.

G.1.2.5 *Post TV interview*

S: Nu sagde du det selv meget i starten i det indledende interview egentlig. Så jeg vil ikke rigtigt have dig til at sige det igen. Så må du endelig rette mig, hvis jeg tager fejl. Du sagde noget med, at du godt kunne finde på at bruge.. Hvis der kom noget som for eksempel kontant, hvor du vidste at der kom noget som du havde en eller anden interesse for - så kunne du godt finde på, at strukturere et eller andet omkring, at du gerne ville se det en dag?

C: Ja.
S: Men ellers så var det mest morgen nyheder - go' morgen Danmark du så fordi det var der når du stod går jeg ud fra, eller noget i den stil?
C: Ja.
S: Og så var det egentlig det, sådan nyhedsmæssigt?
C: Altså jeg er ikke sådan en der ser aftennyheder.
K: Nej, jamen fint.
S: Kan du se nogen fordele ved at bruge TV som nyhedsmedie i forhold til andre?
C: Det er meget mere visuelt. Du får film på det - eller du får bevægelse og du kan vise nogle andre sekvenser. Så egentlig mest det visuelle, plus.. Nej jeg tror egentlig bare mest det visuelle er det bedste ved det.
K: Hvad med de situationer, hvor man kommer til at se nyheder igennem fjernsynet? Hvad er grunden til, at du bruger fjernsynet der i stedet for et eller andet andet?
C: Altså grunden til at jeg nogen gange vælger fjernsynet i stedet for radioen? Er det det du spørger om?
K: Ja, altså, det kan være, hvis man vågner om morgenen, hvorfor man så lige tænder fjernsynet i stedet for at gøre et eller andet andet.
C: Jeg tror meget af det faktisk er vane. Og så skal ikke rigtig selv gøre noget for det, så kommer det bare som sådan en bølge ind over.
K S: Ja.
C: Du skal ikke selv noget. Du skal bare trykke på en knap. Og så kører det bare.
S: Som en bølge..
C: Ja ja, som en bølge
¡alle griner¿
K: Nyhedsbølgen.
C: Ja i citationstegn ¡griner¿.

G.1.2.6 *Post smartphone news application interview*

S: Bruger du selv din telefon nogensinde til at se nyheder på, eller ikke se nyheder på, men til at få information om nyheder på?
C: Jamen så det P3 radio appen, fordi det egentlig er det eneste der duer på min telefon. I den ideelle verden kunne jeg måske godt finde på at have en nyhedsapp. Spørgsmålet er om jeg ville gå ind at tjekke den, det tror jeg måske ikke jeg ville. For jeg har så meget andet.
K: Man kan også sige, at du på din smartphone jo også kan gå på facebook osv. ligesom du kan på din computer.
C: Ja - jeg kan gå på facebook og instagram, hvor der også er noget nyhedshalløj. Men det er P3 radio.
K: Så du kommer ikke nogle gange ind på - altså igennem enten facebook eller instagram - ind på en eller anden hjemmeside omhandlende nyheder?

C: Jo, men ikke på telefonen. Jeg synes det er virkelig træls at læse på telefonen.
K: Ja
S: Okay
C: Altså så er det fordi, igen, at jeg måske keder mig, og på facebook er der ikke flere ting. Men ellers ville jeg bruge min computer til at læse. For jeg synes det er en for lille skærm.
K: Kan det være sådan et eller andet med at finde en nyhed på telefonen, og så lige skrive den bag øret, og huske at man lige skal finde ud af noget om den når man kommer hjem agtigt?
C: Hmm.. Jeg tror på en eller anden måde, at jeg bare mentalt har afskrevet mig nyhedslæsning på telefon i forvejen. Så jeg tror slet ikke, at jeg ville søge det. Plus, hvis jeg går ind på facebook på min computer, så ville jeg støde på det igen.
K: Ja.
S: Når du nu hører radio igennem din telefon, hvornår gør du så det?
C: Når jeg cykler. Ofte når jeg kører i bus. Øh, transport. Ellers er det mest om morgenen når jeg står op, mest lige fordi jeg ikke har TV mere. Så det første jeg gør når jeg står op er lige at sætte radio på. Radio på som det første. Det er bare som det lidt er et morgenritual. Så er man ligesom igang. Jeg er ikke så super glad for stilhed om morgenen. Så kan man lige høre lidt efter og sådan, du ved.
K: Ja, så det er mere bare noget med, at man så lige går rundt og hygger sig. Så er der lige lidt radio i baggrunden, og det er egentlig meget rart at der bare kører et eller andet i baggrunden når man lige er vågnet.
C: Ja, altså nu er jeg jo også sådan en der står og lægger make-up om morgenen sjovt nok, så det er lidt multitasking.
K: Ja, det kan man jo egentlig godt forstå, at det er rart lige at have et eller andet i baggrunden.
C: Tja. Men mest om morgenen og når jeg lige cykler. Ikke om aftenen. Der laver jeg så meget andet.
K: Hvordan kan det være, at du ikke kan lide nyheder på smartphone?
C: Altså min telefon. 100p det går for langsomt. Men det er bare heller ikke særlig fedt at læse på telefonen. Så igen, så skulle det være fordi jeg lige sidder i toget og keder mig, men hvor tit gør man lige det? Nu er jeg jo ikke lige pendler typen. Hvis jeg skulle hjem til Esbjerg, så måske. Men det er ikke det fortrukne. Så ville jeg måske bare sidde på instagram eller facebook. Og så har jeg jo selvfølgelig heller ikke noget net.
¡alle griner¿
S: Men der har du jo avisen ¡griner¿
C: ¡griner¿, ja der har jeg jo avisen! Ud Se, og Metro Express.
K: ¡griner¿
C: Men det er bare ikke særlig fedt at læse nyheder derpå (smart-

phone). Og så bliver det bare presset sammen, så det er lige pludselig ti gange man skal scrolle ned. Selvom det er hurtigt læst, så er det bare sindssygt upraktiskt. Hvis jeg havde en iPad, så kunne det godt være, at det var anderledes. Det har jeg ikke, men jeg ved, at sådan en som for eksempel min bror, han er sådan en nyhedslæser på iPad typen. Der bruger han nærmest slet ikke computer.
K: Cool.
C: Det er jeg vidst egentlig lidt den eneste i familien der ikke har fået ¡griner¿
K: Det er sjovt, du er den første der har nævnt tablet i forbindelse med nyheder. Det er egentlig mærkeligt.
C: Ja, er den egentlig ikke næsten skabt til nyhedslæsning? E-bøger osv.
S: Jo, det giver jo god mening.
C: Men altså min bror og min far, de læser sindssygt mange nyheder derpå.
S: Okay, altså hvornår er det de gør det?
C: Altså min far, han er meget sådan 'når jeg sidder stille i sofaen'-type. Så kører han nyheder igennem. Han er nemlig ikke sådan en klokken otte nyheder.
S: Nej
C: Han opsøger det selv. Så kan han igennem sin iPad selv finde dem. Og min bror, det er lidt sådan hele tiden. På nær når han er i skole, så er det jo lidt mere computeren.
K: Ja, okay. Kan du se nogen fordele ved at konsumere nyheder igennem en smartphone?
C: On the go. Det er en on the go ting. Det tror jeg måske lidt - i forhold til de andre medier - er den eneste fordel. Den er meget transportabel. Igen iPad'en er nok lidt smartere. Jeg synes ikke smartphonen er super smart til det, fordi den ikke sådan er super læsevenlig. Men igen, i nød - der tænker jeg lidt at det er okay.
K: Ja, fordi man altid sådan lige har den med sig.
C: Ja præcis.

G.1.3 *Lars*

G.1.3.1 *Preliminary interview*

S: Lige til at introducere, far, grunden til at vi gerne vil snakke med dig om det her, det er fordi vi gerne vil undersøge hvordan man konsumerer nyheder på forskellige medier. Og grunden til vi gerne vil vide det, det er fordi så kan vi bedre informere vores design i den rigtige retning. Så det ville sige, hvis vi lærer noget af hvordan folk konsumerer nyheder igennem f.eks. web, TV eller radio, så kan vi måske gøre vores første design bedre end hvis vi ikke havde haft de informationer.
K: Ja.

S: Og det er ikke noget der bliver vist til andre end os
K: Nej, og det kan godt være at nogle af de spørgsmål vi kommer til at spørge om kan komme til at virke helt ekstremt søgte, og sådan, men det fordi det skal være meget velartikuleret alt det vi kommer frem til, ellers er det lidt svært at bruge det. Fordi meget af det er sådan noget hvor man ikke tænker super meget over det. Selv at det at man får artikuleret det ud, det kan godt gøre at man bliver bevidst om et eller andet.
S: Og det har ikke noget at gøre med at performe eller noget, så det skal du ikke være bange for.
L: ¡Griner¿
S: Så hvis der er et eller andet der fejler, så er det ikke din skyld, men så er det til gengæld interessant at se fra applikationen eller websiden eller hvordan det nu er, hvorfor det fejler. Så det har slet ikke noget at gøre med at perform eller gøre det godt, så det behøver du ikke bekymre dig om i hvert fald.
L: Jamen det lyder da spændende.
S: Og mange af tingene kender du jo også, så der handler det egentlig bare for os om at se hvordan tingene bliver brugt.
L: Ja.
S: Kan du svare på hvorfor du hører nyheder, læser nyheder eller konsumerer nyheder hedder det vel.
L: Det er da for at vide hvad der sker omkring mig og kunne tale med andre mennesker om ting.
S: Ja, okay. Hvilke medier bruger du til at holde dig opdateret omkring hvad der sker omkring dig?
K: Ja og teknologier og sådan noget?
S: Ja og med teknologier der mener man så sådan noget som at bruge hjemmesider på computeren, smartphones, osv. Og medier det omfatter alt du sådan... bliver informeret igennem.
L: Jamen hver morgen der bruger jeg jyllands postens hjemmeside. Og DMI's hjemmeside. De står som fastlåst når man starter computeren.
S: Ja.
L: Og i weekenden får vi en avis i papirform som jeg også læser, men altså. Jeg læser ikke ret meget. Jeg læser forsiden, så læser jeg hvis der er nogle artikler der er spændende, men det er ikke sådan at jeg læser alle artiklerne i avisen. Overhovedet ikke.
S: Nej.. Nej. Hvad med sådan noget som radio og TV. Bruger du det til at følge nyheder igennem?
L: Jamen altså, jeg hører jo som I ved P3.
S: Ja.
L: Hele dagen, der kommer nyheder en gang i timen. Og så ser jeg som regel nyhederne om aftenen.
S: Ja... Ja.
L: Og så kigger jeg også på min telefon en gang imellem når jeg har

et ledigt øjeblik i løbet af dagen.
S: Og det er også på de samme hjemmesider?
L: Ja, det er også på de samme hjemmesider.
S: Okay. Men altså når du engang imellem sådan ser TV-avisen eller hører nyhederne igennem radioen. Er det så mere sådan for at have noget i baggrunden, eller er det mere sådan for at høre nyhederne?
L: Jamen radioen er, men ikke TV.
K: Okay, der er det specifikt med målet at blive opdateret?
L: Ja. Altså radioen det er primært for at høre musik. sport og sjove ting i radioen. Det er der en masse af på P3, som jeg har hørt lige siden jeg var en lille dreng næsten. Og som mange synes jeg er for gammel til, men..
S: Fedt nok!

G.1.3.2 *Post newspaper interview*

S: Okay. Du bruger det her medie selv i weekenderne.
L: Ja avisen?
S:Ja.
L: Ja.
S: Okay, og hvor ofte vil du sige du bruger det i weekenden? Nu er det jo kun i weekenden, men vil du sige...
L: Det er kun om morgenen.
S: Kun om morgenen. Okay. Ikke på andre tidspunkter af dagen?
L: Nej, ikke på nuværende tidspunkt. Det har jeg ikke tid til.
S: Okay.. Okay.
L: Hvis jeg havde ville jeg da også gøre det på andre tidspunkter.
S: Ja. Hvorfor bruger du dette medie i stedet for andre præcis om morgenen, vil du sige?
L: Det er fordi jeg synes det er nemmere end at sidde og kigge på en computer.
S: Ja.
L: Vi har også en netversion af jyllands posten, men det er meget mere bøvlet at bladre rundt i end i en avis.
S: Ja.
L: Og.. pfff.. Netavisen, den... Det er jo ikke alt man kan læse i den.
S: Nej..
L: Eller jo det kan vi godt, men det er også fordi vi køber de der premium versioner. Men jeg synes da stadig det er nemmere... til gengæld så gider jeg også kun læse i den om morgenen faktisk, fordi når man kommer længere op ad dagen er det jo ikke nyheder mere. Så er der jo andre ting man kan læse.
S: Andre ting man kan læse?
L: Ja nogle nyere ting der ikke er kommet med i avisen.
S: Nåå, ja det er rigtigt. Så det er simpelthen fordi du bliver opdateret på den bedste måde for dig om morgenen. Og så senere, så skal man opdateres på andre måder hvis man vil opdateres, for der er der nye

ting der er sket.
L: Ja, men der kan jo også være nogle ting i avisen som jeg gerne vil læse som jeg så gemmer til senere på dagen.
S: okay, men det at man sådan sætter sig ned med avisen og sådan læser om morgenen. Jeg havde forestillet mig at det var sådan noget man gjorde... sådan.. så sidder man lige med avisen om morgenen med morgenkaffen. lige fik lidt ro på om morgenen, fik noget morgenmad og lige sad og bladrede lidt rundt i avisen. Også mere bare fordi, det er sådan en ting som man altid har gjort og det er egentlig rart nok sådan at få lov lige at sidde og læser i avisen.
L: Jamen det er det da også altså.. Lørdag og søndag der har vi da bedre tid end om fredagen hvor vi også får avisen. Fredag der bliver det jo ikke til mere end en halv time fordi der skal jeg på arbejde.
S: Sådan lige helt til sidst lige for den her omgang. Kan du se nogle bestemte fordele ved en avis som medie, ift. nyhedskonsumering?
L: I forhold til hvad?
S: Ift. f.eks. radio og TV, men også hjemmesider er nok lidt mere relevant.
K: Det kan være alle mulige fordele.
L: Jamen ift. radio og TV, der kan man jo ikke selv bestemme hvad man vil se, og heller ikke hvor meget de går i dybden.
S: Nej.
K: Nej.
L: De er jo naturligt nok mere overfladiske.
K: Ja, så det du siger det er også noget med at man kan vælge at få sig et overblik hvis man bare har lyst til det, men hvis man også har lyst til at læse mere i dybden, så er det også muligt.
L: Ja, ja.
K: Fedt.

G.1.3.3 *Post website interview*

S: du fortalte os tidligere at du selv brugte jyllandspostens hjemmeside til at finde nyheder på. Hvornår er det typisk du gør det?
L: Det er primært om morgenen og om eftermiddagen når jeg sidder og får eftermiddagskaffe.
S: Ja okay.
L: Nogle gange i løbet af dagen også hvis jeg lige har tid.
S: Det gør du, og det gør du fordi.. det du siger det er at når du lige sidder i nogle bestemte situationer, så kan du gøre det. F.eks. hvis du lige har pause et eller andet sted eller når du kommer hjem.
L: Ja.
S: Det er jo ikke rigtigt sådan at man kommer hjem at man lige rammer radioavisen.
L: Nej det er jo heller ikke sådan at der kommer de samme nyheder i radioen nødvendigvis som man kan se på nettet.
S: Nej, okay. Det svarer faktisk lidt på det næste spørgsmå

L: hvorfor vil du bruge det her medie i stedet for andre.
K: Bare lige for at få det igen sååå.
S: Ja nu ved jeg ikke om du kan huske hvad du svarede før, men f.eks. ift. en avis, der var det her mere opdateret.
L: Mjaaa.
S: Vil du sige det er en af fordelene ved at bruge websites til nyhedskonsumering.
L: Jaaa, det er jo bare en anden måde at få nyheder på. Du kan jo ligeså godt få nyhederne ved at lytte til radioavisen, den bliver jo også opdateret hele tiden.
S: Okay. Hvad vil du så sige fordelene for dig er ved at bruge hjemmesider til nyheder?
L: Jamen det er for at få dem mere uddybet. Og så kan man jo også bedre selv vælge hvilke nyheder man vil læse. Fordi det er jo ikke alle nyheder der kommer i radioen.
S: Nej.

G.1.3.4 *Post DAB radio interview*

S: Du siger du bruger radio hver dag.
L: Ja det vil jeg sige.
S: Og det kører sådan i baggrunden går jeg ud fra, hele dagen?
L: Ja, lige fra jeg står op til klokken 8-9 stykker om aftenen. Både derhjemme, i bilen og på arbejdet.
S: Og det er hovedsageligt noget der kører for at skulle køre i baggrunden går jeg ud fra?
L: Ja på arbejdet er det da. Det er det da også tit derhjemme hvis jeg... Så snart jeg går og laver noget, så er det da rart at have noget i baggrunden. Så føles det ikke så træls at arbejde.
S: Ja det kender jeg godt.
K: Haha.
S: Bruger du det specifikt til at få nyheder med, altså for at blive opdateret på nyheder nogle gange?
L: Det ved jeg sgu ikke om jeg gør.. jo det gør jeg vel. Det er da også en af grundene til at jeg hører radio, for at få nyheder.
S: Sådan fordi man bliver opdateret nærmest automatisk?
L: Ja det kommer jo en gang i timen, men altså. De nyheder man får på P3, de er jo ekstremt overfladiske.
S: Ja så der er ikke mulighed for at gå i dybden med det, sådan som du sagde med avisen?
L: Nej, men det er der så nogle andre programmer der er. Både med LIGA. De går i dybden med nogle sportsnyheder, og så er der pressen på P3 om eftermiddagen. De går i dybden med alle mulige mærkelige emner. Og... Hvad hedder det.. Det der der er om formiddagen, Ghandi, det går også i dybden med nogle aktuelle ting.
K: Så man kender ligesom nogle forskellige tidspunkter på dagen hvor man ligesom kan blive opdateret indenfor nogle bestemte ting,

hvis der er noget man har et specifikt behov for?
L: Nej, det vil jeg ikke sige. Det kan man ikke vide på forhånd hvad de går i dybden med.
K: nå, nej nej, men f.eks. det der LIGA det er så sport, eller måske bare fodbold eller hvad?
L: Nej det er sådan set sport generelt. Det er alle mulige sportsgrene, men altså.. Det er jo musik det meste af det, så det er da ligeså meget for at høre musik.
S: Ja.. ja. Kan du se nogle fordele ved radio som medie? Det er det samme spørgsmål som før bare med radio som fokus. Ift. f.eks. aviser eller websites eller noget i den stil.
L: Ja det er noget man kan gå og lytte til mens man foretager sig noget andet.
K: Igen der handler det jo også om sådan noget med at.. Det er lidt hyggeligt, men også.
L: ja det har jo også noget at gøre med at der er et menneske der fortæller det til en. Det er jo de samme personer der er i P3 hele tiden så. Det er da også meget bundet op på de personer der sådan er rare at.. Der er jo også nogle personer jeg synes der er trælse at høre på.
S: Ja!
L: ¡griner¿

G.1.3.5 *Post TV interview*

S: Hvad synes du der er af fordele ved TV som nyhedsmedie? Eller TV som medie til overbringer af nyheder?
L: Det er da at der er levende billeder på. Det er da en stor fordel.
K: Ja.
S: Ja.
L: Og så.. Man vælger jo også hvad man bedst kan lide at se. Nu kan jeg jo f.eks. bedst lide DR1's nyheder.
K: Hvad med tekst-TV?
L: Jamen det bruger jeg ikke.
K: Nej, det er også fint.
L: Det er da næstne kun hvis jeg lige skal se hvem der har vundet i superligaen.
S: Og man kan sige det er en måde, altså det minder jo meget om hvordan internettet virker på nu. Og nyhedsmedier på internettet er vel også bygget op på samme måde som tekst-tv.
L: Jeg tror da også at tekst-tv.. Det varer da ikke længe før det ikke findes mere. Der er jo ikke nogen der bruger det.
S: Ja, man kan jo sige at tekst-tv har fået det fra aviser kan man gå ud fra. Og så har nettet vel også fået det fra aviser, så de har nok samme kilde.
K: Ja.
S: De minder jo alle sammen om hinanden ikke, men det er jo også

sjovt nok.. fordi det er jo det historiske perspektiv i hvordan de her medier er blevet udviklet.

G.1.3.6 *Post smartphone news application interview*

S: Nu fik du nævnt tidligere at du selv brugte din telefon også til at finde nyheder på.
L: Mmh.
S: Det er så ikke applikationen (JP Appen) specifikt eller hvad?
L: Nej det er netavisen.
S: Okay. Jeg går ud fra at den minder ret meget om applikationen.
L: Ja, jeg synes ikke jeg kunne se forskel.
S: Nej.. Fedt nok. Hvor tit vil du sige du bruger den? Sådan bare cirka, det behøver ikke være noget konkret?
L: Et par gange om dagen..
S: Hvad for nogle situationer er du typisk i hvis du bruger din telefon til det?
L: Hvis jeg er et sted hvor der ikke er andet?
K: På toilettet eller sådan noget?
L: Ja det kunne jeg da godt finde på, haha.
S: Hvorfor går du ind på telefonen for at f.eks. hvis man er på toilettet, er det bare for at se om der er kommet noget nyt eller?
L: Det er bare tidsfordriv.
S: Okay.. Okay. Hvad synes du telefonen har, som ingen af de andre har når.. altså hjemmesiden på den platform.
L: Den har da ikke noget en computer ikke har.
K: nååh, nej nej, men den muliggør vel nogle andre ting i det det er en mobil platform. F.eks. at man kan bruge den på toilettet.
S: ja det kan man vel også med sin computer.
K: Ja ja, men hvad synes du der er praktisk ved at få nyhederne igennem telefonen? Hvis du synes der er noget der er praktisk.
L: Jamen ud over at man kan gøre det alle stedet. Det er jo ikke kun på toilettet. Hvis man ikke lige er i nærheden af en computer og man har noget tid i overskud.
S: Ja, ja.
L: Hvis man har hørt noget i radioen som man godt lige vil uddybe lidt.
S: Ja okay, det er faktisk meget interessant. Så bruger du den ene og hører et eller andet der lige fanger din interesse som du gerne vil have uddybet. Så kunne du finde på at bruge et andet medie. Sådan set ikke kun telefon jo, men hvis det lige er telefonen du har i nærheden, så kunne du finde på at bruge det til lige at finde mere information?
L: Ja.
S: Okay. Fedt.

G.2 POST FIELD TEST

G.2.1 *Tom*

K: Okay, so I guess were right about ready, are you ready?
T: Yeah I'm ready, what do you want me to do?
K: We're just going to have a quick interview with you about using our news application prototype, and that's pretty much it.
T: Okay.
K: So yeah of course as you probably know we're going to use this for our master's thesis. The recordings are not going to be published anywhere, it's just for use for us to do some data analysis.
T: Yeah that's fine.
K: So prior to using the amazon echo, have you had any previous experience with voice control?
T: Uh, no.
K: Okay. Where did you place the amazon echo?
T: I put it in my dining room on my bookshelf.
K: Okay, why did you choose that place in particular?
T: Just because it's sort of in the middle of the house, i walk past it a lot, i can hear it from my kitchen.. and it's kind of a power point.
K: okay so it's kind of because it's the most accessible place in the house?
T: yeah, it's the living room so yeah.
K: Okay, that makes sense. How was your experience using the amazon echo in general?
T: Yeah in general i really liked it. It did a lot of things which i didn't realize it could do. I liked how you could obviously control nearly everything without having to use your hands. You know when you leave the house every day, you can just say turn off. And I can see it developing to sort of control aspects of our house. Locking your doors, windows, your heating and lights. So yeah, i think it has got potential.
K: yeah i actually quite enjoyed it as well for some of the things you said. We had it in the kitchen for the most part, and it's just great there for when you've got your hands full and you need to set a timer or something.
T: Exactly. Or like changing the radio station if you don't like a song. It's just so simple to do.
K: Yeah. In regards to using the amazon echo for news consumption. what do you see as the biggest advantages and disadvantages? And in this case we don't think specifically of our news application but just using this device in general.
T: Well I guess the advantages are the accessibility of it, and your don't even have to log on to your phone to get the news, let alone go and buy a newspaper.. it's just there you know. And it's there when

you want it, so.. you don't have to wait for the radio news to come on at 6 o'clock or whatever. You get the news headlines however you want them. It's got different sources of news, which.. they didn't include that much control over it so I got kind of AOL news which i didn't really like.. I think they also included NPR as a source? And then obviously there was News Butler itself for our local news from the EDP. I like also how it just continues on to the next story each time (Not news butler) on NPR and AOL, although i noticed it didn't do that in news butler. The disadvantages was i guess.. it's not particularly in depth. It's just a quick headline. And you don't. It's quite dull to listen to Alexa just reading out the news. You dont get quotes from other people or you know.. dramatic eye witness accounts or hear gun fire from a warzone or whatever it is. It's just Alexa reading out the story.
K: Yeah exactly that's something we found as well. Especially when developing for it. They have some really weird development limitations. As you said for example in our case, one of the biggest limitations is that you can't tell it to go to the next story when it's done reading one.
S: Yeah so you're forced to having to tell it next, or letting up having no interactivity in it. Well as you also mentioned, maybe if this has to go somewhere big, news production might have to change to accommodate aspects of this device, if it has to turn into something. Because we think it's really dull as well with the Alexa voice.
S: Alright, so moving on to something about the experience of using news butler, how often would you estimate you used it?
T: Uhm, every day.
S: Okay, and when primarily?
T: Uhm, in the evening.. so when I came back from work.. Just to get the headline. Although i mean i knew.. I'm not like a consumer of sorts, i'm the editor of the website. I knew what stories it would tell. I wanted to check which ones it did and didn't pick up, and which one it would go to on next story. So yeah, but it was mainly in the evening.
S: How did you use it? That's a bit of a weird question but you just said you used it as just a quick way of getting headlines?
T: Yeah exactly, so I did use it in the morning sometimes as well in the weekend, saturday and sunday morning. So yeah it was like to get a headline, so I just used it for the news. I wasn't that interested in the entertainment and business part. And yeah then I said elaborate as well on the stories to get the next sentence. I think you made a change during the trial and then it read out more?
S: Yeah that was actually a bug in it, because the elaborated version was really short as well, and we did that for testing purposes in our own facilities, so actually Chris made us aware that it was really short the elaborated version as well so we changed it.

T: Okay.
S: It was always meant to be a kind of longer version and then you would have the full article on the web application.
S: Alright, so what did you most like about News Butler as an application?
T: Uhm, I liked how up to date it always was. I thought there would be a bit of a time lag between the latest on the website and what was coming through on news butler, but there wasn't. I liked the control you had of it. I think there should be more automation of it, so I think it should automatically read 4 or 5 stories. But I liked that you could elaborate on the ones you were interested in and just say next if you weren't interested in entertainment news fx. you could also just say show me less of this, which was cool. So yeah it was pretty intelligent so obviously it could do that without you having to lift a finger. That was really nice.
S: Awesome, and what did you dislike the most about it?
T: I thought it hard to come out of News Butler. So when you didn't want to use it anymore, you couldn't sort of just leave it. I tried saying like: Leave news butler or play radio again, but it just sai
D: you can't do that or this isn't recognized. So you had to wait sort of 30 seconds for alexa to turn news butler off itself, so you didn't have control of when you wanted to leave the application.
S: Okay.
T: So that's probably the thing i dislike most about it. You mentioned it already, but in terms of the story, the disadvantage of taking the RSS feed, is that it's not tailored to news butler. Its written for someone to read and then when you hear someone reading it out it sounds a bit silly. There's like a headline which was like "hoop hoop hurray, rare bird spotted in Norfolk".
S K T: Hahaha
T: You know which is fine when you look at it on a website, but when you hear alexa reading it out.. You know the headlines would have to be written specifically for this kind of device.
S: Yeah we came across some entertainment news sometimes which sounded really really weird when read out.. Like: "Top four things to do in Norwich" and then it just stopped, which isn't much of a headline when read to you, but might be when you read it yourself.
T: yeah and we do them mostly at the weekends, we had something like "top 6 things to do in Norfolk this weekend". But yeah obviously it's not written for Alexa. But yeah when it develops you'd obviously want more local control over it. Like just play me Norwich stories or just play me Norfolk or stories near me or stories from my whole county. So that you can sort of have more control that it's giving you.
S: Yeah one thing we found as well when interacting with it were that.. I don't know if its because were not native english speakers, but at least when Alexa does the text to speech thing where it's the

Alexa voice, I don't know if it's also because written news are written in another format, compared to news that are read out, but it sometimes got hard to follow exactly what the story was when it continued too long.
T: Yeah it did a bit because of the way she was playing it quite stuttered, so yeah.. You didn't wanna sort of listen to her reading out a whole story. It's fine with the headline, but it's quite hard to follow it when they're not reading it in a very engaging way. It's not because you're not a native speaker, we get it as well. She also can't pronounce Norwich.
K: but yeah we actually tried having it read an entire article once, and it was just impossible to follow. But were you the only person to use it?
T: My girlfriend used it as well, but I think she found it difficult, because I did the voice test on it when I set it up, so it was tuned to my voice, not hers so it didn't want to do what she told it to do a lot of the time.. She's scottish, so it had a hard time knowing it. She's got a quite different accent.
K: Yeah it's really tailored to americans right now at least.
T: yeah it seems to, but luckily it always did what i asked it to do. I don't know if that's because i did the voice training or whatever it was at the beginning. You read out like 25 phrases and then it understood your voice better.
S: Yeah alright.
T: i thought that was really nice.
S: okay, regarding interaction and input with news butler. How did interacting with it feel to you? And in that way we mean like did it feel like if you were fluently speaking with a person, which is probably not going to be entirely the case or if it felt like.. Clunky or commandy or something like that?
T: Well.. You sort of gave it one word commands so yeah it's quite hard to say, you know you would say elaborate, next story and so on. But yeah it always did what I asked it to do, which for me was the most important thing. But yeah obviously it doesn't feel completely natural when you give it one word commands. But yeah that's going back to the point i made earlier about having more control.. You know if you could say: "what's happening in Norwich this evening"? already there it would feel more natural. Or: "are there any crashes in Norfolk at the moment" and it would respond by telling you about the traffic and the sorts.
S: yeah.
T: So it can definitely be more humanized.
S: Okay. So how did you get the news mostly through news butler. Was it using the summary function or just the regular news feed or category based news feeds?
T: Uhm, just the regular news function. So yeah I did control cat-

egories sometimes, but it was mainly just.. It just read out the top headlines from the RSS feed. I didn't use the categories that much.
S: Okay, did you use the help function?
T: I didn't, no.
S: Okay, that's great then.
K: so regarding content length and output. How was the length of the content?
T: Yeah initially it was pretty short, but once it was fixed it was longer and gave you a good amount of the story. I mean if you're using it just for the headlines, then what you want is the headline and the next sentence perhaps. It depends how you want to use it, if it's something to get headlines or something to really consume news through. You know if you wanna consume whole stories with it you wanna pick the story and elaborate. If you just want a summary of what happened in your area then I would want the short headline and sentence and you want it to move on automatically to the next headline.
S: Uhm, yeah. We implemented a very simple form of personalization where you got either one story from a section or all of them. Did you notice this?
T: Yeah I think I only got one story, is that right? I don't know.. Yeah I noticed that it was short.
K: So one story from each category or?
T: yeah I got one story from each category.
K: Yeah okay, I'll just check here. It seems like you should have gotten more from general and sports. But I don't know if that wasn't the case.
T: Yeah well I turned off entertainment, but I don't remember getting any sports stories automatically. I got a lot of general at least.
S: Okay, so I guess that answers the next questio
N: did you actively modify your feed by telling the application to give you more or less content from a specific category?
T: Yeah I told it to give me less entertainment.
S: Alright. So in relation to consuming news on other media. Aside from this being part of a test, why would you use News Butler compared to others? You partially answered this already previously, but this is specific to news butler instead of just the amazon echo.
T: Yeah well I guess because it can personalize it to you both from your interests and your geography. And the other stuff from Amazon didn't sort of come from a range of different sources. Like it was all done directly through that particular media outlet. It was just the AOL headlines or NPR headlines, where news butler will give you exactly what you want. And potentially from different sources.
K: yeah, that's great! How do you see an application like this fit inside a home where people already consume news by reading newspapers, watching TV, through internet media and so on?
T: Uhm, just for news consumption you mean?

K: Yeah as an artifact used for news consumption.
T: Well I mean if you have one you're going to be using it for various functions. So it's already going to be on and already going to be there. So why not also use it for news, you don't have to do anything else. You don't have to log on to a site, turn on a TV or go get a paper. It's already there and always on.. All you have to do is ask for it. And it gives you the news when you want it on command. I dont think it replaces other forms of media, I think it's almost a way to tease stories in its present form. I know on saturday we had a really good story in our paper about this guy who tried to climb a mountain in the himalayas.. And he failed, and he had this really dramatic story about his failed expedition in the himalayas and the story was good, and also sounded really good on Alexa once she read it out. And then after that while you know.. I want more of this story, so I would log on to the Eastern Daily Press website or look at the paper today. You know I think it can tease other forms of media.
S: Okay, alright.. Thats awesome. Did you use the news butler web application?
T: No, i didnt.
S: Okay, did you know that it was there?
T: No, haha, no there was nothing on the note about that. I just sort of followed your instructions to set it up.
K: okay, it should have been there. Just to explain what it does, did you know you could save stories on News Butler?
T: Yeah I tried that.
K: okay. when you do that it comes up on the web application with a direct link to the story. We can try to show you on the screen.
T: Yeah I heard she said you could save the story but i didn't know what that was for.
S: here it is in a browser so you could do that on your phone as well. Its just to quickly show you, f.x. this would be my user. I would log in and then get a list of stories i saved. And then clicking on it leads you straight to the source.
T: Oh that's really good, that's just what i explained haha.
S: yeah so it's a way to support what you said about it being a teaser. So you can save the story and go directly to the website.
T: yeah that's great! And you would be able to use it on a lot of devices.. Could you make it an app on the phone as well?
S: yeah you could, ideally you might want to have an app for it as well for easy access on the phone.
T: yeah I really like the look of that web application.. Just didn't know it was there.
S: Yeah, no, that's perfectly fine!

G.2.2 *Chris*

S: Just for the sake of it.. The recordings we use, they will not be presented - it's something for us to analyze.
C: Sure.
S: So, just to start off, have you had any previous experience with voice control before the Amazon Echo?
C: Yea, both with Siri and Cortana
S: Okay. Where did you place the Amazon Echo?
C: It was actually in my kitchen.
S: Ah, okay. Why did you choose the kitchen?
C: That's kind of the hub in my house. It's where I come in and leave, so it's kind of just always there.
K: That's great. How was your experience using the Amazon Echo in general?
C: Great, I love it. It's actually become part of my day now. Especially in the morning you know, when I wake up. I get the news.. and it's just great.
S: Nice, that's good to hear.
C: Yea! (laughs)
S: Okay, so in regards to using the Amazon Echo for news consumption, and this is not just talking about news butler, but news applications for this platform in general, what do you think is the biggest advantages and disadvantages?
C: I think the advantages are that it is always on. So you know.. If I want the news I can get it straight away. I don't have to wait for a radio bulletin, which is what I would normally do.
K: Yea.
C: Uhh it's.. You know I can access it at any point, I can access it at any time, and at any place which is really useful. And it's also much easier than consuming news on my phone, because I can actually do other things while listening to the news.
S K: Yea.
C: Uhm.. Disadvantages.. I think, in terms of things like tune-in news (from the default echo app, red.) it's a single bulletin news.. It's not always.. relevant. I'm not always sure when that latest bulletin has been updated. There are no timestamps, so I have no idea whether I'm getting the updated version, or if I should wait ten minutes for the updated version. In terms of the News Butler stuff, uhh. I think it's really good, but, uuh. I love the interactivity of being able to just ask for the next story.. But (laughs).. I often forget to ask for the next story.. So I get the prompt from the Echo which is fine, that's good but I think that's more.. It's not really a negative, I think it's more a case of getting used to using it. The more I used it, the more I became aware of having to say next or having to say elaborate.. Just over time.

S: Alright, so going to the experience of using News Butler.
S: How often would you estimate that you used it?
C: Uhm.. Depending on the day really.. Quite often you know. I would say... Between three and ten times a day.. But dependant on the day.
K: Cool, and when did you primarily use it?
C: First thing in the morning. And, you know, later in the evening.
S: Alright, you kind of already mentioned how you use it, but would you say that you use it mostly as a quick way of getting updated or kind of as background noise while doing other stuff?
C: It's a background activity.
K: Ok, so kind of like radio I guess. You mentioned that as well.
C: Yea yea. Definitely as a replacement for radio.
K: That's cool. What did you like most about the News Butler application?
C: Uhm... I think the fact that it's local news, and the fact that it's configured as such. It's relevant to me. Also I was quite surprised by the fact that it was able to pronounce village and town names correctly. It did get a few things wrong, but I think that's more because of the pronunciation from an americans perspective rather than a UK perspective. But yea in general it's just really good at delivering that kind of news in that way. More so than Cortana you know.. Cortana just really struggles with reading.
K: Ok. What did you dislike the most?
C: Uhm.. I think not being able to. Initially not being able to chose the categories that I get first. It's always general, then entertainment, then sport.. But then after a while, being able to ask for more of that (news from a specific category, red.), that was really good. But yea, being able to configure a little more. Maybe from the app or from the website, that would be good.
K: Yea.. Right now it's only our very simple form of personalization that chooses the amount of stories you get from each category and in which order they come, based on the profile (user model, red.) of you.
C: Yea, and that's great, but I think that over time, it would also be useful to customize.
K: Were you the only person to use it?
C: Yea, most of the time. I mean occasionally my girlfriend would use it as well, but not much.
K: How did the interaction with News Butler feel? Did it feel fluent, or did it feel clunky?
C: Initally it was a bit difficult, cus I didn't really know how to get the different stories. But over time it just became natural.
K: Okay.. So did you mostly just use commands or did you use descriptive phrases? Like when you wanted it to elaborate, did you say 'elaborate' or 'tell me more about this'?

C: Yea. used all of the commands.
S: Ok.. We've peeked a bit in the logs obviously, but how would you say that you got your news the most? Was it through the summary or was it through the regular news feed or was it by getting news from a specific category?
C: It was mostly just getting the general feed.
S: Has this in any way changed from the beginning of the test towards the end of the test.. How you used it? Would you say?
C: Yea absolutely. I started out.. You know initially by just gettting the headlines but then later I started getting elaborated versions of the stories. But I think that was more a matter of the content, whether or not I would elaborate on the story. If it wasn't something that was relevant, it was just, you know... skip to the next story.
K: Mmh. Did you use the help function?
C: Yes, a couple of times. And I liked the fact that if I didn't ask for anything, then I would be prompted for a response.
S: How do you think the length of the content was?
C: I think that in most cases it was okay. It might be beneficial to have a specifically spoken headline element and then a summary story. Most of the stories that I consumed were relatively short.. I think that entire stories would be too long. Although they could be interesting, I think that a summary version would be better. Even if it's the case of headline, then elaborate on the summary, then elaborate on the full story.. I think that would be options to take into consideration.
S: Alright, so you think that it would help to have an even deeper version of elaborate?
C: Yea, yea.
S: Ok. Did you actively modify your feed by actively telling the application to give you more or less content from a specific category?
C: Yea, I did that with entertainment and general, and I think I got less from sport as well.
K: Alright, so these questions are in relation to other types of media.. So aside from being part of a test, why would you say that this medium would be good for news consumption in relation to others? And here we're thinking about News Butler specifically as a news application.
C: Getting news while doing something else, you know. That's a big advantage.
K: Okay.
C: I think, that it's also another kind of delivery. I like the fact that I can get a headline, and then it's my decision whether or not i want to read more about that story. Whereas other media you either get the headline or the full story. You don't get a choice. And you also don't get a choice in categories or the types of stories that you get so.. Being able to control all of that is a real advantage. And I think that more and more over time, it will get more specific to me, which

I think is really good.
K: Awesome, so how would you see an application like this fit inside a home where people already consume news by reading newspapers, watching the news, through internet media and so on?
C: I think, initially it's more of a complementary service.
K: Mmhmm.
C: But I think that over time it will kind of learn what kind of content you consume. And then it will become something that is much more useful and usable than a news newspaper and a radio bulletin.
K: Yea.. That's great. did you see the News Butler Web Application?
C: Uh, yes, I had a quick look at it, yea.
K: Okay, so you used it. How was that experience?
C: Yea, that was great. I tried to save a few stories just to test, and had those delivered to me on there. I actually hooked it up to if this then that (ifttt, red.) to deliver those stories directly to my email.
S: Wow, cool.
C: So that's quite a nice little function.
K: That's pretty clever (laughs). Alright, cool.
C: What I've been setting up as well, was ehm. When I saved my stories, I could then get them delivered at say.. Seven o'clock in the evening to an email, and link it with my home automation stuff to flash my living room lamp.. And that means that I got stories, which is quite nice.
S: (laughs) That's pretty cool!
K: Wow, you've got a pretty techy home.
C: Yea yea, it's quite cool. And actually, having Alexa control the lighting is quite.. cool.. It's not really an advantage, but it's quite nice to have.
K: Yea... I just have one last question..
C: Sure
K: And that's about the text-to-speech synthesis Alexa voice thing for delivering news. How did you think that was?
C: Yea, I think that it was really quite good. It's much better than the other applications that I've seen. At least much better than Siri or Cortana. It's also more conversational. So.. The interaction between me asking questions and getting responses, that's really good. There were a couple of town names that I noticed it didn't say correctly, but I actually noticed that you can correct that in the application (Alexa companion web application, red.). And I think that once it becomes a UK product it will probably be much better.
K: Alright! That was... That was kind of it actually.
C: Cool!

G.2.3 *Dan Nathan*

S: Well, we're going to ask you a couple of questions related to the use of Amazon Echo and the use of the News Butler application in general to kind of round off the field test.
S: And to start off, have you had any previous experience with voice control prior to this test?
D: Uh, yes. Siri.. In terms of applications, uhm. Actually it's pretty much the only interaction I've had with voice activated systems.
N: Yea, same
S: Cool. WHere did you place the Amazon Echo?
D: Where we've placed it?
S: Yea
D: Yea, so I had it on my desk at home next to my computer.. So not very far away. In the office, we've had it at the end of our six-foot table. Just in the corner, and it was also kind of behind some equipment.
N: Yea.
S: And why did you chose this place? Perhaps most interestingly for us is, why chose the office at the home?
D: Uhm, because my wife didn't like the idea of the Amazon Echo
(Everybody laughs)
D: Uhm, well.. She didn't. Well honest answer, she didn't like the idea of technology that's always listening. She has concerns with that. She also didn't like the sound of it generally.
K: Yea.
D: So yea in terms of testing, I was using it while I was also working in the office. Rather than having it in the living room.
K: Alright, cool.
S: It was banished then, into the office.
(Everyone laughs)
D: Absolutely.
K: How was your experience using the Amazon Echo? Did you use it for other stuff than News Butler.
D: We used it for News Butler, yea. We didn't use it for much else besides News Butler to be honest. Uhm, yea.. It's quite good. But I think.
N: Clunky
D: Yea, it's quite clunky, and I don't know if it's a device I would buy now. If it was in the market as it was. For local news, uhm.. So in terms of the device itself I.. Because it's an american voice.. That's fine, but I think it can misunderstand our speech. I know it can get better over time, so that might not be an issue long term. With some commands uh, when it was further away, it could still hear your, but I think it can hear you less clearly. So we would ask it something, and then it would just shut up, because it didn't understand what we

were saying.
N: Yea.
D: In terms of content, uh. As a local news, it at the moment can't say local towns correctly. Because it's just a robot. So it says it wrong. Uhm, and the functionality of News Butler, I think, can be improved. I think it should be a bit more advanced.
K: Okay. So in regards to using the Amazon Echo for news consumption. And here were not just talking about News Butler, but news applications on this platform in general. What do you see as the biggest advantages and disadvantages?
D: With the News Butler application specifically, I found it quite frustrating if I got to the fourth story, and if I didn't ask it quick enough or if it misunderstood what I said it would quit.
N: Yea, that was really annoying.
D: And to go back in.. I would worry that people would be annoyed by this after a couple of uses, and then wouldn't use the application.
N: Indoors you really had to be quite quick to get the news command in, so you had to say 'Alexa, open News Butler and get the news'. Yea and you (Dan, red) prefer to do it the other way around where you first open News Butler and then tell it to get the news.
D: I think the biggest pro of it is, that I mean you don't need to touch anything. It's quite easy to get the news. So I think the biggest pro is to digest non-serious content, I think. Because if you want serious content, like if there's been a crash or a crime, you want to concentrate, and when it's being spoken to you, I think it's harder to get all of the details whereas if it's something entertainment related you don't need all of the details to really digest it and enjoy it.
N: Yea.
D: So I think that's the biggest pro, generally.
K: Ok, so you think that the medium in general is better for providing overviews, rather than get into detail.
N: Yea, really.
D: Yea yea, correct. Because that's.. Yea, because on a serious story I would personally get into more detail on another form that wasn't listening. Because I can miss something. And especially if it's going to be in a home and the home has got more than one person in it, I can imagine it being quite hard.
K: Yea, that makes a lot of sense. Regarding the experience of using News Butler. How often would you estimate that you used it?
D: Uh, we didn't do a massive amount of testing compared to the other guys I'm sure. We used it on like four or five occasions I think, in total.
K: And was it some specific time of day? Or was it just when you were around?
N: Mostly in the afternoon. Like four o'clock.
D: Yea, and we kind of planned it. So I guess it wasn't that natural

of a test. The first one was done late at night, or late in the evening, uhm, and the other ones in the afternoon.
S: Okay, so you said something about the interaction feeling clunky, can you elaborate a bit on that?
N: Yea, it just.. So, first of all when you open the application obviously, I know the whole command process.. You have to open News Butler and then fetch the news. If you don't say fetch the news quick enough or you don't say it in that specific order, it doesn't recognize it. And then it might go in and get the news from the default amazon news application. Also when you go through the articles, you can obviously say next article, which goes to the next article obviously. If you say previous article, quite often it didn't go to the previous one.. Uhm.
S: Yea, and there's a specific answer for that, because we didn't actually implement any functionality for going to the previous article.
N: Haha, aah.
S: Which we would've done if we had more time, I would say, because then we would've tested it again with this functionality.. Because quite a lot of people, or pretty much every person in the test have said that this functionality would be nice to have, which makes sense.
D: Yea.
S: So we really understand that. In regards to the interaction feeling clunky, we aggree. And this, I think could be solved by implementing a larger vocabulary to kind of make the interaction feel more natural.
N: Completely.
D: Yea, I also think that you did, like, top stories and just the headlines. I think smaller content that you can expand on is the best, because otherwise it's just a list.
S: Sure, uhm, so how did you get news mostly when you tried to get the feed? Because there was different functionalities for doing this. You could get a summary, you get a specific category, or you could get the personalized feed. Which one would you say that you used the most?
D: I only ever did, give me the news and then going through the list. We tried to search by categories in a different kind of way, but it didn't kind of understand us or.
N: Yea, then often it would just say like thank you, good bye or something like that.
(everybody laughs)
D: Yea, and then when I said kind of, give me less of entertainment it then proceeded to give me an entertainment story.
N: Yea.
K: Ok, did you at any point use the help function?
D: Yes, when I first set it up. It informed me of all the different things I could do, so.

K: Did you find that it provided sufficient guidance?
D: For the very basic stuff, yea. I would say that it didn't on stuff like categories and what not. It just said the actual words I needed to use to elaborate, or read the news, or something. It was very basic, but it did what I needed it to do when I first set it up.
K: Alright, just to quickly go back to the experience of using it. What did you like the most about it?
D: Uh, the most.
N: I think, the fact that you don't have to be engaged in it. The fact that you can be going about your business, doing other tasks and just speaking to it. So you can use it while doing what you wanted to do. Whether than be around the house or on the laptop.
D: Yea, I mean I aggree. You just let it do its thing and then if something interesting comes up you can pay more attention.
K: What did you dislike the most about it?
D: One thing that I found during the testing that I found very frustrating was that when it was reading stuff, it was hard to get it to stop, so I could give it a new command.
N: Yea.
D: So if I wanted to have it do something different, and said stop, do this instead, it would take a while and I would get impatient.. I get really impatient with technology.
S: Yea, ok. How do you think the length of the content provided was? By this we mean mostly the title and the elaborated version of the stories.
D: I think it was too long. The content didn't really feel appropriate to the Amazon device at the moment. I think it was just too much. And it doesn't.. The content doesn't read well for a human, I realised.
N: Yea.
D: So if you read it from the screen it's fine. But when you hear the robot say it, it sounds really weird.
N: Yea.
D: So, yea. I think it needs to be shorter and easier-to-digest content.
K: So, yea, what I hear you say, and what we kind of think as well is that content needs to be made specifically for these kinds of devices for it to work properly.
N: Yea, completely.
D: Yea yea, we had a couple of stories that were kind of, out of these ten images what's the bla. bla. bla. and obviously that's... Or can you name these songs based on these audio clips?
(everybody laughs)
D: So that's definitely not appropriate for this device. So yea, shorter and more appropriate.
K: Definately...
S: We tried to implement a very simple form of personalization. Did you notice this, or did you try explicitly telling it that you want more

of this? You said that you did, and it continued to give you another story from the same category?
D: Yea, when we tried it, it didn't seem to work.
K: Yea. I can actually see in the logs that it has worked. We can at least see that when you said less entertainment, it put entertainment down to, yea, the least amount of points that a category can has.
N: Okay, yea, so you mean that it restricts the amount of entertainment stories that it delivers?
K: Yea, exactly.
N: Yea we didn't get much of those. I also had one where I said 'give me news from sport', and it would say 'ok, you will get less news from sport'.
(everybody laughs)
N: So yea, it wasn't doing was I was expecting there.
K: Yea, that's a result as well of the limited vocabulary of the application (laughs).
S: Ok, awesome. Putting News Butler in relation to other media. Aside from being part of this test, why would you say that you would want to use this kind of application compared to other media, like newspapers and so on?
D: Uhm, I think that it kind of just gives you the demand. So you can chose what you listen to, whereas radio just does what it wants to. You can't interact with it, which is good and bad, because if you want to be lazy and don't want to do anything radio is good, but yea hopefully the Amazon can do that, but with extra control so you can get exactly what you want, which I think is good.
N: I know it's the same for me, but it's more about uhm.. The plus point that I was saying where I like to use it was that I can just really imagine you coming downstairs, you get up in the morning and come down in the kitchen and say 'give me the local news'. You haven't got to pick up the paper, you haven't got to turn your iPad on, it just starts telling you the news whilst you're making your breakfast. It's not quite there yet, but that's where I can really see it.
K: Yea, I aggree.
S: Awesome, uhm. So we see that you tried to save a story at one point as well. DId you ever try to go to the web application?
D: No, I didn't, I was just testing the different commands.
S: Okay. Do you have any more questions, Kasper?
K: No, I actually don't.
S: Well, thanks a lot for the corporation!

G.2.4 *Nick*

K: So just to start off, have you had any previous experience with voice control prior to this test?
N: Uh, a tiny bit on Siri but not really

S: Alright!
K: Where did you place the Amazon Echo?
N: pretty good actually, its at least as good as Siri, I think some of the exchanges ive been trying were really good.
S: Okay, so where in your house did you put the Amazon Echo?
N: In the kitchen.
S: Any specific reason for this?
N: That's where I make my breakfast, haha.
S: Alright, cool, so you use it mainly in the morning?
N: Yeah I did, yeah.
S: Alright.. alright.. How was your experience using the Amazon Echo in general would you say?
N: I've been out a lot so I havent been in the house as much as I usually would .. but I found it quite easy to use
S: Okay
N: for obvious big stuff like, whats the weather in london, its really good at that. If you start getting more specific it can get lost quite quickly. So for example it doesn't know the local towns in Norfolk.
S: Yeeah.
N:I guess it's not a big surprise.. But yeah, no, it's fine. It's sometimes when you're in news butler, it doesn't pick up the signal, it doesn't pick up, you know, get me the news, and I need to say it three times, but it's new tech so I guess thats not surprising.
S: in regards to using the Amazon Echo for news consumption, and with this question we don't mean our application only, what do you see as the biggest advantages and disadvantages?
K: So the possibilities for the Amazon Echo for news consumption.
N: I like particularly the ability to go through the summary of each news story from the EDP and then elaborate on the stories you like and find interesting and skip the stuff that you find boring. It's a shame the feed wasn't longer, because you ran out of articles quite quickly. The two things that would be really nice to see is.. One is a related articles function
S: Yeah
N: where it looks for other stuff in the history or indeed in other feeds that were related to the article that you just went through. But the other thing that struck me was the idea of using other devices. It would be great to have functionality letting you bring up the webpage on the TV or bring up the pictures that are related to the stories, that it was telling me about on the TV or on another monitor, so the interaction that went into it could go to other devices as well. That would be really interesting!
S: yeah we really agree, thats one of the main advantages of having it connected to the internet as well, or the possibility of having it alwasy connected to the internet and in your home at the same time among other devices.

N: Yeah, exactly!
S: Okay so.. In regards to the experience of using news butler, how often would you estimate you used it?
N: When I was at home I used it once a day, trying to keep up with it the news and I did like the fact that, you know, it was so easy to get the local news through it because it contained news from our local news source on it.. that worked really well! And actually given the synthetic voice reader, it didn't make too many dreadful mistakes.
S: yeah some of the other guys mentioned that it was really rubbish at pronouncing norwich.
N: Yeah, haha, you know I use, im dyslexic so I use a kindle to read pages, and I change it into reading aloud instead of me having to read, and it compares well to the kindle, which is a pretty good reader. I assume it's the same tech because its from amazon. On the kindle actually, you can change the voice between different voices, male or female, and different accents and change how it reads it.
S: yeah like the Siri as well, but you cant actually do that with the amazon echo so far.
N: Oh can you not?
S: no I dont think so.. which is weird as you say because if they have made the kindle they might as well have used the same tech.
S: Okay. you already said that you used it in the morning, which I find interesting because with the news generated by the feed of the EDP, it's kind of best to use it once a day, because some of the other guys mentioned that they used it loads to test it because they thought it was really interesting in the start. So the kept getting the same news over and over again.
N: How tedious
S: yeah and that gets really tedious to go through, so I think you probably had a better experience with it compared to some of the other guys then.
N: Frankly I didnt have the time to do it any more often. Im glad the others had time.
S: So how did you use it? and with this we mean use it as a background activity while doing other stuff or as a way to quickly get updated?
N: yeah.. for my breakfast i usually get in the kitchen and grab a cup of coffee and it takes me 15-20 minutes to get my whole morning sorted out. So I used it as a background activity because I don't want to waste time in the morning, just do the stuff I need to do and then go.
S: Alright, were you the only person to use it or did anyone else try it?
N: my daughter had a little crack at it when she was over one evening and she quite enjoyed it. But she was just playing with it.. But yeah its easy to interact with as you just speak with it.

S: yeah it is a fun technology as well.
N: The person that I would like for to try it out at some point is a very good friend of mine whos disabled.. shes paralyzed from the neck down so she has a lot of interactive devices by nature of the way she works. And I think it would be very interesting to get her take on it because she's a very experienced Siri user. She reads her emails and things like that, so it might be quite interesting to lend her one for a little bit and see how she gets on with it and thinks about it in comparison with other devices that she's used.
S: Yeah, thats a great idea.
N: I don't know what your plans are and what you're doing next with it.
S: No, we just have to finish our thesis and then we'll find out.. haha. But just to get the rest of it done we have some questions about interacting with News butler.
N: Okay.
S: So how did you think interacting with News Butler as the application feel? Did it feel fluent or clunky and what did you use most.. as in descriptive sentences or short commands or what?
N: Uhm, I used the short commands, the one word commands, once you got used to them I found that absolutely fine, so.. next, elaborate.. that worked fine.. And I don't have a problem with having command lines like that, seems to work fine. I found it perfectly fine to work with.
S: Alright!
N: You just have to remember, you know to tell alexa to get the news to get her started, and then you can execute by using the different commands.
S: Alright, awesome.
K: So how did you mostly get your news through news butler. Was it through the summary or was it through the interactive news.
N: Through the news feed and then some through elaborate and navigated them by telling it next and so on. It was really nice.
S: Alright, cool. Did you get to use the help function at any point?
N: No, i didnt.
S: an experienced guy apparently?
N: No, lucky maybe, hahahaha
S: Okay.. something about.. just to as a last. How did you feel the content length was? And in this we mean both the elaborated version of the story when saying elaborate and the summary which was basically the story title.
N: Okay, the summary length was fine, I think the elaborate length was too short. So I think if youre going into the elaborate, you kind of want the whole article. If you get bored you can always tell it to stop. I sort of got to the end of elaborate and wanted it to elaborate some more to get the whole article. So personally if I commit to the

story then i want to get the whole story, otherwise i wouldnt have committed to it. So having it cut down doesnt help. thats my view
S: Okay, thats interesting because chris said the exact same thing actually, or something similar.
K: Aside from being part of a test, why would you use this medium compared to others? I guess you read papers and internet papers and so on. So what do you see.. why do you think you would use this amazon echo as a medium for news consumption compared to others?
N: You know, for me personally, I cant read the paper while im making breakfast, that doesnt really work, and the local media isn't available on radio, so this gives me the ability to have a handsfree experience without having to listen to the whole thing even if im bored shitless by it. I think if you could have the picture content on a secondary device, then you would have a complete experience that would work really well.. Because some of the stories would be really enhanced i think by having an appropriate video or photograph I think. Even if it was on command.. if it didnt do it all the time. If you could tell it to elaborate and show me the picture. But the amazing thing about it really is that its hands free and you can be doing something else.
S: We tried to implement sort of a version of this in the web application. you probably didnt have a chance to check this out then but in the news butler.. once you heard a story you had the opportunity to save it. Then you could log into a web application and check the whole story which would be the publisher website.
N: Yeah I was aware of that. I didn't use it but I was aware of it.
S: Okay but we get your point with connecting to another device and push the content to the device without being bothered with logins and so on.
N: Correct. That would be very cool if you could do that!