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Bachelor thesis

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An IT person's view on New Digital Storytelling

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An IT person's view on New Digital Storytelling

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Kurzzusammenfassung

This document is an attempt to bridge the communication gap between IT people on the one hand and journalists employing digital technologies on the other. It is supposed to create a mutual understanding of the situation of their counterpart as well as an examination of the current status quo, the common working tools and environments and the needs and requirements for journalism in the digital age. Some possible fields of development for new narrative structures are highlighted throughout the thesis.

Ewa Baumgarten

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An IT person's view on New Digital Storytelling

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1 Introduction

Not since the invention of the letterpress printing or the radio has humanity as a whole faced a new technology with the potential to change the world as completely as the internet.

With the beginning of the digital age, both journalists and IT are faced with a new situation: news in the age of the the web, digital journalism. There is one problem, though - both worlds have barely touched in the past, and the close collaboration that would be necessary to face the challenge ahead often comes to grief because of the wide communication gap.

Despite the fact that journalists have a lot to gain from better understanding of information technology, this gap between the press and the programmers has barely been bridged, and many computer scientists are reluctant to leave their workstations to communicate with people. A wider understanding needs to be achieved, and as every party involved is too busy to make first contact, this thesis attempts to create a common base of comprehension for both sides.

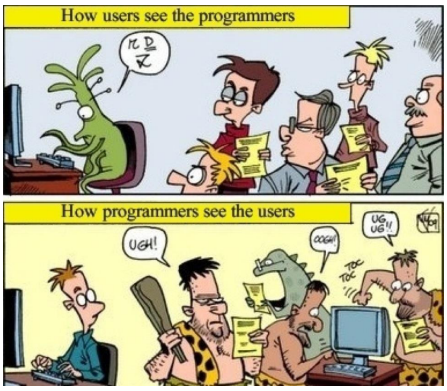


Figure 1.1: KIM09

In medieval times, a redactional system would usually consist of a scribe, a parchment and a jar of ink, while distribution would require a herald of some sort, a crowded public place and a lot of *hear ye, hear ye!*'s. By now, these things are more refined and usually digital - information technology is a part of journalism since its beginning, the first big step being

the invention of the typewriter for the at least fifty-third time by Christopher Latham Sholes from Milwaukee, who's idea from 1841 was successfully marketed by the arms manufacturer E. Remington & Sons, having found themselves with a lot of free capacity after the Civil War. The design of the first QWERTY keyboard has only experienced a few modifications until today and is widely spread over desks all over the anglophone world.

Throughout the 1980's and 1990's, typewriters were slowly replaced by desktop computers all over the electrically powered world. The first prototypes included the IBM Personal Computer and the Macintosh, the third specimen, the Commodore Amiga, succumbing to evolution in the early 1990's. In 2014, most people can't even begin to imagine their work without them, and they are a fixed part of daily routine in every media company, both for accounting and as a redactional system.

Keeping track of interviews, subscriptions, pictures - the content management system is a fundamental part of a newspaper editor, and when it made the evolutionary jump to transform itself from huge filing cabinets to huge files, storing and searching things got much easier. And not only the spell checker and the style improver have made it so much easier to write a text on a computer, layouting systems have made the whole profession of typesetting mechanical letters obsolete. The opportunity to re-phrase texts as they are written has destroyed the image of the trash can full of discarded drafts, but created a whole new approach at creating texts. And it can be taken one step further - today's (digital) redactional systems allow creation of an article in an environment where it will directly be accessible to co-workers and layouters while it is written.

But there's a third way to use a computer, one that has not been possible before the invention of the web, and it's shattering journalism in its foundations. The impact of the web on media agencies and journalists will be featured in this thesis to point out where the work of the IT person is about to begin.

The next chapter gives a brief analysis over the situation as-it-is, while the second gives an explanation of the buzzword *New Digital Storytelling* to make sure everyone is talking about the same thing.

Chapter 3 covers the historical technical development that build the foundation on which digital journalism is built. Chapter 4 investigates how the new medium can be used for traditional mechanisms of storytelling.

Chapter 5 covers the situation as it is, explains some technical terms and summarizes the different types of content management systems that are utilized by today. It also sheds some light on different hosting services and the cloud.

Chapter 6 examines the internet as a journalistic input channel and summarizes the changed expectations and demands in the age of information overflow as well as the change in the role of a journalist, while chapter 7 investigates possible opportunities to enhance journalistic output with the new technological means available.

The final chapters carve out user stories from the previous part, discussing the necessities for a journalist who wants to work digitally, and point toward example services that have a technical realization in place that is similar to the required one.

2 General situation of news publishers in 2014

One of the biggest changes that came with the internet is the way in which people access information. The content a user sees is carefully selected by search engines and social networks based on previously gathered information. This phenomenon, also known as the filter bubble, was first observed in 2011.

According to Pew Internet and the American Life Project Internet und Project (2013), sixty-one percent of Americans get at least some of their news online, ninety-two percent get their news from more than one platform. Social media is playing an important role in sharing news:

> Seventy-five percent of respondents said they get news forwarded through e-mail or posts on social networking sites, while thirty-seven percent of online users said they've reported news, commented on a story or shared it on sites like Facebook and Twitter[...]

For journalists this indicates the biggest change since the tribal storyteller. In the past journalism was about filtering information for readers. Being a journalist meant being a gatekeeper. Primary sources weren't easily accessible, and the only way to acquire information was to go there in person. Articles (subsequently used in summary for any journalist-made news item) used to be preprocessed information that the journalist had access to and his readers didn't. Another part of journalism was a big network of experts, giving them exclusive access to insider information whenever necessary.

The internet has changed all that. Projects like Europeana Europeana (2014) or The European Library EULibrary (2014) offer online access to the content that used to be displayed in galleries and museums or buried in archives. Even if the journalist doesn't link his article to the primary sources they used the raw data is just a web search away. The online availability of articles also speeds up the process of journalism. In the past this input wasn't visible. It would be filtered and then carefully chosen examples would be published as letters to the editor in the

next edition. Before an article would be published there was a verification process ran by full-time fact checkers that would go for weeks, often for months Canby (2012) The internet has changed the pace drastically. Once an article is published feedback and new input comes in every minute via email, Twitter, social media and the comment section. Each day we create 2.5 quintillion bytes of data Conner (2012), 100 hours of video are uploaded to Youtube each hour Youtube (2014)

This development hasn't failed to influence the audience, leading to a growing distrust in newspapers and TV news Mendes (2013) and a boom of fact checking websites.

Journalists are no longer the only people who can make their opinion widely known. Since the creation of the first blog in the early 1990's more and more people have started to write content into the internet, being journalist and expert on a topic of their choice at the same time.

3 New Digital Storytelling

This change in the audience's demands leads to a shift in journalism from gatekeeping to a different way of narrating stories known as New and/or Digital Storytelling (consecutively referred to as New Storytelling). To understand its different approach, this chapter will explain how digital storytelling explores and expands the limits of a narrative as defined in literature:

> narrative [na-ra-tiv], a telling of some true or fictitious event or connected sequence of events, recounted by a narrator ? consist[s of] a set of events (the story) recounted in a process of narration (or discourse), in which the events are selected and arranged in a particular order (the plot). Barrett (2004)

> Story exists where high concept and high touch intersect. Story is high concept because it sharpens our understanding of one thing by showing it in the context of something else. . . . Story is high touch because stories almost always pack an emotional response. Alexander (2011)

This definition points out that a story

- is sequential
- consists of words
- covers an event
- is narrated in third or first person or discourse
- creates an emotional response
- transports understanding

The traditional idea of a story has heavily influenced the image of journalism in the 1990's, putting the journalist in place of the storyteller who shares his knowledge with appreciative listeners. Clearly this has not applied to online journalism since the dawn of the comment

section, when online storytelling became more of a cross-examination with a 100 lawyers all talking simultaneously.

New Storytelling expands this definition:

> Digital storytelling is the modern expression of the ancient art of storytelling. Throughout history, storytelling has been used to share knowledge, wisdom, and values. Stories have taken many different forms. Stories have been adapted to each successive medium that has emerged, from the circle of the campfire to the silver screen, and now the computer screen. Alexander (2011)

Digital Stories can, but don't have to be limited to one genre or medium. The probably most common example is a mix between picture and text, like an online storybook, widely abused by online newspapers desperate for page impressions in form of a picture gallery.

The first example of Digital Storytelling was the radio adaptation of H. G. Well's novel The War of the Worlds, a 62-minute episode of a drama anthology series. Listeners who had missed the introduction at the beginning of the show had no way of knowing that what they were listening to wasn't real, taking the information seriously Boese (2010). This example will be referred to in a later chapter from another context.

4 The technical birth of New Storytelling

4.1 ARPANET and NSFNET

In the beginning there were silence and darkness, but on January 1, 1983, a day forever known as flag day, there was light - the ARPANET Postel (2012), which was the initial core of what would eventually become what we know today as the internet.

The network was funded by the Advanced Research Projects Agency ARPA within the U.S. Department of Defense, intended for internal use. The packet switching was based on concepts by Paul Baran, Donald Davies and Lawrence Roberts Baran (2010), the implemented communications protocol was NCP (Network Control Protocol). As the network traffic grew NCP became incapable of handling the data load, leading to the development of a new communications protocol: TCP/IP in 1981. Two years later the DoD defined the new protocol standard, enhancing the scope and importance of the ARPANET Susan R. Harris und Gerich (1996).

ARPANET, developed by the Pentagon, created a variation of the package switching technique, making computers able to send messages between each other and utilize other computers on the network for your own purposes if those were idle or better-suited to the task at hand. He made clear that the opportunity to send messages between users was

> not an important motivation for a network of scientific computers (Roberts, 1967)

Two years later, in 1985, the National Science Foundation launched another network to link their supercomputing centers. NSFNET eventually developed into several nationwide backbones connecting campus networks. By that time an "internet" would describe any network using TCP/IP. In the late 1980s, when ARPANET and NSFNET became interlinked, that term would change to describe the global TCP/IP network in general.

As the government-funded network infrastructures were limited to non-commercial use commercial internet service providers were excluded from exchanging data traffic over the NSFNET backbone, eventually leading to a commercial solution:

> In 1991, the Commercial Internet Exchange (CIX), by then the leading industry association of the ISPs, became the first entity to establish an exchange point for commercial users. Seagal (1995).

In Europe the internet started at CERN, where computer systems and workstations were connected internally with a TCP/IP infrastructure called CERNET, which opened first external TCP/IP connections in 1989 and eventually brought forth IPv6, being a part of the web as we know it. Network Research Center (2013)

4.2 Project Xanadu

> "In Xanadu did Kubla Khan
> A stately pleasure-dome decree" Ted Nelson (2012b).

While military, government and commercial players started bringing together a web that would suit them, Ted Nelson came up with another idea that would be much better suited for the internet in 1960 during his first year at Harvard, a global hypertext publishing system nicknamed "docuverse", dubbing it Xanadu in 1967:

> (The poem) ... goes on to describe that eerie and beautiful palace with innuendos of sensuality and madness. This poem's tradition also associates the name "Xanadu" with memory and lost work, because Coleridge said he lost part of the poem due to a mundane interruption. We chose the name "Xanadu", with all these connotations, to represent a magic place of literary memory and freedom, where nothing would be forgotten. Ted Nelson (2012a).

The name was chosen long before the internet became accessible to the wide public, but a hint of irony remains: The internet is the summer palace of the Mongolian emperor, and most of it's denizens behave like Mongol hordes. An incomplete implementation was released in 1998, but as many other of Nelson's projects, Xanadu never saw the light of day, but the more civilized among the Mongol invaders still dream of the stateliness of the former pleasure-dome and the ideal that fathered the project is still held dear by many.

Xanadu was meant to put all information within everyone's reach, to make copyright obsolete and provide a discussion platform, believing that only the lack of facts stood between people and the Enlightenment. As mentioned in Chapter 2, the idea lives on. Ted Nelson (2012b) Nelson believed that information should be read non-sequentially, as he believed in

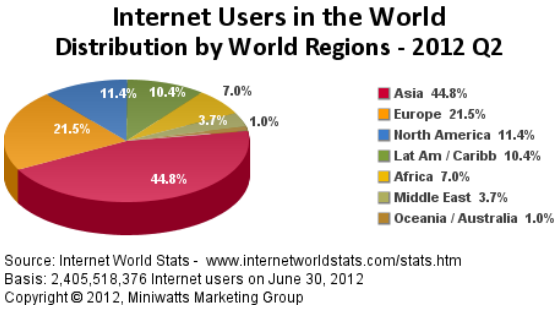
users to find a sequence of their own, and published two books according to this principle. Rheingold (2014)

4.3 Eternal September

Although public internet access was available by now the infrastructure wasn't very sophisticated. The population of Usenet and the newsgroups consisted mainly of the people that had helped shape the web to their own need. Every September university freshmen would acquire Usenet access for the first time and either be made familiar with the network's social norms and etiquette or tire of using the network, leaving the Usenet a homogeneous environment for the rest of the year. All this changed in 1993, when AOL offered Usenet access to tens of thousands of users. This traumatic experience was summarized by Dave Fisher in 1994 in alt.folklore.computers:

> It's moot now. September 1993 will go down in net.history as the September that never ended. Fisher (1994).

The early days, when the web was just accessible to nerds and scientists, are long gone. By the end of 2013 34.3 % of the world's popularity is online, 2.4 billion people in total Mary Meeker (2013), with an expected growth rate of 8 % Y/Y:



4.4 Mobile web

In 1926 the artist Karl Arnold created a sketch in a German satirical magazine envisioning people with mobile phones on the street. Arnold (1926) It took decades until that vision became reality, on April 3, 1973, the Motorola company produced the first handheld phone. The prototype, weighing 1.1 kg, was developed by Dr. Martin Cooper, who claims to have been

inspired by StarTrek HandelProductions (2008).

By the beginning of the 1990s people had begun to include mobile phones into their everyday lives, leading to the development of the first smartphone prototype, IBM Simon O'Malley (1999). Being both a phone and a PDA Simon also featured a pager and a fax machine.

The first full-fledged internet service on a mobile phone was introduced in Japan in 1999 by NTT DoCoMo. When users began to adapt to the new technology the need for larger bandwidth capacity became obvious, eventually resulting in 3G-networks, allowing media streaming to a mobile device for the first time in 2005 Yapp (2005). In the mid-2000s the first dongles and wireless routers became available, making the 3G network available to several devices simultaneously instead of directly connecting one computer to the internet via cable.

In 2009 it was clear that the 3G networks wouldn't be able to supply the bandwidth capacity that users needed, especially due to the fact that applications created more and more traffic and people had gotten used to streaming services. In 2008 4G requirement standards were defined and in 2011 the protocol was standardized.

Mobilebuzz has an interesting info graphic about mobile usage growth in 2013 digitalbuzz (2013). Key statistics are that 91% of all people on earth have a mobile phone and 56% a smartphone. For 50% of those mobile users their phone is their primary internet source.

4.4.1 Ubiquitous computing?

Although there's still an unknown quantity of data caught in dusty old tomes, decaying while piled on top of each other in secluded halls of contemplation ("libraries"), humanity has never been closer to the point where every desired information was accessible at any time in any place. Google Executive Chairman Eric Schmidt predicts that the whole world will be online in 6 years:

> For every person online, there are two who are not. (...) By the end of the decade, everyone on Earth will be connected. Schmidt (2014)

This is probably the biggest change in human information management since the invention of the printed book, and the severity of that impact is yet to be understood by most. Every question's answer is just a web search away, and the satisfaction of very nearly every desire can be ordered on-line and express-delivered directly to one's location, very often making stationary shops obsolete because of lower prices, a wider product range and better product

information through user feedback or the like.

The term *ubiquitous computing* describes the process of the interaction between man and machine leaving the desktop computer, the interface growing from a limited access point to an omnipresent fabric woven into every aspect of human life, provided with enough artificial intelligence to be unobtrusively integrated into every activity. Covering that topic more detailed would go beyond the scope of this thesis, but with the evolution of the mobile web ubiquitous computing has left the imagination of Science Fiction authors and become a very likely future.

4.4.2 Building better worlds

The benefits of internet and computer become most obvious when looking at the poor regions of Earth. Through various support programs poor countries gain access to computers and mobile technology for their educational system, making sure that those who come out of it possess the necessary skills that are required not to be left behind in the world of today. Finding reliable numbers is hard to get, but a look at India indicates that New Information and Communication Technologies (ICTs) are helpful:

> In a developing country such as India, for example, even though 10% of the workers are employed in service and information-related jobs, they account for 42% of the country's GNP, suggesting that ICTs are helping the country to progress towards becoming an information society, even if slowly. Haque (1991)

Mobile phones are helpful for gathering information as well. Surveys used to be written on paper, making it difficult to distribute them among a huge number of people who weren't so courteous as to be in one place at a convenient time. In Uganda a system called MobileVRS has helped reducing the number of unregistered children under five years by 4,7% VRS (2014), giving them the access to a birth certificate and the consequential rights by text message.
The availability of an information access point means that this access point will be used. The data from this can be gathered and evaluated, as for example in Google Flu Trends Trends (2014), which was utilized by the World Health Organization for a pandemic alert in 2009 A Valdivia (2010), being much faster and more efficient than traditional tracing systems.

Another benefit of reliable web access is the option to research and compare prices for products. Farmers in Africa, for example, had previously been excluded for this, stripping them of the opportunity to make a well-informed purchase decision and making them vulnerable to

usurious practices by wholesale traders. FTA (2013)

Another thing that has changed a great deal is the availability of bank accounts. In 2002 the University of Ghana noted that people had created a replacement currency by trading air time, leading to the development of mobile payment systems like M-Pesa (pesa being Swahili for "money"), which provides banking for the poor since 2007 Economist (2007).

5 Traditional storytelling with new media

New technologies become part of everyone's daily life in three steps. First there are the early adopters, who are very savvy about technology, which encounters much scepticism among the rest of the population. Next, frequent users pick up the habit and it becomes mainstream, bequesting their worn devices to less interested and next of kin, and a few decades later everyone has always been using it and people can't even imagine life without it. At the moment the internet is stuck between step two and three, providing many valuable suggestions while at the same time leaving plenty of opportunity for good ideas.

Although Gamification (adding gaming elements to mundane tasks that distinguish themselves by not being enjoyable) may be involved, this thesis will skip fully-fledged computer games despite their great storytelling opportunities. For paragon examples of this art, a look at Bioware role-playing-games is advised.

This section gives an overview about the technical circumstances, offers a definition of the most commonly used and mis-used terms and concludes in a detailed explanation of the various platforms for traditional storytelling in the digital environment, providing examples of how they are used in journalism. This chapter will give an overview from both a professional and technical point of view and should provide background information for the technical conclusions in the User stories chapter.

5.1 New Digital Infrastructure

Before we can talk about professional requirements, first we need to take a look on the technical circumstances, because their implications are something that's often overlooked by the average user, although it's crucial for both them and the engineer. This section will give a brief overview on the most commonly used buzzwords.

The web of things

Another utopian idea from science fiction of yore, the web of things is still far from implemented, although by now the realisation has been planned and is in progress. webofthings.org. Items communicating with each other for their owner's benefit are within reach, because communication over the web can be achieved by providing every participant with a custom API. Many prototypes are under way Trifa.

Transparency

While the concept of transparency is easy to understand, it's difficult to explain due to the various connotations coming with different contexts. This thesis will focus on transparency of information and the technical means for this.

Technically speaking, transparency is the opposite of a black box, a closed system that provides an API through which it can be accessed. The system will then do something and provide some sort of feedback. What happens, and in which way the input is altered, can not be observed and therefore not be controlled.

The world is becoming smaller as communication becomes faster, cheaper and better accessible. We are in the middle of an ongoing process that started when the letter made it possible to stay in touch over a distance and is far from finished. People have become so used to the availability of interconnectedness that situations without cross-linking become something out of the ordinary and require a new code of etiquette. Spending time with fellow individuals in public while consuming nutrients, a common social ritual in the past, has suffered to a degree where the participants actively extort each other into online abstinence by piling all electronic gadgets up in the middle of the table and making the first to touch theirs pay the bill Trevor Kapp.

As distances grow shorter in a globalised world, administrative processes aren't as far away as they used to be. Where the subject didn't care for their god-given sovereign's strategy, the responsible citizen of today wants to participate in decision making, or at least has a strong distrust towards everything not intended for the public. This is a huge advantage for a democracy as well as a police state, because those who got nothing to hide have nothing to worry about when held accountable for their actions. Political transparency can prevent the abuse of power transparency.org. Sceptics trace the need for transparency back to a widespread lack of social trust transparency.org, but on the other hand trust can be created through transparency

transparency.org.

Technology today makes transparency as possible as complete surveillance. There is barely a computer system that does not support logging, so it becomes completely transparent who has done, said, purchased what, when and even where. Every electronic action basically comes down to a command with two or three values, and these commands can be tracked and written in a database, which can then be sorted by every criteria one can think of. And while single hard drives can be destroyed or deleted, once data has reached the cloud it's impossible to control, much less delete.

When people can be held accountable for their actions, those who are in control of the data are in a position of great power, as the Stasi so thoughtfully demonstrated. The only way to prevent the abuse of that power is to share it with as many people as possible - to make it open.

A democratic official, elected by others, should be directly accountable to their voters. Luckily, there's the internet. There are several senate.gov websites e.V. (2014) determined to track the votes cast by congresspeople, which puts voters in the position to keep track of their representatives' decisions, which can directly influence their voting behaviour on the next election. Word of the great new opportunity didn't get around yet, but here lies a great opportunity for any political journalist - evaluating politicians has never been so easy. Do they keep the promises they made during their election campaign? Do they even bother to show up at all GmbH (2011)? By giving citizens more insight into government business, a greater understanding for limitations and compromises can be created. It's easy to criticise a decision, as long as not all the parameters are known. By providing these to the people, democratic governments can gain a completely new and improved kind of legitimisation and be far more representative and legitimate than they can ever get by counting check marks on election bills.

But it's still getting better. If a process is transparent, that means that many eyes can supervise it. This will lead to a greater chance of seeing mistakes early or preventing them at all. It will also reduce corruption and lower the total direct and indirect cost of public projects by increasing the efficiency of subcontractors. If the average shady real-estate entrepreneur gets hired by his brother-in-law for a project for twice the cost of competition, someone will notice. If a subcontractor is notoriously late and overruns the budget, somebody will know and influence the process. If one participant has a reputation for inadequate work quality, it will be known before damage is done.

The technology to make this work already exists. When a decision-making progress is under way, information can be spread and the public can be asked for input. This input can be pre-ordered by categories, which can be requested upon submission, as it's already the case in most bug tracking systems. The individual suggestions can then be machine-filtered and automatically weighted by certain criteria, such as numbers or percentages, and then sighted by the decision-makers to influence the process. The final result can even be fortified with reactions to the suggestions to make transparent why the decision was made the way it was.

Another big change is coming for the way society deals with past events. When mistakes or actions can no longer be covered up, we have to learn to admit them and to forgive them. A constructive community is a huge benefit, be it for a company, for a computer game or for a society as a whole. When the system changes to one where mistakes will not be ridiculed but admitted and where feedback will not be deflected or seen as personal attack, but instead valued and accepted as a learning experience, the quality of social interactions will increase. Although this might seem either autistic or utopian, it's not uncommon among more matter-of-fact communities (such as IT).

Technically speaking, these things are well on their way, and their conclusion in the cloud is the "... as a service" approach to software design. Spoiled by apple, users don't want to be involved with setting up or understanding the system they work on, but only want to use it. The more user-centered computer specialists agree with them, but they are a minority.

5.1.1 Everything as a service

As everything moves into the cloud, what better solution could there be than being thorough and leave as little as possible to the user's inconvenience (or to the IT person's control) and shove programs and computers along? The *thin client* approach is the logical consequence from that insight. By taking more and more of the program tasks out of the clients (the user's side of the application) and putting it into the server, clients become less complex and hardware dependent, but rely on the server instead. The nomenclature of cloud computing describes this approach as *... as a Service (XaaS)*. The according software architecture style is called *multi-tenant*, revealing not only the growing influence of marketing departments on software engineering but also a change in customer perception. Where in the past those utilizing a software were users and their programs were clients, now there are *tenants* and *apps* Bobrowski.

The X substitutes one out of the following:

- software: Some sort of interface, providing a functionality. Usually doesn't require much more than a simple install,
- infrastructure: Outsourcing hosting and maintenance of a digital framework like a website or mail to services in the cloud, waiting for tenants,
- platform: hardware, operating systems - the entire computer can be outsourced, leaving only a touchscreen and a printer in the company,
- storage: hard drive space, for example Amazon Cloud Storage, making it unnecessary to host files on own computers or bothering about sharing,
- communication: the means of communicating with each other, like *voice over IP* in combination with other collaborative tools, saving contacts and contents to the service, so that the identical status of communication can be accessed from any client,
- network: a more specialized version of infrastructure as a service, providing not a whole virtual town, but only a road network that can be scaled to fit,
- monitoring: the opportunity to keep an eye on things, from a nuclear power plant to the water temperature in an aquarium.

Services of this kind are used by companies big and small as well as citizens of the digital space, both natives and immigrants - communication as a service is usually the first thing discovered by digital newcomers for free phone calls.

Cloud based services are available in different sizes, the pricing range usually depends on the tenant's business size. Different service providers have individual presets to offer, which can be chosen or combined depending on one's needs. That provides an agility to company development that was unheard of in the past, but it also creates a new kind of critical centralized infrastructure.

Since 2007, the 13 biggest cloud providers' downtime of together 568 hours has had an economic impact of 71.7 million dollars due to the International Working Group on Cloud Computing Resiliency Borja. A complete failure of all services of the kind would be an economic disaster that has already found its way into cinemas Silverman, but was fortunately averted by John McClane in *Live Free or Die Hard.*

Data hosted in the clouds and scattered around other services can also be lost to the user from one day to the other, sometimes almost without warning, as it happened to clients of Nirvanix Katz (2014) or gamers losing their saves when Games For Windows Live became Xbox Live. Problems like these can be avoided by local backups, but usually aren't.

"The private cloud"

The term itself is in most cases both a paradox and an exaggeration. A private cloud is webspace under the direct control of the company's IT department - which is an ambitious goal for companies that are not Google or Amazon. A private clout approach is basically a tiny cloud implementation on a different server, and combines advantages and disadvantages of both. Examples are services like ownCloud, not hosted on providers' severs, but being under direct control of the companies, being a mix between storage as a service and an own file server.

The server in the basement

The average user doesn't have a web server in their basement, the average computer specialist probably has. Although the server is connected to the internet and can therefore be accessed, the files on the webspace are completely under the owner's control. If an article is deleted from the web space, it will not be available on the internet any longer - unless someone else has copied it first

Like every good web, the internet is full of *crawlers* - bot programs that only exist to browse, typically for the purpose of indexing. If such a crawler gets their metaphorical limbs on a piece of data, it will leave traces. These traces range from a simple hyperlink to a full copy of the article in question. The most famous crawler queen goes by the name of Google and provides a huge cache, in which the spiders' prey can be accessed long after the original content is offline.

Certain entries in the robots.txt file will prevent all law-abiding crawlers from accessing the associated webspace.

Uploading something to someone else's server means yielding the control over the file to the owner of the webspace. If that owner is some sort of legal person, laws, regulations, terms and conditions apply and some sort of contract has been agreed on.

All the services mentioned above can be hosted on a company-owned or even private server, which takes away some of the advantages (for example a huge company standing behind it) and some of the disadvantages (for example a huge company standing behind it).

Cloud Encryption

As data in the cloud is basically public, uploading unencrypted data is the digital counterpart of putting one's desk on the market. Legal regulations enforce that third parties must not be able to access an organisation's sensitive data, but although encrypted data may be legally sufficient the best encryption algorithm has ciphered in vain if the key isn't secret.

The Ancient Greeks were the first to use ciphers to encode their messages. Their example was followed by mystery-mongers through history, from Caesar to Leonardo DaVinci as well as the next-door Secret Service agent. Today, ciphers are better-known as algorithms. Encryption is distinguished into symmetric and asymmetric, describing the different ways to encode data. As all data can be reduced to a set of 0 and 1, encrypting usually means calculating the encrypted data based on the numeric values of input and cipher and decrypting it in a similar fashion.

Symmetric encryption requires both the sending and the receiving party to have the same key. The first major algorithm developed in the 1970's was DES, Data Encryption Standard, featuring a 56-bit key. It is, however, no longer considered safe due to the fact that the key can be calculated by using a *brute force* approach, trying combinations of 56-bit keys until the data can be unlocked. By today, DES has been replaced by AES, Advanced Encryption Standard, using much longer keys of up to 256-bit, which is considered relatively safe due to the number of combinations that supposedly exceeds the amount of atoms in the universe Seberry.

The substantial weakness of symmetric encryption is the transmission of the keys, which can obviously not be sent encrypted themselves and therefore could be plucked from the data stream. The solution was public-key or asymmetric encryption, which included a way to encrypt the symmetric key. The first algorithm of this kind was envisioned in 1970 but could not be implemented until seven years later at the MIT in form of the RSA algorithm, named after the initials of its creators, Rivest, Shamir and Adleman, involving a total of four keys.

Each of the conversation partners has a private key that's known only to him, and a public key that is shared with the conversation partner. The message is encrypted with a symmetric key, then encrypts this key with the public key of the receiving computer. The recipient then decodes the symmetric key using their private one and decrypts the message. A popular encryption program is PGP (Pretty Good Privacy).

The NSA had promoted Simonite (2014) a flawed RSA encryption algorithm, jeopardizing data security as a whole, which was discovered in 2013 and dropped from the standardization process. Other algorithms, such as SSL and TLS, are vulnerable to such flawed algorithms as

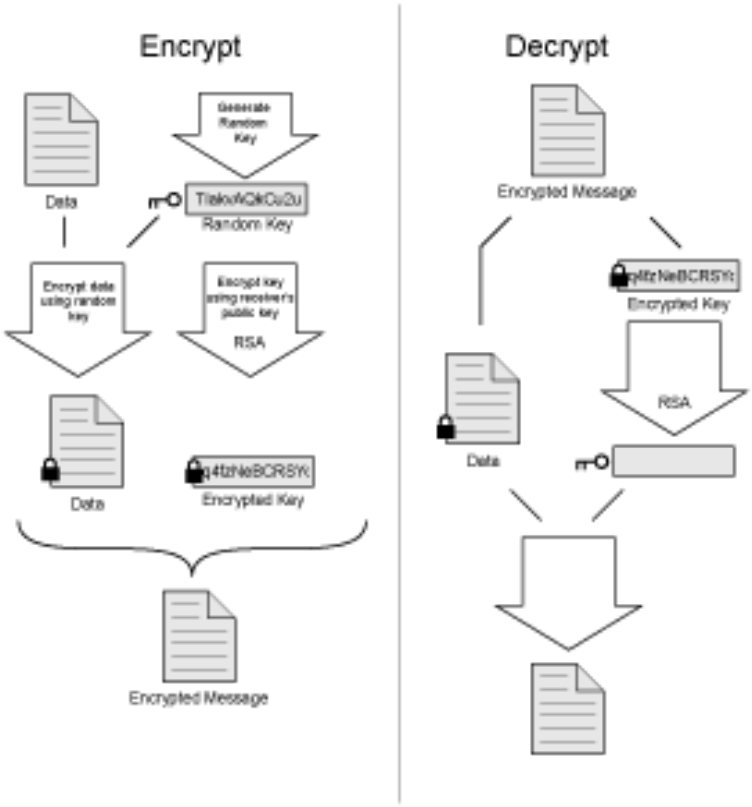


Figure 5.1: wwaawaw

well, because the whole encryption is based on the unpredictability of the keys. When the random number isn't random anymore and some sort of correlation exists between public and private key, those knowing the correlation can decipher encoded data in a very short time.

When it comes to the implementation on a larger scale, some sort of authorisation is required, a digital certificate from a middleman trusted by both computers.

5.2 Rules of participation

One of the early noted principles for social media is the ratio between consumers, participants and creators, called the 90-9-1 rule Arthur (2006). It states that for one content creator there are nine people who participate (leaving feedback, commenting, sharing etc) and ninety people who benefit from the content but don't participate in any way.

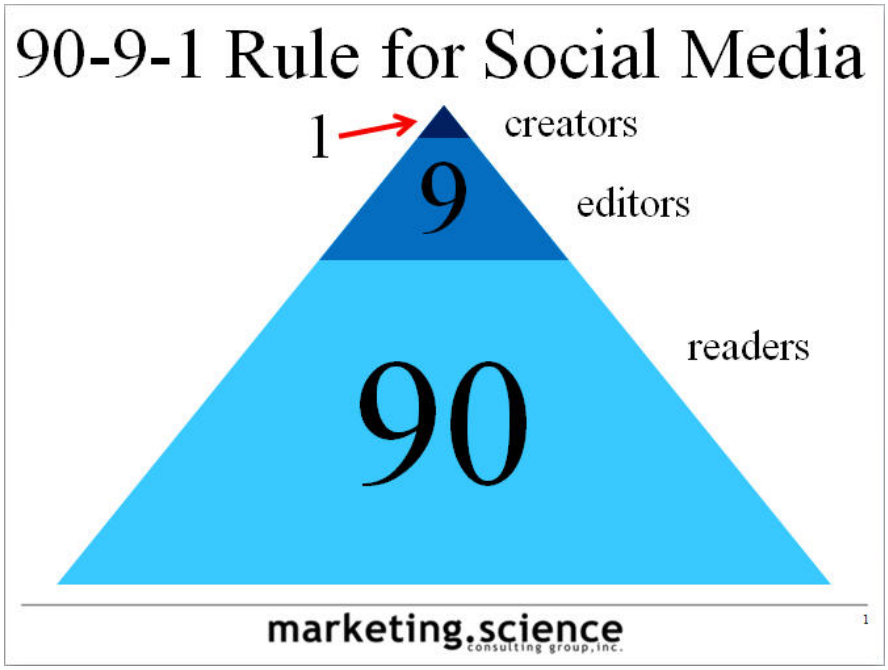


Figure 5.2: Source: Dr. Augustine Fou, May 2005, Digital Image. Available from: http://go-digital.net/blog/wp-content/uploads/2012/05/90-9-1-Rule-of-Social-Media-Participation.jpg, accessed January 3, 2014

As this thesis is being written there's hardly such a thing as a non-social medium anymore, most publishers having noticed by now how beneficial contact with their readers can be. As Barbara Ganley is quoted in The new digital storytelling:

> If you're not thinking about social media for digital storytelling, you're basically creating something that is analog. Alexander (2011)

This thesis will not consider articles or platforms that don't allow user interaction.

5.3 Blogs

The weblog has devolved from the internet diary in 1997 when the term was created by Jorn Barger Wortham (2007), initializing the change in the nature of the internet from a one way read-only medium to what it is today. They experienced a huge popularity boost after 9/11. The eventual breakthrough happened in 2001, when bloggers managed to uncover controversial comments made by an U. S. senator shortly before the election and the topic was picked up by mainstream media. In 2014 most online newspapers feature blogs of their own, and linking blogs as sources is common practice in journalism.

Before the emergence of social networks, blogs were the only easy accessible way for the average web user to publish online content, leading to many hobbyists with online diaries and the accumulation of communities of interest.

> The category of blogs as storytelling devices is broken down [...] into a typology: diary, character exploration, time-based republication, and one-post stories. Alexander (2011)

Most blogs focus on the medium of text, although embedding other media isn't difficult. Unless disabled users can leave comments on blog entries. When linking to another blog entry the linked block receives an automated linkback Hope (2013) that's listed under the entry, creating a network out of linked blog articles pointing from one entry to another.

The line between bloggers and journalists is fluent, although the difference is still subject to heated discussion almost 20 years after the emerging of the first weblogs. There are journalists who started blogging Bradshaw (2011) and bloggers who commenced on their own and now write for newspapers like the New York Times Richter (2014).

Resisting the overwhelming temptation to blog pictures of their lunch of Thought Editors (2012), some journalists use their online diaries to share a documentation of their work with their readers, like award-winning photo journalist Zoriah Zoriah (2004). In other cases civilians

create an online, real-time chronicle of change, like anonymous blogger Riverbend Riverbend (2012), who wrote about her life in Bagdhad since the invasion in 2003 until fleeing to Syria four years later, creating a vivid snapshot of these years that will undoubtedly be of huge service to future historians.

A weblog is usually hosted on a single server, either by the blogger themselves (which is not too difficult do to preconfigured blogging systems like Serendipity 1tox33 or Wordpress 1tox34), or hosted on central services like blogger.com blogger.com.

5.4 Wikis

A wiki is a web application which allows people to add, modify or delete content collaboratively with others. Differently from a blog a wiki text doesn't have an explicit owner or leader and there's usually no predefined structure, allowing the wiki to grow as required.

On most wikis the user has to register and validate their mail address and can immediately start participating. Usually the changes aren't reviewed and apply immediately.

Wikis can be used for *collaborative journalism*, the most prominent examples being Indymedia 1tox14 (2014) and Wikinews 1tox13 (2014), although news organizations have been very careful with Wiki experiments after what happened to the Los Angeles Times in 2005, when the experiment of letting users participate in their editorials led to the flooding of the website with inappropriate images. The project lived for three days before meeting an early shutdown.

Wiki Journalism seems to work best in times of crisis, like the London bombings in July 2005 or Hurricane Katrina later that year, when Wikis can excel at their main purpose: sharing information.

> Wiki makes an effort to make sure the calls for help (that aren't the Big Guys like Salvation Army) are legitimate. They're a clearing-house of info for people in the area and outside it. Know anyone who needs oxygen in the flood-struck area? Go to wiki. Rothwell (2005)

Wikis are usually not hosted in the cloud, as their administrator tend to be interested in technology and prefer direct control over their service.

5.5 Social Networks

Predicted as early as the late 1800s the first social web was proclaimed in 1996 Quittner (1996). Myspace, launched in 2003, became the first widely-noticed social networking site in 2007 but was overtaken by Facebook in 2008 Techtree.com (2008). In October 2013 there were 1.19 billion active Facebook users each month and 728 million active users every day Smith (2013).

Technically, the most interesting fact about social networks for this thesis is how mobile their users are and how it influences New Digital Storytelling. The following figure shows which percentage of the traffic comes from mobile applications opposed to traditional desktop stations:

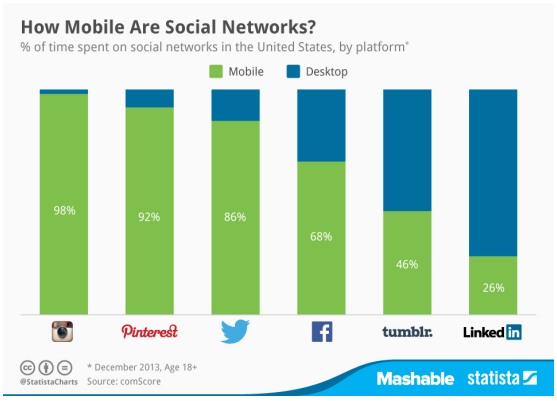


Figure 5.3: Source: comScore, December 2013, Digital Image. Available from: http://www.statista.com/chart/2091/mobile-usage-of-social-networks/

A high percentage of mobile usage indicates users considering the network something essential that is part of their daily lives, making it worth discussing as a channel to reach a journalistic audience.

Every network has a different focus, but they all have the same purpose: Sharing and creating content, which is a brief (if incomplete) summary of journalism. Information is scattered over many platforms, depending on how much time has passed and who has provided it:

> Twitter is what happens, Facebook is what happened, blogs are what has happened (v. Luck, 2014)

Much thought was given to finding a good approach to the topic for the social media chapter, resulting in finding a document for management staff of the city Hamburg, a Social Media

Guide City Hamburg for public servants that gives an insight into the mind of the average user and lets the Digital Natives determine the level of familiarity we can take as granted. This section will provide a brief overview, then address Facebook as a representative of "slow" social media and mention the impact of Twitter on journalism.

5.5.1 Consideration

The guideline highlights requirements for social media usage that are very relevant for journalists, less so for IT.

- Coordinating target audiences, benefits and higher-level (management) goals
- providing human resources to react within the expected time frame
- being open to criticism ("Every feedback is a great chance to improve")
- considering legal implications
- Marketing activities

y

The first point is, compared to times of yore, rather difficult. Everything on the web is more or less public, unless it's encrypted, and then it's just one brute force attack and an interval of time away from being public. From this it follows that articles will eventually reach recipients outside the target group to be questioned, analysed and shared. The saying "there is no such thing as bad publicity" is among the many hardly noticed casualties of the information age, as the Danske Bank found out the hard way Palopoli (2010). A flawless article that leaves absolutely no room for disagreement is the Journalist's Stone, and like the philosophers before them their search hasn't yielded results yet, but everyone who posts content to the web must be aware that it becomes public access and brace themselves.

The second point is most important for businesses, less so for journalists, but the internet demands fast and appropriate reactions. Online communication disasters that cause an uproar in the surfing population are so common nowadays that Germany made up an own Anglizism for it. Meet the Shitstorm Lobo (2013), describing a player in the crossfire of public opinion, most likely caused by communication mishaps, for example demonstrated by Nestle in 2010 Broida (2010).

Second and third bullet point make it clear that it's necessary to connect with an article's readers. If people are touched by something they will want to react on it by sharing it with their friends, saying their own opinion, making observations and comments and giving (sometimes even constructive) feedback to it's creator. Of course reader dialogue is not an unrewarded obligation. If a commenter's feedback is answered by the person causing it, their reaction will usually be benevolent, creating the customer loyalty every marketing practitioner is dreaming of.

Legal circumstances and marketing will not be covered here, as it would go beyond the scope as well as the topic.

If you gaze long into social media, social media also gazes into you. And this is a good thing, because social media is communication, which is the essence of journalism. Ahmad

5.5.2 The black hole of Facebook

First mentioned by Jeremiah Owyang in 2007 Scobble (2007), the phenomenon is still active, as Facebook's communicative gravity sucks in everyone and everything, adding it to their own mass. As Jemima Kiss observed in the Guardian Kiss (2007), things that cross the event horizon are difficult to get out again. Most Facebook users have shared the experience of vainly searching their own timeline and history for a link they have shared some time ago. What comes on top is that Facebook, as other social networks, has an own interest on unique content posted on their website Law Offices of Craig Delsack (2012) and with their Terms and Conditions grant themselves permission to delete any content, page or profile on their page, making it almost impossible for the creator to get it back. Although Facebook is a great channel to share and discuss content it's strongly advised to host content under one's own control.

Facebook is constantly changing user interface and background algorithms in an attempt to chisel as much money out of content creators and distributors as possible. Currently (April 7 2014), good practice for a journalist would be to create a Facebook Page, either for himself or for the current topic, and share a link to that article through the page. Followers of the page can add pages to lists, which can be configured to notify them on update. A simple "Like" will not show all page updates to a page's followers, unless this feature was paid for.

5.5.3 All that gold is does not Twitter

A social networking and "microblogging service" , Twitter content is limited to 140 characters ("Tweets"). Since the launch in 2006 it has experienced growth ratios only surpassed by cancer cells, and by 2014 the network has not only developed their own set of customs and habits, but a whole new language custom-fit to press as much information as possible into the limited space.

Twitter is where the web gossips and spreads rumours. The information there isn't checked, processed, refined, ranked or evaluated, it's just shared, sorted by so-called hashtags. There's a number of way to search Twitter, but none to find specific information - the digital way of sitting in the tavern, listening to the crowd and trying to tell truth from tale.

There were some disastrous experiences made when companies tried to integrate Twitter directly instead of using it as primary source and filtering out everything unnecessary and profane Kearney (2012), but Twitter integration should still be part of a storytelling framework.

Due to the brevity of the posts Twitter resembles the telegram style, which has inspired German journalists to come up with the "news ticker" Niggemeier (2014). Originally designed to keep users up to date on hyped events by updating the ticker with briefest information bits freshly Twittered, the tickers soon became an annoyance to many.

Social networks are usually maintained by big companies. The user does not have access to any advanced customization besides that he's offered by the service provider, but social networks are generally free of charge.

5.6 Podcasts

Podcasts are an audio recording that are available online, varying from music only, interviews or a single narrator up to complex radio dramas with effects and multiple speakers. They originally resembled the most traditional form of storytelling, a single narrator, talking to an appreciative audience, but assimilated radio plays and shows. The podcast is the recording of any internet radio broadcast.

Many people prefer the spoken word to the written, and a podcast is a way to narrate content that can be effortless processed on the side, as opposed to reading, which requires all of the recipient's focus. Also a spoken voice can create a stronger bond between narrator and listener than that between author and reader. While a podcast is not the right choice when much

information has to be shared (people usually tend to take notes when they listen to longer talks), it may be a good way to tell a story.

There's no preferred hosting provider for podcasts, and they can be found everywhere on the web for streaming or download, for example on platforms like iTunes.

5.7 Videos

After video was accused of killing the radio star in 1978 it was swallowed whole by a bigger fish. People failed to notice until The Limousines immortalized the moment in their song "internet killed the video star" that was released in July 2010. The observation isn't one hundred percent accurate, though, because video isn't dead but, together with it's former victim radio, merely enthralled. Since the first Youtube video was uploaded in 2005 Baron (2010) internet videos became widely popular while at the same time the equipment for recording them secretly introduces itself into almost every new device. Where ten years ago a video camera was an expensive gadget and videos were made by professionals, today's teenagers record themselves with their phones and directly upload the clips to make sure that Youtube preserves their youthful misdeeds for all eternity.

As the declining medium of television shows, journalistic film productions are all but unheard of.

Although videos are uploaded and streamed all over the web, the most famous video hosting provider is likely Youtube.

6 New Digital Input

As explained before, the internet makes an abundance of information available to everyone who knows where to look. Everybody can walk into a wonderland of wisdom, carouse in clusters of knowledge, indulge in infinite information. The gates are no longer locked and therefore don't need to be kept any more, but a new need has arisen: That for a guide.

If the general direction of the story was already given, three main tools were most important when fleshing up a story with facts: interviews, observation and background research Curtis (2011).

An interview usually involved talking to some kind of expert or concerned party. This conversation usually happened on the phone or in person, in the latter case the journalist often had to travel great distances to meet their interviewee. These results then had to be brought into some newspaper-processable shape. Recording techniques of yore were shorthand or tape recordings, which were usually of bad quality and exposed to environmental threats, because the data medium was error-prone and usually didn't have a backup. Nowadays, the low-quality land lines have been replaced by the internet, and interviews can be had in higher quality via voice over ip calls. Services like Skype have replaced conventional telephones, making a much better audio quality possible. The format of video is no longer limited to television, and the technical equipment to create one is available to everyone. On the one hand this makes journalism easier, on the other hand the competition now includes as aforementioned everyone.

In the past observation meant visiting an event and then reporting about it. The more exclusive the event, the greater the achievement was for a journalist to gain access to it. A film opening night, for example, was something that the average reader didn't have access to, and an article describing how it was, who attended it, what they wore and if a visit to the cinema was in order or not was a valuable piece of information, as the journalist was most likely the audience's only source to perceive this event. Today, this is different. The average celebrity is broadcasting details about their appointments that a journalist will never get access

to, and thereby cover most social media channels directly. Politicians use Twitter to keep their followers up to date about conferences, actors announce their filming contracts mere moments after they were signed - many news can't be observed directly any more, because they will be broadcast before. Of course this means that a journalist can now simply observe the observers and assemble their data in an article. This is a great opportunity, because it takes pressure off the logistics department. On the downside, though, this leads to a virtualisation of events - if a tree falls down on twitter, how can we tell if there's a corresponding tree in the forest? And if this tweet is then picked up by the media, the public may end up mourning a tree's death which was never alive to begin with. Raymond (2014)

Background research has become both easier and more difficult in times of the internet, as most eight-graders finds out when their teacher starts foaming at the mouth because they have quoted from Wikipedia. Information on every topic the heart desires is just one web search away. Experts aren't exclusively accessible resources, instead they pop up on every corner on the internet - or do they? Media literacy is not a school subject (yet), but judging the credibility of a source (on- or offline) has become much more important than in the past, when sources were automatically credible because nobody bothered publishing an encyclopaedia of nonsense. Once an error has been picked up by a media agency, most journalists take the information as verified and it becomes truth. Avoiding these mistakes is a new task for any researcher.

6.1 States of Data

The internet has made many new information sources available. Some are open for the public, some have limited access. They offer access to journalistic raw material in different states of refinement. The famous Wikileaks cables, for example, weren't raw *data* but instead contextualized *information*, although the shared effort of sighting this data is another new thing that will be looked upon later within this chapter.

A bit like quantum particles, data is changing its state as it is observed. That's why wild data in it's original and primal form is almost extinct and can only be found in a few, secluded enclosures. The human mind constantly alters data as it passes through, by evaluating, prioritising, validating, classifying, "parsing" it, as the IT person would say.

6.1.1 Peer preprocessing

Of course, there is nothing wrong with that. People are more likely to view articles that have been reviewed and recommended by others Mtati (2014), because people usually socialize with those who have similar preferences when it comes to the use of media. A recommendation by one of these people usually indicates that the article has been read, understood and liked (or strongly disliked), and was considered valuable. One of the companies to successfully utilise this is IKEA B.V., who approached owners of German weblogs focussed on family life and asked them to write articles about their products, which would be provided for them. The company made it clear that they asked for honest feedback instead of praise, looking for either positive feedback or critical product reviews that would give them the opportunity to increase their products. Even bloggers that are known as critical agreed, and by talking about IKEA products caused at least one sale for the company, when the author of this thesis bought a shelf for re-purposing that she hadn't considered otherwise.

Theorized in "six degrees of separation" Editor und Chambers, in today's world every two persons are only six acquaintances apart. If analysed, every peer group will have certain key individuals, who have great impact on others' opinions. Identifying these persons and swaying them into reviewing one's article (which may or may not result in a share and the corresponding regard) is one of the great opportunities of the world wide web, because these multipliers can be easily identified and contacted.

6.2 A new niche - journalism in the age of information overflow

The easy access to information is often mistaken as JournalismdÃ¤mmerung. If everyone can access everything, critics say, then why should society have a need for journalists? Can't the need for a newscast be sated out of one's Twitter feed? Don't we get all the information we need from our Facebook timeline? Of course all these information will come from the inside of our filter bubble arXiv (2013), but why should that be a bad thing? If we wanted to take a look outside the box, we could just add a deviating input source to our news stream?

> All we have to decide is what to do with the time that is given us. Tolkien (1988)

The one thing that these enthusiasts often overlook is that people have limited time at their disposal, while the modern Homo sapiens is subject to a constant bombardment of information

Berner, which is so overwhelming that it can't be properly processed or filtered any more. Therefore it's often referred to as "white noise", a constant background stimulus that most people have learned to fade out of their lives entirely.

According to economical principles, people won't want to waste any of their time on things that are not of any significance or concern to them. To stick out of the white noise, an article must not be a piece of it anymore, but provide a service that the reader otherwise had to execute for themselves - that of parsing the information. By today, online news agencies often try to match the speed of twitter, participating to the white noise rather than filtering it Berner.

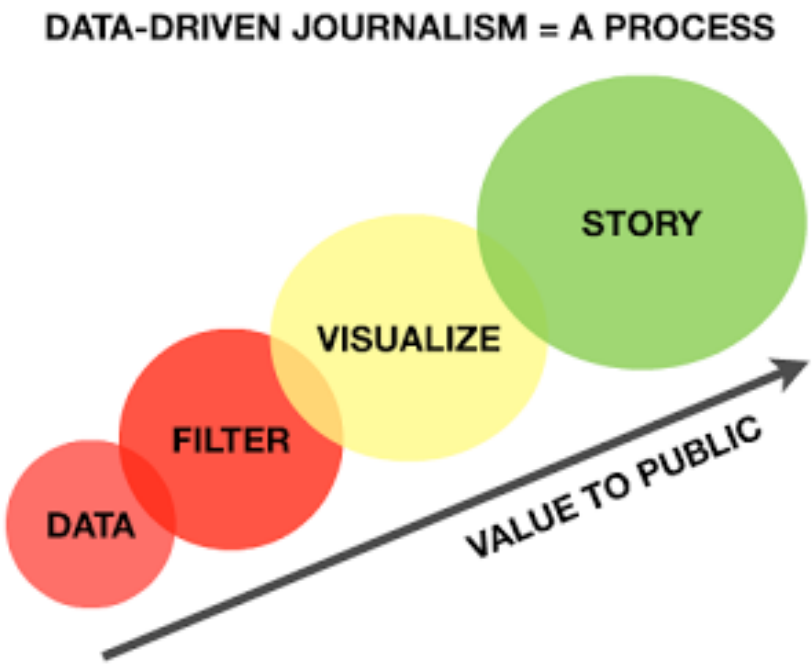
By 2014 most news publishers are competing for page impressions from a shrinking audience, often leading to one online publisher quoting the other. In high speed news processing it often leads to traditional media trying to give real time updates Niggemeier (2007).

As soon as an incorrect information has reached certain channels of distribution, it may as well be true, because the high-speed journalistic business doesn't leave much time for validating information anymore. This has to change, because verification is an important part of service to the reader.

The first recorded hoax in history involves the previously mentioned audio play "War of the Worlds" by Orson Welles. According to newspaper reports of that time, a mass panic broke out because people believed the radio play to be an actual news broadcast about a real world alien invasion. This titbit becomes even more remarkable when one finds out that the media reports about fake media reports were fake Pooley und Socolow (2013).

6.3 Data (Driven) Journalism

To filter and pre-process information for the reader, making the white noise more ordered and better accessible, is called *Data Journalism*. It includes computer assisted reporting as well as data driven journalism and is often paraphrased as *structured j.*. It can be found halfway towards a programmer's job, representing a collection of competences from separate areas of expertise, such as statistics, visualization as well as the occasional item out of the computer specialist's toolbox fab/dpa/dapd (2012). This process does not necessarily yield an article, but can include a more sophisticated data set that the user can browse on their own, although due to the fact of journalists usually having a more verbal (or textual) approach towards presenting data, these usually don't come without explanatory statements.



An example for data driven projects is New York Roadmap. With 7.5 million monthly visitors, the digital road map is a successful attempt to combine various data sources into a single platform with centralized access - combining information to something more than the sum of the parts, collecting recommendations from the citizens of New York for their peers. Hidalgo und Baek

6.4 Data Mining

Also called "data discovery", mining is all about discovering gold nuggets in a vast quantity of sand input26 (2013). As previously mentioned2, sighting all the information on the internet is as impossible for a human mind as is keeping up with novelties. Data mining tools help the accessing party to filter the dataset, to accomplish the tasks mentioned in the previous section.

6.5 Data, big and open

All kind of data can be gathered, indexed, organized and accessed by computers, often fully automated. The technology can be used to save many lives: For example, after the devastating tsunami that killed more than 230 000 people in fourteen countries Paris u. a. (2007), warning

systems like PHIVOLCS have been installed to prevent a second disaster, automatically sending out text messages to inhabitants of affected areas as soon as predefined threshold values are exceeded.

Automated gathering of weather data is another benefit of the new technology. The AWOS system ncdc.noaa.gov, mostly ran by the US Federal Aviation Administration and available to the public. Computer generated voice messages are broadcast via radio frequency or accessible via phone call, providing live weather data to pilots and farmers.

Contextualizing this data is also important to avoid unnecessary information. For example would a sailor and a kitesurfer need an entirely different focus when receiving weather information.

Mountains of data are gathered and saved away, stashed up into piles of a size so vast that it can't even be accessed without the help of data processing tools Dumbill. These data hoards are known as big data, and usually enviously guarded by those who have amassed them.

6.5.1 Personal Data

Of course the collection of data is not limited to flood levels and thunderstorms. What's most interesting to companies worldwide is personal data, because in a global economy everyone is a potential customer. Everything we do in the world wide web leaves behind traces of data, which is gathered by an abundance of scripts, cookies, tracers, trackers and the like, and piled up on hard drives.

But the first recorded big data archive was not a digital one - the Stasi, Eastern Germany's secret service, piled up as much as 158 km of written documents, among these 12 km index cards, and 1,7 million media with unrefined data, such as photos, sound documents and microfilms. By today, roughly 63 % of this has been made accessible BStU. With today's technical means, the administrative effort to maintain such an archive has dwindled to almost nothing - and the interested parties are no longer limited to secret intelligence.

It's old market lore that knowledge about one's customers grants an advantage when it comes to business. Many companies have jumped at the chance to gain an abundance of insight by gathering every bit of information they can access about their clients. One such example is Amazon Amazon - an algorithm suggests interesting items to the user, based on the

purchasing history and on the individual wish lists, but taking into consideration purchases made by customers with similar histories or preferences. Another such example is every local supermarket, putting the potato chips right next to the beer.

Unlike most their sources, these data collections are not usually accessible to the public, which is where the attribute *open* comes into play.

6.6 Social Monitoring

Of course the purpose of this data is not limited to product placement. Many parties are interested in keeping a keen eye on the public, political ones being among them as well as secret services and market researchers. That's where social monitoring comes into play - tools and algorithms to browse data on social networks, like socialmention various. By today, evaluation of twitter streams can predict an election result much more precisely than polls Rojas (2013), and the Department of Defense is funding research on the contagion of ideas that at least in one case took place as psychological experiments on facebook Kramer u. a. (2014) - without the consent of those involved. But not only big brother is keeping a close eye on social media services, so are schools Wallace (2014) - to be able to keep in touch with their students and to watch out for them, allegedly. The social impact of constant monitoring aside, many people are not aware of the fact how much their profile affects their digital surroundings, as Wired author Mat Honan tried out Honan.

6.6.1 Open Data

Like in *Open Source*, *open* is a good thing when it comes to data. Open Data is defined by it's use rather than by it's size, so it's licensed in a way that it can be accessed, remixed and transformed into something else - articles, for example. In general access to the open data sources is available for free or at minimal cost.

The Open Data movement originated as an attempt to regain control over the heap of data that has been picked up by putting access and control back in the hands of those who had originally created - or funded - the data. Information was created by means of public funding should not be public instead of locked away behind additional paywalls. In science Commons (2014), the greater benefit is rather obvious, if research isn't done in secret the same data won't be gathered twice and scientific goals can be reached way sooner.

Figure 6.1: Kmenta

6.6.2 Open Government

When it comes to national data, the claim of the Open Data movement appears so obvious that governances have begun to support them. National data has been funded by tax money, so what good reason is there not to give them access to it? Several states couldn't come up with one and joined the movement, for example America data.gov (2014) or smaller players like German federal state Hamburg Gillmor (2014), who even implemented a "Transparenzgesetz", transparency law.

Taking the whole thing a step further, the UK government has launched the midata initiative gov.uk in 2011, in an attempt to shed some light into companies' Big Data stores. Although Brands like Google and Visa back up the initiative, but so far the impact is controversial. In 2013 the midata innovation lab midata innovation lab was funded to make closed data collections available to the public for all kinds of purposes that have been foretold by science fiction authors for decades, but haven't found their way into everybody's daily life yet:

> Imagine a world where you have easy access to the data that companies have about you, so that you can use digital tools like apps and personal analytics that

> will help you to make choices, save money and manage your life more efficiently. For instance, how about helping to manage your money by sharing your credit card transaction data with an app that can alert you to when you're spending more than usual on particular types of products or services? Or tapping into a service that joins up information about your travel plans with your health records to check and plan your vaccination and prescription needs while you're on holiday? midata innovation lab

6.7 Up, up and away - data in the cloud

The internet is a bit like Las Vegas, only worse - what happens on the internet, stays on the internet, no matter how hard one tries to get it out again. Since 2005, when Barbara Streisand sued a photographer who had included pictures of her house in his documentation of Malibu's coastline, countless attempts were made to remove information from the internet. More than a decade later, word didn't get around yet and people continue to make this discovery over and over again, as for example BeyoncÃ© Parkinson (2014) in 2014..

Depending on national laws, content is more or less protected once it has been published. Copyright, author's law and similar legal constructs are supposed support the claim one has on their own work, but enforcing it is a difficult enough task - in both directions. Not every country has a fair use policy, and not every use is fair, but the legal situation of content management is not subject of this thesis, other than the technical circumstances (which have been discussed earlier).

6.7.1 If you love something, let it go. If it comes back, nobody wanted it.

In medieval Europe, any serf who reached the cities was free of the justice of his liege. The cloud is the equivalent for data. Once a file has been uploaded into the cloud, it can never be captured again - at the very least one of its copies will continue to roam free. The healthy approach to this is to accept the facts and to raise data in a way that gives it everything it needs to live on their own. Once an article is remarkable enough, it will draw attention and be linked to and shared. It will also be stolen, but everyone who takes a real interest in the topic will usually turn up the real source sooner or later.

7 Not-so-new Digital Output

7.1 Computer generated content

News Agencies are providing a great service to every news publisher by pre-filtering, -indexing and -tagging content, offering various output formats to automatically insert their items into the publishers' content management system dts Nachrichtenagentur. Even if these items are published without any further editing, they are not technically speaking computer generated articles - yet. But already computers are creating texts, for example summaries of Little League games, created without any human participation Levy (2012).

Of course our abilities to make information more appealing to possible readers surpasses that of a machine by far, but how much creative effort goes into something like the articles of the German website news.de Rosenkranz, where news agency reports are read, accumulated with lurid headlines and wild speculations and then published? On the web, something like this is known as *click bait*, an attractive-looking website with a catchy or provocative heading that's difficult to resist for most readers and contains little or no information.

7.2 Second Screen

> If you're the kind of person who can sit through an entire TV show without sending an email, tweeting, skimming your Instagram feed, swiping through some Tinder profiles or browsing Amazon, congratulations: You have a better than average attention span. And that makes you a little weird. Bercovici (2014)

Based on the observation that many people carry a second screen with them wherever they go, the step to using that for the advantage of the story isn't a big one. A mobile can be used as an access point to information or communication about the subject that's on the other screen, for example a chat about a TV show that's just broadcasted, or additional information and statistics about news. A global average of 48 % of people don't watch TV anymore without a second screen, spearheaded by 79 % of Japanese adults, and although this activity isn't necessarily supporting what's going on on the big screen Curtis (2014), the opportunities seem

endless. Not only could the mobile device be turned into a remote that isn't constantly missing, the full potential of this technology hasn't been fully explored yet.

The main use for the second, smaller screen is communication - people turn television into a social experience. Blogs commenting in real time on live events is not a new thing Tempest und correspondent (2003), but the technological frameworks have become more and more sophisticated and are by now integrated into journalistic daily routine. Not only teenagers are constantly connected to their friends

By creating a link between the big screen and the small, additional value can be given to the events on the bigger one. An example for a paragon app is The Walking Dead Story Sync, creating a shared viewing experience by offering a chat function as well as providing the watcher with additional photos, flashback videos, trivia and polls AMCTV. In some cases the second screen completely replaces the first, as for example with the FIFA World Cup, which could be accessed via streams from every place with a decent internet connection Alvarez.

7.3 Gamification

People like to play games, and if games are connected to the process of passing on information - passing on stories - those are more likely to be remembered. Children pick up films and TV shows in their games, teenagers write poems and short stories ("fan fiction") about fictional worlds they want to spend a little more time in, and grown-ups often have a more adult way of playing these games by developing alternative endings and scenarios together with their friends ("small talk").

Gamification is a scientific approach (easily recognizable by the "-ation" ending) to find out how this mechanism can be of use for everything else, for example in the eternal struggle against entropy, also known as household duties, by gaining experience in Chore Wars Wars.

Another example of an app greatly enhancing an experience is "Zombies, Run!", which makes physical exercise all more interesting by creating an audio overlay to the runner's audio track that puts him into the role of Player 5, a survivor of the Zombie Apocalypse. The story is told through a series of audio recordings and radio messages, and the runner is tasked with gathering supplies to help building a base. Free online syncing to Zombielink Zombielink makes it possible to

> View run logs and statistics, including calories burned and zombies evaded See how fast you go when you've got a zombie chasing you or listening to a favorite song Read full recaps of your run activity and story events Automatically share your run logs with friends on Facebook and Twitter

The author of this thesis, who would probably not even resort to running in case of a real Zombie Apocalypse, has convinced her betrothed to try out the app for her, and he is very excited about it.

7.3.1 Casual Games

Casual games are designed to be played in the passing. Their mechanisms are usually simple, and although they can be quite captivating, they either don't require one's full attention or are designed in such a way that a loss or game-over has no severe consequences (restart level, don't get all the stars etc.), often both. The most popular casual game of all times is probably Tetris, but due to the fact that it's learning effect (except when it comes to pack car trunks) is minimal, it won't be considered any further.

Google has made use of serious games elements in several ways Hill (2011), the most obvious one being Google image labeller.

7.3.2 Serious Games

Opposed to casual games, serious ones are not a pastime but an approach to teach the player something in a playful way. The most popular serious game of all times is Hide And Seek, which taught the children of the first humans how to obscure themselves from predators.

The general approach still hasn't changed and may even be more important then it ever was. Today's children are called *digital natives* by many, and teachers all over the world bemoan their short attention span Prensky (2007). When it comes to things they're taking an interest in, however, their learning curve is only surpassed by bacteria growth Rutter und Bryce (2006).

Gamification and games in general will not be covered in greater depth, because it would exceed the limits of this thesis.

7.4 Interactive fiction

More a form of narration than a form of journalism, interactive fiction is an elementary form of digital storytelling. Being one of the main elements of computer games, how can interactive storytelling be of use to a journalist, and which technical means would they require?

Of course making the story as interactive as it would be in a good computer game or a pen and paper role playing situation Delmas u. a. (2009) is impossible because of the much larger audience and the immutability of the environment (unless one takes into account the kind of interaction that comes with Facebook scamming as in *Only five hundred lives, and this child will receive heart surgery*).

As for online storytelling, interactive means multimedia. Texts, fortified with everything the web has to offer. Maps, additional text information in strategically valuable spots, audio and video information. Paragon examples of this can be found on the interactivenarratives.org web archive DeVigal.

The technological challenge is to make everything seamlessly interactable, so that the process of making multimedia narratives is as intuitive and natural as using a sock puppet.

7.4.1 Game mechanics

As gaming psychology is well-researched, there is plenty of material to choose from. Most interesting for storytelling purposes is the Cascading Information Theory Schonfeld (2010), which basically says that, if information is given out in the smallest possible bits, the recipient will be excited to learn more of it. Of course a wrong execution of this can easily result in intellectual under-challenge and the eventual loss of (more intelligent) readers. The use of gaming mechanics in digital journalism would no doubt be an interesting topic to discuss, but exceeds the limit of this thesis.

8 The resulting user stories

This chapter covers the analysis of User Stories to chisel out the requirements that a software for journalists would have to meet.

A piece of content is summarized as an article in this chapter as established in the previous chapters. An article is everything that's not a complex combination of several elements.

8.1 Creating an article

So a journalist wants to create an article for their readers. The necessary process is well-established and has been programmed into an abundance of online and off-line services, so this section will only cover the basic mechanism.

The article will need a heading, an author (for legal and copyright issues), a descriptive teaser and some kind of content. From experience the journalist will want to add a description of the content, so there will almost always be text.

The article's content can be anything that has been covered in the previous chapters.

8.1.1 Embedding media

One of the central tasks of journalism is the evaluation and classification of raw data, putting it into a context. Often articles discuss information already found online.

A popular way to generate page impressions and clicks are galleries or rankings, like 10 best Christmas presents for parents or the 10 funniest YouTube cat videos. Although it's ethically questionable to support the practice of splitting information into tiny bits for the sake of clicks, the need for such a thing must be considered.

Another requirement is the illustration of an article with several pictures, as offered in blog software like Serendipity and even Facebook notes. A picture is attached to the article, a short description is added and the picture can be positioned within the article.

8.2 Adding additional material to an article

8.2.1 Unprocessed background material

For most, research is a lot of work. Gathering sources, sighting them, prioritising the material and deciding what relates to the topic and what doesn't is considered the hardest part of research by many. It's not as common to include one's sources when writing an article as it is in the scientific and research area, and even if one could keep their work - and all the research that went into it - neatly organized, most people don't bother. What if there was a way to pin related items to the article? Transparency includes to give the interested reader the possibility to draw their own conclusions from the given facts, so why not take it one step further and include their sources right away?

This kind of material falls into one of four categories:

- open to the public: If the material isn't restricted by any means, it will be accessible via internet sooner or later. In this case, a simple link should suffice.
- restricted, but obtainable: If the journalist can't share his source for some reason, he or she should at least be able to reference it.
- not yet available, but open to the public: If the background material is not available online yet, there must be some way to change that by uploading files to some kind of server
- secret: Won't be credited and thus not considered here

In either of the cases, the material must be open for underlining with further information, such as a title, some sort of tags, a (short) description and maybe a rating of sorts, not too different from the main article itself.

8.3 Creating a weak link between two articles

If two articles are loosely connected to each other, the connection should best draw itself. If one article is linked in another, then the system should link them in a way that can be followed by the interested reader. An example where this is successfully practised is the pingback in blogs that has been described before, although this kind of connection lacks any semantic information.

8.3.1 Location based

Some things have nothing in common but geographical proximity. However, such an information can be extremely valuable to recipients. Sometimes it makes more sense to connect information on a regional scale than by topic - parents of infants would likely prefer information about daycare facilities in their neighbourhood to news coverage about the educational sector.

8.4 Creating a strong link between two articles

Some pieces are strongly connected to each other, and an easy way to display this is necessary. Two articles that feature two sides of the same problem or a pro and a contra opinion have such a strong link, as well as articles sharing a common topic (for example the same event). Of course that implies that the articles don't render each other obsolete.

German online magazine Spiegel-Online already features a simple computer generated dossier, where an article leads to a higher-level page about the central subject various (2014). The filtering criteria upon which the single items are chosen have to be set by hand and the individual collections have to be prepared, but in the near future this task will be completely automatized.

8.5 Sharing an article

If an article catches the reader's attention, they might want to bring it to their peers' the attention by sharing it in some way. Facebook is paragon when it comes to that - due to the huge user base many websites offer the option to *like* and *share* their content. Another approach at this is the Pinterest way, which already meets most of our requirements, but is focussed on images. The technical details will be looked upon in the next section.

8.6 Inviting readers to interact in a complex way with an article

Simple interaction with articles is already possible since the invention of the comment section. Everyone can add insight, perspective and meaningful information to anything that comes with a feedback section in the best case, or at least tell the author how completely off track they are. Although nested comments make this kind of communication a bit more sophisticated, it

is as old as the internet itself.

Once an article has been cast out in the web, people will want to add information to it that they feel it's missing, if there's an easy way to do that. This is the Wikipedia Problem - when somebody writes an article, who will be allowed to alter it, and in which way? The wider the community becomes, the more security layers can be found. The wikis on the relatively famous computer game series The Elder Scrolls, for example, can be edited by everyone who has registered and the additional information is not reverted in any way, while the Wikipedia knows a phenomenon called *edit wars*, where an article is constantly altered in different directions, and has a quality control in place to make sure that changes the core community doesn't agree with are immediately undone.

Another way to achieve this is to have users add metadata to articles, like Facebook emotions or the previously mentioned Google Image Labeler.

8.7 Cross-arranging articles

Sometimes a story originates from a new perspective on familiar material, or from a connection that hadn't been reflected upon. Wouldn't it be great to be able to combine elements from other articles to something new, *remixing*? If this was possible, a strong connection between two pieces would automatically emerge (the picture illustrating this article has been originally uploaded for...). What we are looking for are more complex ways of interaction, and that is where simple feedback becomes a mix between social reading and a discussion board.

The wet dream of every data journalist and many IT folk is semantic description, which can eventually be used to create the *smart web*. Although the hype started more than ten years ago, the dream of a web where information can be shared and connected over the boundaries of applications and communities WC3. In theory, such a thing is possible and can be accomplished relatively easy by creating an infrastructure meeting all technical requirements in this chapter, which can then be filled with content. This content could then be processed by machines, who could create articles based on algorithms how pieces could be connected. Several implementations of the semantic web are in place, but the internet in general hasn't accepted the approach. One interesting example is the Argument Web, which comes in different implementations Reed und the ARG:dundee.

The Argument Web is spun on the base of one item. In response to this, users add their arguments via a pre-defined interface, entering the connection to the original item directly upon creating their reaction. The most simple relations are support and conflict, which can then transitively be used to create relationships between two items that are not linked directly. The more detailed the given meta-information is, the better is the classification and differentiation.

9 Analysis of sample services

In the final section of this thesis we will look at example services that are implementations of the user stories from the previous section or could easily be altered to be them.

9.1 Basic article creation

A content management system that can be easily used by people without deep technological understanding, completely hiding the underlying database layer and possible semantic connection from the user. It would require a graphical user interface of sorts. Basically any web form can serve as example here, so a the dashboard of the blog software Wordpress was chosen.

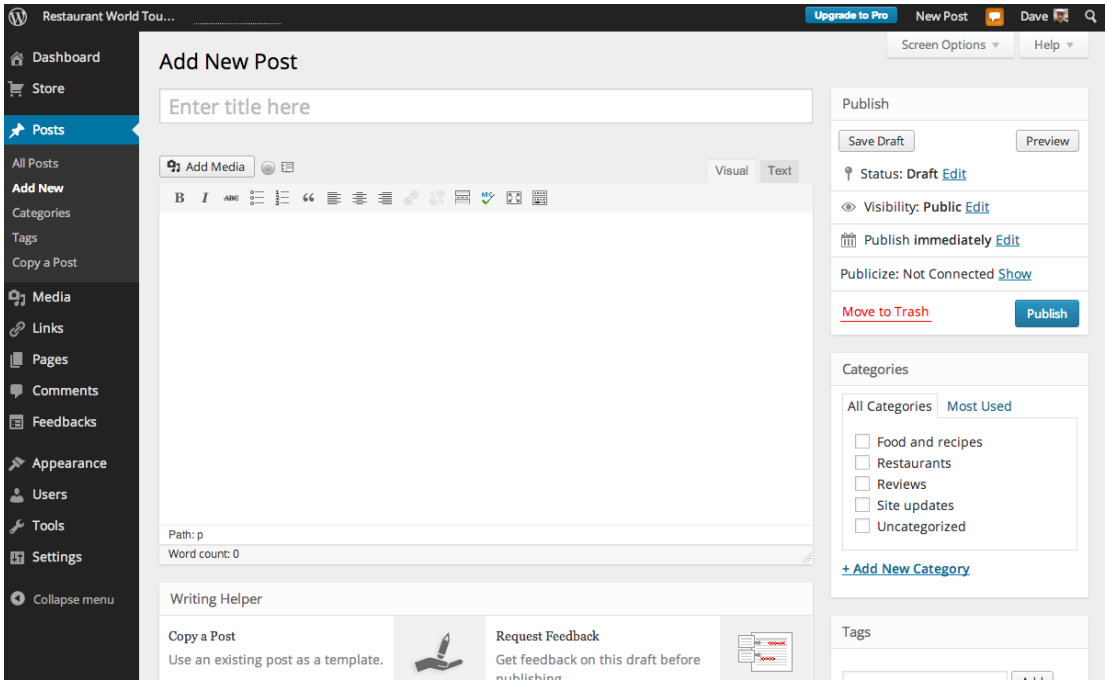


Figure 9.1: WordPresss

The author is identified by his system login, the article has a name and a text. Additional media can be provided for the article, and a predefined category can be chosen. A flexible text editor is featured and can be adjusted to the formatting needs of the target user.

9.1.1 Zeega

Mentioned in a previous chapter, Zeega offers the user a way to connect images, including moving ones like GIF, with audio, into *Zeegas*. The interface is kept simple and the user is provided with a short tutorial.

Figure 9.2: Screenshot of the Zeega Looney (2013) user interface

There are two tabs on the left side of the interface, one is for graphic sources, one for sound. Scenes are grouped into slides, and each of these can be appended with effects like full screen or blending, similar to a megalomaniac Power Point presentation.

9.2 Responding to something

The first step to replying to something is usually the eponymous button, which will then generate a content item that is directly connected to the origin in some way. These can be implemented in different ways, for example nested comments:

Given that the responding party should be registered with our system, a reply form would at the very last require an optional title and a text. Any reply could be expanded to the level

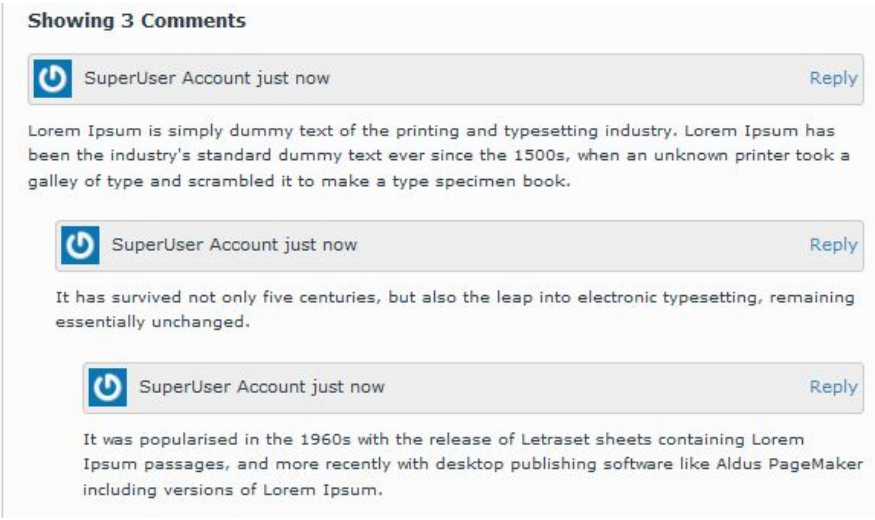


Figure 9.3: WordPresss (2014)

where it was a full-featured article itself, or even further, and a semantic relation could be set via dropdown menu or tagging field, similar to the example of Pinterest.

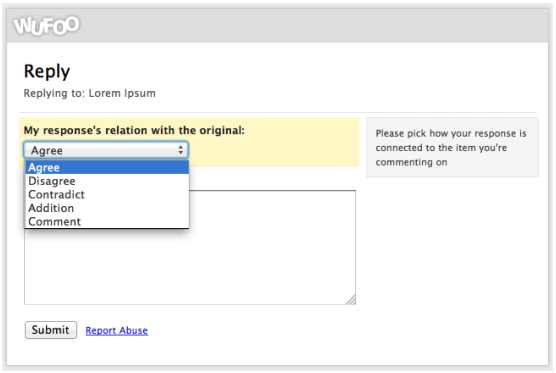


Figure 9.4: Form generated with wufoo Inc.

Another way to interact with something is the basic up- and downvoting as well as giving an article a sort of one-click feedback, usually choosing one option out of a predefined set. These tools are a simple, yet powerful tool of community management: Something that has been downvoted by dozens of users is most likely not worth considering, and something that has earned a lot of *lol*s is most likely funny.

Figure 9.5: Screenshot from forums.elderscrollsonline.com

9.3 Connecting information

The internet is already perfectly prepared for the task of linking information, although this usually only works in one direction instead of two.

9.3.1 Linking

A simple link can be set in any rich text editor or via html by adding parameters to the text. This is usually done by highlighting text, pressing a button and pasting the URL into the specified text field. The linked text will then be displayed according to the web page's style sheet and the linked item will be displayed on click.

9.3.2 Embedding

The other way of linking something into another article is embedding. Although many web content management systems support direct upload of images into articles, others are limited to linking to a previously uploaded (or remotely hosted) image or video, which will then be displayed within the text as specified. Youtube creates code for embedding their videos with a click on a button, which can then be pasted into a text editor.

If one article is linking to another within the system, the information can be made available on both sides of the connection - either by keeping the connections within the article and updating them for both items or by creating a relation between both of them that would be displayed if necessary.

9.4 Sharing

The best way to organize information I've encountered so far is pinterest, a web service that lets you remember items you encounter all over the web. The service is heavily focussed on images, but it has an intuitive interface and an obvious approach at organizing information.

The user can select items that they *pin* to a board. If the user has already created a board, the drop down menu will offer them as selection, but typing a name that isn't used by a board while pinning an item will create the board immediately. The items on the individual boards can then be organized via drag and drop, deleted or moved.

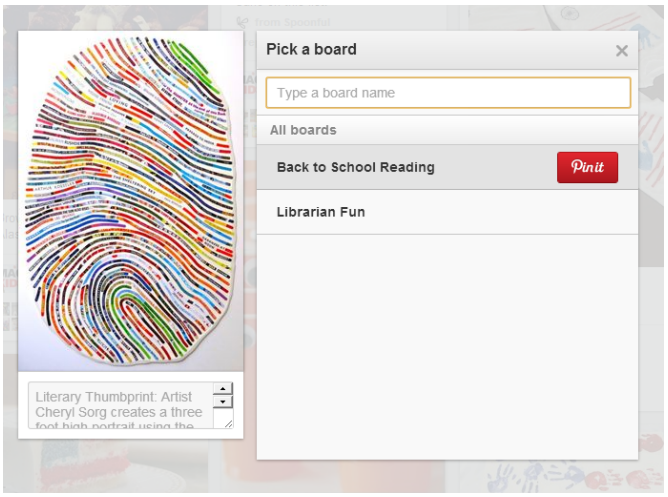


Figure 9.6: Mom

It is possible to connect to friends via pinterest, as there are opt-ins for Facebook, Twitter, Google+, Gmail or Yahoo.

Upon viewing a pin, it offers options to pin it, the link to the original website, the opportunity to send it to friends from the services mentioned above, twitter it, see who else has pinned it and comment on the pins.

The browser expansion *Pin It Button* adds the functionality to images all over the web.

A similar approach would work well for adding media of all kinds to an article. A similar browser add-on could remember for which item the additional material is gathered right now and then directly insert the corresponding information into the system. Additionally, a drop down text field like the pin board choice could be utilized to add semantic relations to the new item.

Figure 9.7: bsamil (2011)

9.5 Location based

Location based services usually include some sort of GPS tracking. A project showing the power of location data is loc.alize.us Media (2014), a project of service provider Ubilabs ubilabs, where flickr images are connected with location data, so that the world can be explored in pictures, or the German carsharing project mitfahrgelegenheit carpooling.com GmbH, which utilizes geolocation services to provide better matchmaking.

9.6 Metadata

Due to the fact that the Google Image Labeler isn't active any more we'll just focus on Facebook's latest addition to their status post box, the activities.

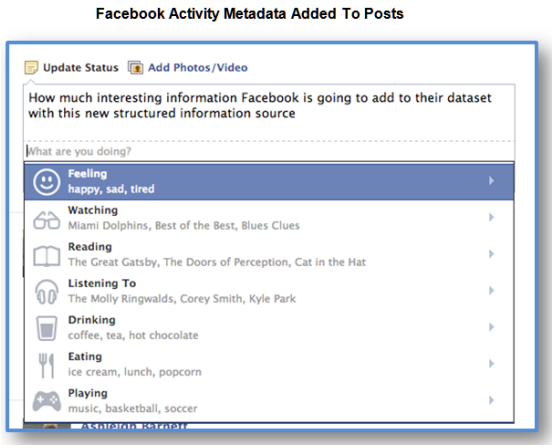


Figure 9.8: Starr

By providing a playful, graphic way to add meta data to otherwise contextless information, Facebook has given users an incentive to do algorithm work and pre-categorize their status postings into different classes. By picking an activity, a usually predefined smiley is added to the status text, optically enhancing it and making it more meaningful. If no matching category

is found, the user can create one of their own, teaching the system the correlation between emotions and at the same time making the categories more precise.

10 Conclusion

Many of the more conservative media companies used to close their eyes and hope that the internet would go away if they ignored it long enough. But by 2014 almost everyone has understood that it won't and accepted the necessity to deal with it.

The challenge for the IT, to come up with a single, brilliant solution that will be so intuitive and obvious that it will become the standard editing and developing tool for journalists and media companies, while at the same time maintaining data security, is not one that has been completed yet, although usability examples and structures can be found throughout the web and are implemented in different places. Analysing and further developing these into a combined system that can satisfy a journalist's every need is opportunity enough to occupy oneself. But there's more. Once we've implemented the user friendly platform and hired a trainee to do the maintenance, can the IT go home and never talk to journalism again? No, we can't, because there's so much left to do.

As previously mentioned, humans and computers have a complementary set of qualities. Although the current generation is considered a digitally native one and acceptance of IT has developed much further in the last generation, computers and their wetware still haven't found an interface that's fully suited to the needs of both sides. Although continued exposure to computers will eventually turn people into nerds, the effects on the silicone side are much less obvious - yet.

But when it comes to collaborating smoothly, there's much potential for improvement. Give a journalist a hard drive full of data - how will they find out which stories are contained within? The current solution to problems like this is manpower. If there's a complex database full of relational data to maintain and keep up to date, hire an army of trainees to do it. But that's not the IT approach - where others think of trainees, we think of robots, and where others think of sleek user interfaces, we think of algorithms.

Although the buzz around the semantic web has gotten quiet in the last decade, information has yet to be made machine-readable. Sorting to a big heap of raw data can't be outsourced into third world countries for the rest of humankind's existence. Tools must be made to help journalists dig through data, and the current implementations fall short, a more sophisticated shovel is required.

Data mining technology is a field that needs improvement. When it comes to the files that need to be sieved for gold, what methods promise the most success? Is there any way to filter the facts from the fluff?
How efficient are the algorithms in guessing what a human would want from a pile of facts, and how efficient are they in stripping away everything unnecessary? How is the original data chosen, what is necessarily kept and what is not, and who decides what's wheat and what's chaff? How is the data reduced, transformed, and optimized?
How do algorithms scale? If the calculation time is growing with more data, is it possible to reduce it, perhaps pre-filter the data in a way that makes it easier to process the smaller chunks? Or is it better to handle everything at once, perhaps because the algorithm can learn and become more efficient while it's at it? Can the experience from past searches be used to make future ones more precise, more predictable? And if it doesn't, is there still a way to keep the calculation times short, perhaps by adding more resources?
Is it possible to create patterns from human behaviour that are precise enough to do the time-consuming part of the calculations beforehand? Which format is required for the output, and who determines the parameters?

Another field for IT research is interoperability. Different systems will be made compatible with each other, and due to the human nature this can not be achieved by making everybody using the same standard, but instead by introducing a common semantics and creating means of translation from one API into another.

Being the fastest is often what matters in journalism today, because being the first usually means being the primary source, which equals links, which equals page impressions. That's why many are aiming for the earliest time stamp instead of the best article. An approach to sort news by quality rather than by speed is another valuable goal that we have yet to achieve - and it's only the final step of a long chain of equally important discoveries. How do we measure the quality we prioritize by?
The current measurement unit is the page impression, which causes a high quantity of click

bait waiting to waste everybody's time. Given the fact that this standard has been developed by the public (advertisers and marketing people, who jumped at the opportunity to turn traffic into money), perhaps someone with a less economically centred perspective could come up with something more significant.

In many corners of the world initiatives are taking place to close the bridge between digital and traditional media, as the aforementioned Digital Roadmap New York as well as the New Media Initiative in Hamburg among countless others, working on the problems mentioned above. Since there is so much work to do, there's plenty of opportunity and challenge for specialists from both sides, content as well as technology.

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Hiermit versichere ich, dass ich die vorliegende Arbeit ohne fremde Hilfe selbständig verfasst und nur die angegebenen Hilfsmittel benutzt habe.

Hamburg, 15. September 2014 Ewa Baumgarten