1 Introduction

"As a rule of thumb, the more human your job feels, the safer it is" - Kotecki, 2015

In 2015 MittMedia Company, which owns 19 of the Swedish newspapers, launched their first robot journalists and their tasks were to produce weather news and sports reports. As a result, the debate in Sweden among journalists does not differ much from the World debate outside Sweden. Will robo-journalists replace the labour of human-journalists? What are the consequences of having a robot journalist? How about the quality of newly written news articles? Will automated journalism assist journalists or not? Why are some technologies forcing journalists to lose their dream job?

It has been more than 10 years since Thomson Reuters announced for the first time that it would use algorithms to produce financial news stories in less than 0.3 seconds after receiving the data (Momus, 2006). The trend of automated articles is moving faster than ever before. Just tell the software the topic you want and you will have it written within seconds with less errors than human journalists. The advancements made in jobs regarding robot technologies and artificial intelligence will change the very nature of the work, itself. Some will be lost, some will increase, and others will be entirely new creations (Watry, 2016). Technological developments have always assisted journalists in the newsroom by making journalistic labour more cost-effective and cheaper. By the same stroke, however, it reduces the staff. Technologizing the workplace could force journalists to do more work in less time as well.

Tilburg University launched its first Master's Degree Program in Data Journalism. The program focuses on data retrieval, data storytelling, data visualisation and data publishing. This reflects that the once distinct fields of journalism and computer science are growing closer to each other more now than ever before (Grimm, 2010).

1.1 What is automated journalism?

According to Tow Center for Digital Journalism the first story written by algorithm was created by Yale University over 40 years ago.

The innovation of automated journalism technology is still in its nascent stage. During the last ten years, and with the use of algorithms, the profession of journalism continues to change significantly (Napoli 2014; van Dalen, 2012; Pavlik, 2013; Broussard, 2014). The media

industry has started to use algorithms to generate news from structured data and without human intervention, for example, when Associated Press started to use an algorithm with Wordsmith, a software tool developed by Automated Insights, to produce earnings reports. Algorithms have shaken journalism industries because of their ability to create thousands of news stories for a specific topic and even make fewer errors than human journalists, which led to the question whether algorithms will gradually eliminate the work of journalists, altogether. At the same time, media managers see it as an opportunity to increase the productivity and the quality of the work in less time, and with the extra bonus feature of being able to offer personalized news to individual readers.

Now we are witnessing the intersection of big data and intelligent robotics, enabling us to analyse large amounts of data. Such innovation of automation may entail an element of risk to the journalism workforce (Marr, 2013). With the increased proliferation of structured data, such as spreadsheets and databases, this automation is only sure to boom. However, we must not mistake data for information. Ultimately, robots will end up summarizing our data. Investigative journalists need to know how to acquire, clean, and collate structured data into "structured information" in the new digital age.

Meredith Broussard, a Data Journalism professor at Temple University asserts that we tend to forget that data collection systems are implemented by flesh and blood humans and are therefore prone to error. (Broussard, 2014). Computers can process millions of rows of data and produce thousands of reports or news articles much faster than humans. (Ivancsics, 2015). Even the most creative jobs have an element of repetitive routine to some of their tasks. These are specific tasks that could be, otherwise, performed better by a machine, for instance, than a reporter. As a result, the field of journalism must change.

Noam Lemelshtrich, dean of the Sammy Ofer School of Communications at the Interdisciplinary Center in Herzliya, Israel predicts, "... the new leader of the newsroom will not be the experienced journalist… but the computer engineer." However, there is the fear of economic ramifications that force media organisations to venture into robot journalism. Automating reports for most media organizations could mean two things: a reduction of the reporter's workload and accessibility to newer data recourses (Lecompte, 2015).

Automated journalism refers to algorithm journalism (Dörr, 2015) which is synonymous with robot journalism as well (Oremus, 2015). Robot journalism and automated journalism or even

machine-written journalism are used in the same sense (Anderson, 2012; Carlson, 2014). Algorithms can create news stories from structured data and automatically deliver them. It shines when the topic is repetitive and the data is available on demand. Right now, algorithms are generating sports reports, financial news, and weather, including such sensitive content as Earthquake alerts.

In this study I will use the term robot journalism and automated journalism synonymously if and, if necessary, algorithmic journalism as well.

1.2 The inevitability of Automated Journalism

"Everything that Can Be Automated Will Be Automated" -Shoshanah, 1981

It is not hard to imagine that human journalists will be replaced by software in the near future. In fact, this transition exists already. Editors have been replaced by software editing programs. Stories will be increasingly generated by robot journalists in the near future. Maybe production is all about the volume of articles these days. But in the future the focus will be more on the richness of the content produced by the joint effort of both the data resulting from algorithmic journalism and a yet necessary human finishing touch.

James Kotecki, head of communications at Automated Insights (AI) - an American-based technology company behind the Wordsmith template, which generates thousands of personalized articles and transforms them into readable narratives - has described his role as that of reassuring journalists. Kotecki claims that he is not aware of a single job that technology has displaced. However, no one knows how the future looks because everything is evolving so very quickly. The ability of algorithmic software to, furthermore, generate multiple versions of tailored content makes the news even more powerful and personal (Sharman, 2015). The recap of sports events, for instance, could be written in an enthusiastic tone for fans of the winners and, alternatively, in a more sympathetic tone for the opposite market (Graffe, 2016).

1.3 Aim of this study

This paper aims to discuss the context of robot journalism, the consequences of the future of journalistic labour from the perspective of media professionals, the pre-existence of robot journalism, and its changing content. The field is, fundamentally, in the hands of two groups

of people. On the one hand, journalists collect and present information while, on the other, media managers establish the criteria, not only of the output of the journalists, but also of the target audiences. These are two areas of journalism that journalists, themselves, often have no say about. This paper will study the contrast between the qualitative approach of the journalist population and the quantitative perspective of the media managers.

It questions the career and professionalism of journalists and their core skills as well as the role of academics and professionalism in this knowledge field, touching also on the introduction of new fields of academic studies. Included is a brief treatment of the implications of these new tools.

The purpose of this study is also to discuss the concept of automated journalism in relation to professionals working on editorial desks or in development for Swedish media outlets. It is a study of people who work within journalism production. The object of my pursuit will be the people, their perceptions, their experiences, and ideas as related to automated journalism. I present not only the harmonic collaboration of roles but, as well, the contrasting features of those roles that define the division of labour and the distinct perspectives that drive this definition. Naturally, differing perspectives come with different feelings about the nature of the business.

1.4 The research questions

Will robo-journalists replace the labour of human-journalists? What are the consequences of having robot journalists? Do new and traditional journalists need to learn new skills? And how about the quality of robotic text? These are the main research questions, that this study tries to answer. These question could be interesting for the development of mass communication education or other studies of journalism, in order to arm new journalists with new knowledge of new techniques that shape the tasks of journalism today. New journalists need to study data processing and programing in addition to traditional journalism. This would raise their level of confidence to be able to work in this ever-evolving field instead of merely studying theories.

1.5 Thesis outline

The following chapter *Previous Research Studies*, presents three different studies on algorithmic journalism. Chapter three, *Theoretical Framework,* delves into digital media theory, and frames the present study. Chapter four, *Material and Method*, describes how the

material was gathered and the methods chosen. Chapter five the *Analysis,* outlines the data analysis. Chapter six, presents the *Results* of this study. Chapter seven, the *Conclusion*, will be a summarising of the findings, a comparison of the analysis, and an evaluation of the findings.

2 Previous research studies

One of these studies, by Arjen van Dalen (2012) describes how machine written news has made human journalists wonder about their core skills. This causes them to attempt to re-examine and re-define them. Dalen's study explains in four different categories, how journalists see their skills and their future in light of the development of automated journalism: as strengths, as opportunities, as weaknesses, and as threats. He states that "new technologies have always been met with overly optimistic or pessimistic scenarios" (Dalen, 2012).

In a small-scale pilot study, by Christer Clerwall from Karlstad University (2014), the focus was on both the text as well as the message. His study contained three stages: a pre-test, a small test of a survey, and a pilot test. Clerwall had two research questions. The first question was, "How is software generated content perceived by readers with regard to overall quality and credibility?" And the second was, "Is the software generated content discernible from similar content written by human journalists?" (Clerwall, 2014). The participants assess the article for objectivity, reliability, accuracy, boredom, level of interest, readability, clarity, informativeness, literary form, usability, descriptiveness and coherency. He finds that the software generated content is perceived as descriptive and boring but also considered to be objective, accurate, and trustworthy. On the other hand, the text written by humans is perceived as pleasant to read, of higher quality, higher coherency, and better written. The study raises a new question - whether the differences between human text and software generated text is significant, and finds that it is not. From this Clerwall draws the conclusion that the study indicates that the software is working well or possibly indicates that the journalists are doing a poorer job, or perhaps both.

Andreas Graefe (2016) from the University of Munich, illustrates how humans react to content manufactured by a software application. He finds that the results from his study agree with the previously referenced research study conducted by Clerwall, namely, that the text generated by machine is perceived as being more credible than the text written by a human. It

also agrees with the previous study that human written text is received with more pleasure than the text generated by a machine. But Graefe asserts, as an explanation of sorts, why readers feel bored when they read text generated by a machine. He posits that initial applications might produce more boring content, such as sports and finance reports, because of the ease with which such data lends itself to unattended composition. Another explanation for the boring style of the text is that there might be a general dissatisfaction with some of these topics (Graefe, 2016).

3 Theoretical Framework

Audience behaviour has been transformed and they are consuming more information than ever before. Facebook, Twitter, WhatsApp, or Snapchat, are examples of different channels that audiences use in order to gather new information. Journalists and audiences are doing more things together in the "era of the active citizen" and that is why journalists cannot ignore their readers preferences anymore. (Newman, 2015). Is this why we need another concept of journalism? The concept of automated journalism? What does this mean for journalists? Do we then need to redefine what journalism is? What are the benefits and downsides of using robot journalism? Will there be a need for professional human journalists in the future?

Technologies work side by side with journalism and afford journalists and news organisations major benefits (McNair, 1998). A growing number of studies guide us to understand this transformation of the newsrooms (Bardoel, 1996; McGregor, 1997; Cottle, 1999; Garcia Avilés and Léon, 2012; Boczowski, 2004). The introduction of computers in the 1980s required journalists to learn more skills in order to do their jobs (Garrison, 1999). One of these new transformations in the digital age is multiskilling, which means the ability to record, edit, and write up interviews for broadcast, newspapers, and online - a new trend in news organizations (Rintal and Suolanen, 2005; Chung, 2007; Ursell, 2011). Journalists need to be concerned about developing diverse skills as well as to cope with different kinds of responsibilities (McNair, 1998). It is the economic situation that has led media organisations to think about multiskilling (McGregor, 1997).

Digitalisation has greatly affected the individual journalist because it raises a question about the quality of journalism. The journalists should interview, take pictures, and edit or design their own content. In essence, journalists' multi-tasking, in order to keep their jobs, has led to a decrease in the quality of journalism. The load and the pressure on journalists requires them

to research less or even face less editorial control. The speed of publishing material is still important (Apstien, 1973; Tuchman, 1972; Altheide, 1976; Cottle; 1999; Scott, 2005). This has sparked a debate on whether multiskilling actually leads to de-skilling journalists, as well. On the other hand, there are those who highlight the positive aspects of multiskilling journalism such as offering journalists more flexibility (McGregor, 1997), producing a variety of types of content, control over their own tasks (Wintour, 1989).

3.1 Media managements and new technologies

Journalism has always been an enterprise of innovation and new technologies, and journalists have been always aware of this (Örnebring, 2009). New technologies are changing the way news is produced as well as defining media outputs (Ursell, 2011). It is shaping the relationship between news management and journalists including their many audiences as Pavlik (2001) states. However Journalistic labour experiences continuous change due to the commercialisation of the media industry (Paulussen, 2012). "The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres" (Schwab, 2016).

3.2 Algorithm and the audience

Today's introduction and integration of the new technology into a typical media organisation does not require that everybody use it, however, they do (Karlsson and Strömbäck, 2015). The competition amongst media organizations has resulted in the economizing and diversifying of their products and services. The use of algorithms enables tracking users using the data they leave behind in order to tailor their news for them (Keeney, 2015). But in this case Keeney wonders if the news organizations will take responsibility for the story or if the automated technology will assume liability?

Journalists claims that their technological tools are supposed to save them time but, at times, they don't. The load and pressure on journalists forces them to oversimplify their product. On top of that, newer technologies are constantly driving economic and organizational transitions in the workplace (Örnebring 2010). Now, with the emergence of online journalism, there are

yet newer changes in the routines of journalistic tasks and practices. Journalists can now produce interactive, personalised, hypertextual, and interconnected reporting. We have a "better form of journalism" (Pavlik, 2001; Kawamoto, 2003).

Thus, 'roboticizing' media outlet aims to assist journalists to do more journalism and process less data. Robots take no holidays, miss no deadlines, and produce well researched content, even learning from their own errors along the way. Kris Hammond said to Narrative Science in an interview, that more than 90 percent of news production in the US will be automated by 2030.

Automated journalism has the ability to fine-tune the news by 'harvesting' content criteria from the consumer's computing environment. In fact, this could effect a filter bubble, of sorts. However, summarising such raw data into words could be parlayed into an enormous value, such as in the case of, Great Call Link, an application service using Natural Language Generation (NLG) developed for the families of elderly people to collect information about them and summarize it, including location information directly from public GPS sources.

3.3 The ethics of automated journalism

Robot journalism is here, today, in a tangibly measurable way. On the other hand, however, and in order to face the ethical challenges inherent in algorithmic journalism, there are many reasons why robot journalism cannot completely replace journalists. More so, automated journalism cannot manufacture the requisite atmosphere to inspire readers' emotional reactions, such as laughter, or to catalyse a secondary action, and so on. Neither can robots be creative. They cannot go out and conduct interviews with people, for instance. We know that organizations, and not their robots, must be held responsible for any computerized mistakes. Another challenge is that robots cannot distinguish between the data from news and from advertisements and marketing (Matthews, 2014).

The whole idea behind robotic journalism is to liberate journalists from their routine tasks, such as the mundane, repetitive action of generating earnings reports. Human journalists should still prescribe the specific sources from which robots should glean their data to prevent them from including irrelevant sources.

4 Material and Method

This section will include the choice of topic, methodological approach, the collection of data, and an introduction to the participants.

4.1 Choice of the topic

In order to understand how technology transforms journalism labour, we need to understand the implications behind it, whether the technology assists journalists, or works against them? Why do some new technologies trigger layoffs, forcing journalists to lose what might be their dream job? Automated journalism has become an example of a new technology that has developed fast, now growing even faster. Today, the demands placed on journalists, in most cases, are more about speed and flexibility and about accepting less than favourable conditions of employment. All the while, the readership continues to desire a high level of journalism and they increasingly desire it on demand.

Journalists have not the power to influence their employers regarding work conditions, and trying to would only exacerbate the situation. The use of this technology by media management, in order to increase the production of journalism and save money by releasing journalists from their work in the same time, engaged me in this topic to research automated journalism. The study draws on qualitative interviews with media professionals by assessing working experiences, viewpoints and reflections on automated journalism.

4.2 Methodology

Having a methodology is like "having a plan of investigation" (Garson, 2002). The Qualitative research method is seen as a tool to achieve the necessary level of detail. Qualitative research enables the researcher to develop an in-depth understanding of the topic through techniques that have been used (Garson, 2002). It provides a more valuable amount of data because of the attractiveness of its richness (Bryman, 2012). The qualitative methodology lets the observer (researcher) focus on intersubjective meanings and to discover what he calls, "many true meanings" (Garson, 2002).

This methodology makes the researcher reflect on the diverse thoughts and opinions of a variety of people that are studied. The role of the researcher here is to moderate the interview meeting and observe and see things through the eyes of the people being studied. Face to face

interaction is the main characteristic of this methodology (Bryman, 2012). However, the problem of qualitative research is its subjective nature. (Garson, 2002).

The qualitative research methodology tends to be fairly structured while providing the interviewer with the flexibility necessary to avoid obstacles. Considering the time constraint of eight weeks - including the practical part of such a thesis involving the limited data extant in such a new field - this methodology also works well in saving time.

4.3 Data collection

This study engages three interviewees. The in-depth interviews took place in the first and second week of April and the first week of May. They were recorded and transcribed, and the data was summarized immediately following the interview. No problems were encountered in reaching the participants and they were positively set for the interview. Email was successfully used to achieve rapid responses from the interviewees and one participant was contacted through Facebook. Totally, I contacted five people by email and I received an response from three. I was unable to connect with an international participant for my study, specifically one working with big data or one working as an investigative journalist here in Sweden.

4.4 Selection of participants

This study observes three professional participants in the field of journalism, two male and one female. The selection of the participants was driven by their positions to present their different roles and experiences. This enabled me to study media management's perceptions vis-a-vis the journalist's perception about robot journalism. All names, workplaces, and details that may reveal their identity have been concealed and the subjects will be referred to, herein, as Helena, Fredrik, and Tomas in order to protect their anonymity. The participants are located different parts of Sweden.

4.4.1 The participant Helena

Helena, age 37, works for a daily medium-sized, newspaper that owns xx newspapers in Sweden. She worked as a journalist many years in different countries but mostly in Sweden.

4.4.2 The participant Fredrik

Fredrik, age 39, is a journalist working for one of the biggest news organizations in Scandinavia. Fredrik has a management position in this organisation and is involved in developing robot journalism that produces more personalised news.

4.4.3 The participant Tomas

Tomas, age 34, works as a strategic developer in one of Sweden's leading media houses which owns xx newspapers. Tomas is a former journalist who now has a management position. He is involved in operating a robot journalist for producing weather and sports reports.

5 analysis

This section will elaborate on the process of analysis and explain how the data was processed and later collated. Following the recording of the interviews, they were transcribed and carefully edited. The analysis of the material was summarized, categorized and tuned to the specific topics from which conclusions are drawn. This was done in a descriptive way by creating tables of themes/categories that cover all the topics introduced by participants throughout the interviews. Next, the key statements that will support the empirical section of the thesis were selected. The citations presented have been edited from the original vernacular of the language to improve readability. The analysis will be structured around these three categories: *the intensification of news production in the workplace, the media management and the audience, the impact of automated journalism and its consequences on both journalists and the production process.*

5.1 Intensification of production in the workplace

In the digital age, fewer journalists are producing more journalism than ever before, and with different tools. This adds volume to the content being produced.

Journalists currently work with many diverse tasks at the same time. Digitalisation has had an impact on the production of journalism in that it has evolved multi-skilled journalists, (Helena)

Journalists are not necessarily photographers, but they can learn how to take photos and shoot videos. While not necessarily aiming at aesthetics, the new polymath journalists aim more for accuracy.

It benefits journalism that the new journalist personally takes pictures for original material and also edits the copy. It puts more control over the content in the hands of its author, (Helene)

An important aspect of the idea behind automated journalism is to facilitate fact finding. This helps journalists save time while at the same time to produce more material with better quality sourced data.

If you live in a small village you can see there are only a few news articles, so we need to produce more, (Tomas)

This is all about improving "journalistic productivity" as well as the personalisation of news stories.

..., if you look at Facebook, it is personalised for you. Twitter as well, (Tomas)

Many journalists now suffer from time constraints when trying to do good research. Algorithmic journalism proposes to assist journalists to produce more feature and investigative stories. The dual impact of automated and personalised news leads to an increase in news production, which I will present in the next section from management's point of view, as well.

5.2 Audience and media managements perceptions

Automated news, by its tuning of content to the specifications of an individual reader is one way to improve and increase the productivity of journalism.

I believe that human beings have individual needs, (Tomas)

The manufacturing of content by way of automation, as well as other time-efficiency enhancements to assist journalists with precision research could help consumers by producing hyper local material such as a housing crisis report for a selected city in Sweden.

*We journalists feel that automation is interesting for us as well… producing short stories to find some way, using infographics, to illustrate population development or how the city of Örebro compares with Laxå in the context of a housing crisis, (*Fredrik)

One way media management competes for their audience is by customising news stories. In this sense, media management asserts that every individual person has specialized needs and interests and should receive news that specifically interests them. In the next section, I will present why audience behaviours have changed in the consumption of news, and the consequences of automated journalism.

5.3 The consequences of Automated journalism

This section presents the emerging consequences of automated journalism in terms of the way changes in consumption behaviour are perceived by media managers, a decrease in the journalistic workforce, the pressure on journalists, and the introduction of new journalistic skills.

5.3.1 Management perspectives on evolving consumption behaviour

The consumption of news has morphed in behaviour from a manner of traditional paper logic to that of a newly defined digital media logic.

I took myself and my behaviour as an example. I no longer read paper-based news nor do I watch news on TV, and I was a news editor at one of the biggest newspapers here in Sweden, (Tomas).

Contrary to digital logic, paper logic empowers the editor to select the news for the consumers.

The digital logic is a new logic, and you cannot take the paper logic or broadcast logic and put it on digital media logic, (Tomas)

We have many ways to compose and produce stories in the digital world, implementing such tools of illustration as infographics, interactive maps, and digital timelines, instead of the monolithic approach previously observed in the paper format.

We broaden our competence to tell the news, so if we used to tell a story only in written text, now we tell it in newly different ways, like digital timelines, interactive maps, or life blogging, (Fredrik)

Traditionally speaking, audiences consume what is presented to them. Nowadays, audience behaviour newly reflects that they have more freedom to select varying kinds of news content from diversely programmed channels affording them the opportunity to consume precisely what interests them. As a result, media managers have had to develop their own ways to produce news as well learn to use different tools.

5.3.2 Reduction in the workforce

Because automated text can be personalised, Tomas is sure that the majority of articles in the future will be automated. Journalists cannot write personalised news for everyone but a robot can do this effortlessly. However, Robots are limited and they cannot produce analysed text nor write about feelings.

There are many things that unemotional robots cannot do, for example, write a text with feeling. They produce very standardised text, (Tomas)

Robots cannot analyse if they are presented with simple binary tasks based on simple case scenarios such as "if this is true, then do that". However, according to Tomas, the automated text will grow better over time and it will be able to write complicated text if the robot could be trained (programmed) how.

Robots cannot analyse how the football games turned out, or why it ends one way or another. (Tomas)

In any case, robots can be tuned by feeding them more algorithms to analyse football matches or to interpret feelings, and even to imitate emotional behaviour.

We have made a robot that can identify if the text is positive or negative. The robot can actually scan social media, relate such findings it to a targeted event, and see if the attendees had positive or negative perceptions of the event. Ultimately, the robot can identify the majority of such a binary case and write an appropriately oriented text, (Tomas)

The robots are simple today and they write weather alerts and reporting on sports and traffic accidents. But, as Tomas, mentioned robots can be better during time. This alone could replace most of the editors in the newsroom.

Robots can supplement editorial work, but they cannot replace the editorial decision, (Fredrik)

However, for Tomas, this is more of a philosophical question, whether the robot could take a job away from a human journalist. He rather sees it as a complementary tool in order to achieve better or at least the same quality as can be produced by human journalists. Saving time is one of the important reasons to install such software. According to Tomas robots cannot replace good journalists.

I have said to my employees that if you think that you can be replaced with a robot journalist, you should perhaps have already left your job by now, (Tomas)

In the end, Tomas admitted, that professionals must evolve in order to successfully work alongside robots.

In fact, we don't know how it will end, so humans will probably end up becoming best at what robots will never be able to do, (Tomas)

Helena, for instance, has become familiar with these techniques of editorial applications. For her it is more about media organisations wanting to save money from layoffs. She does not see it as a supportive tool only to save time.

Most of the newspapers today have an editorial computer system, which enables us to type directly into the software and have it imported automatically into to the InDesign program, but they are very limited and hard templated. They also cost an arm and a leg and they do not really save that much time, (Helena)

She points out that these smart software companies are good at seducing media management to buy their products.

If you buy this product, you will cut out five editors. Company management does not really understand how things are done in the newsroom but they decide anyway to buy the products and the results will be that they will kick the employee out, (Helena)

Helena raises the issue of the condition of journalistic labour and how journalists become threatened more today than ever before because of the new techniques. According to her, co-workers in her newspaper, journalists and editors alike, do not want to deal with any editing software programmes. In addition, she insists that journalists are growing hostile to such technologies.

These big media concerns go for profits and they have share dividends each year. I remember when I worked as a journalist for one of the Swedish newspapers, we always received peppy emails from concerned management, that we have increased our profits. One week later they kick two people out to earn more money, (Helena)

Managers and journalists look at robot journalism differently. Managers, for instance, consider this new technology as a complementary tool that helps journalists to better do their jobs. They do not imagine that such a limited and simple tool as a digital robot, from the perspective of doing tasks, will replace human journalists, but rather save them time. Robot journalists, here in Sweden, are new and simple. They produce weather alerts or sports recaps and managers claim that a human journalist cannot be replaced by a robot because a robot has not the ability to analyse a football match, for instance. What management can acknowledge is that robots are able to excel over time if they are fed greater complexity through advanced algorithms.

On the other hand, journalists in Sweden experience much stress and they have much work to do. The consensus among journalists is that a robot can, indeed, replace them. This is because it had happened earlier when managers had bought editorial software programs from companies that make media development tools. Human journalists are convinced that media management wants more to save money rather than save time.

But saving money by reducing the staff of journalists has its consequences, not only for

journalists who are left without a job, but for those who are still working in the same place. They are immersed in a pressure-driven workload and cannot see that these robots will save them time.

5.3.3 The condition of journalism

Helena criticised how media management makes such a decision to replace a journalist with a software tool. According to her, journalists have no power to influence their own employers.

People are reading more and more on the Internet and we have not found a way to get people to pay (Helena)

Helena argues that journalism for fee is, in a sense, guaranteed to be delivered. But because of the time and effort still demanded by 'for free' journalism, sponsorship is still necessary.

That is why, I think, we need to find a micro payment method, but this issue is yet too complicated. Journalists must realize that these media companies buy very expensive software or robots to make the work easier. They do it to earn more money. (Helena)

Journalists become resentful and fatigued because of this ever-evolving industry which does not give them any kind of security or job guaranty. On the other hand, Helena tries to understand the whole economic situation. The micro payment method would be a solution for selling articles and journalism should not be free according her.

5.3.4 The pressure on journalists

Referring again to the older paper logic, journalists have different roles in the production of journalistic material. Journalists often work in teams. Alternatively, digital media logic rewards journalists who are multi-skilled and work more independently. However, multi-skilled journalism has its downsides, such as the constraining of research time and limited opportunities for post-production proofing.

You should write your own version for print and your own version for the newspaper's website, and you should take photographs by yourself. Sometimes you should even produce a segment of a web TV program. And, all of these tasks are considered to be one assignment, (Helena)

The multi-skilling of journalists has increased the need for employee journalists who produce at least the same or more product in less time. Helena argues that quality of journalism suffers along the way.

When I started working I had to deliver one article every two days. Today, a journalist must deliver two or three articles each day. We have worse journalism today, (Helena)

For Helena it is not difficult to handle only text. She mentions, as well, that journalists should produce more than one article per day. This dilutes the quality of journalism because of the added pressure produce more volume. According to her, most articles contain only one source; a press release, and one interview. Sometimes journalists take only the citation from a press release.

This would have never happened when I started working, to merely copy and paste a citation from a press release, (Helena)

However, Fredrik states that having constant deadlines is not a new thing. The new thing, rather, is telling a story in many different ways and that places pressure on the staff resulting from the shortage of journalists these days. This compels the newsroom to compromise on what will be able to be accomplished and what will not.

We can provide the reader with different levels of depth. We can point the reader to the essential raw material, to the sources, themselves. Of course, this is also time consuming and adds additional pressure to all journalists working in the field today, (Fredrik)

On the other hand, Helena insists that to be a multi-skilled journalist is no easy task. The requirements on journalists remain that they should be skilled investigators, well-read and informed journalists, proficient photographers, comfortable with interviewing, and so on.

…but in reality it will be received less seriously and will produce less informative journalism, because few will value the early renditions of its output, (Helena)

The overall situation and the pressure on journalists, including Helena, herself, begged yet another, follow-up question:

Do you consider yourself to be a multi-skilled journalist?
No! Because, I feel very bad about this word. You are writing, and you are shooting, and you are editing your own pages. I feel that I am being forced to do a lot of different things.

To be a multi-skilled journalist means being responsible for all the material delivered. But the implication of this is that you do not have time to check the facts or even proof read the materials. The workload on journalists and the constant deadlines puts more pressure on them. In Helena's case, she does not like the concept of multi-skilled journalists. She is forced to do tasks that she does not want to do.

5.3.5 Combining skills.

Journalism is a constantly evolving field, compelling journalists to perpetually upgrade their skill levels and, furthermore, to expand their skillset by acquiring new ones. No one knows how the future of journalism will look, but with the arrival of automation, and its requisite programing skills, it behooves journalists to embrace this higher level of technology as well.

If you combine journalism with programing… the future will look much brighter… combining skills is really important, (Fredrik)

Right now, both programming and journalism are becoming very exciting because of their ability to effortlessly and exhaustively manipulate 'big data', which is a huge amount of data. This presents yet another new way of finding information.

If you take into consideration the sheer volume of the data in the "Panama Papers", for instance, we would simply not have been able to handle it, say, ten years ago… Today, however, we have tools that facilitate the casual utilization of huge amounts of data, (Fredrik)

Tomas agrees with Fredrik that journalists should develop a more advanced understanding of 'data' and their output should be more data-driven. In addition, understanding the consumer's needs is very important to Tomas. He suggests to take more seriously the study of consumer needs.

You need to make data talk to them (the users), … in order to make good journalism, you need to make numbers talk to you in order to grasp the users needs, (Tomas)

However, Tomas argues, journalists are susceptible to poor reporting but robot or algorithmic journalism can fix this. But he still acknowledges that journalists need to understand good journalism, which, according to Tomas is:

Good journalism is measurable as well. It is not about what you feel in your stomach anymore.

Tomas insists that journalists should learn what is a news item and what is its worthiness, observing that, "it is worth it when the user thinks it is worth it".

In order to survive in this field or even to work it, combining skills is probably one way that offers journalists, new ones as well, opportunities to find jobs within this field. Journalists should develop themselves and try to learn more about data and even a little about algorithms. Both Fredrik and Tomas see that the future for journalists will be brighter if they achieve these skills. The impact of robotic journalism will be to force innovative solution, creating a new sort of job in the industry.

6 Results

To answer the first question, will robo-journalists replace the labour of human-journalists? The answer is both yes and no. This study shows that media professionals have mixed feelings about the technology of automated journalism. One of the participants of this study who is a journalist answered yes, that the robot journalists can replace editors in the newsroom. Two of the participants who are involved in robot journalism who have because a management position, answered no.

The robots can do editorial work and help us, but they cannot replace the editorial decision, (Fredrik)

This answer shows that the participant acknowledged that yes the robot could replace in fact editors. The other participant answered also no,

In fact, … what people will be best at, probably will be the what robots cannot do, (Tomas)

This answer shows as well that this participant had a difficult time to acknowledge releasing journalists in the future.

This finding answers other question, why some technologies forcing journalists to lose their dream job? Well media mangers have no answer to that while the journalist had a clear answer which concerns saving money through layoff their employees.

To answer the second question, what are the consequences of having a robot journalist? We found there are a lot of consequences about automated journalism. The first finding is about the perceptions of media management about production of journalism that it will increase with using robotic journalism. However, the data shows that production in digital media has been increased already, despite a reduction in journalists. This is because a journalist develops multiple skills and can produce many things at the same time.

The data also shows that, the pressure on journalists has also increased, meaning journalists have no single deadline but a constant cyclical deadline. Meanwhile, the quality of journalism dropped. This study shows that journalists have poor work conditions, and their situation is both bothersome and worrying, to the extent that some even expect to be fired, or replaced because of the introduction of newer technology. This leads to journalists applying less effort towards doing a good job. Furthermore, the amount of work is still the same, which causes a pressure on journalists again. Meanwhile, readers tend to care less about the machine sound of automated reports and such articles.

To answer those questions about the quality of newly written news articles by a robot? And if the robot journalism assisting journalists or not? We found that, these question are depending on each other. If the participants see it as a help tool, then the quality of the piece of journalism will increase, but if not see it as a help tool, the production of journalism only will increase. The findings show, as well, that robot journalism will help journalists in saving time in order to make better quality of journalism. While others, see it as expensive software and not able to save the time that the company's management thinks it will.

The data also showed that the introduction of automated journalism led to or will lead journalists to rethink their core skills and updating them. Both journalists and academia have to think about what journalism is today. Combining skills across programming and journalism

provides a good opportunity to still work in journalism in the future or even to retain their jobs.

7 Conclusion

As Pavlik states (2000, 229) "journalism has always been shaped by technology". The technology is actually not the only factor that changes journalism, however, the economic factors affect journalism as well (Boczkowski, 2004). As a result, algorithmic journalism is incredibly criticized because of the business model that supports it. This new technology has divided journalists into two camps, those that advocate and those opposed. On the one hand, there are those who see it as a tool that assists in the laborious task of gathering data for journalists and lessens the pressure on them, and on the other hand, those who see it not helping as much as media management supposes it does. Van Dalen (2012) also pointed out that automated content compiled through repetitive tasks is perceived by some journalists as a threat.

Because of the limitation of using automated journalism here in Sweden, the study tried to analyse how digitalisation affected the production of journalism in the newsroom, in order to broaden the understanding of how the technology affects journalism, in general. And to also further clarify whether robot journalism is responsible for the release of some journalists. The findings show that some journalistic work can be eliminated not because of the introduction of algorithmic journalism, but rather because of the influence of the digital age of producing journalism. However, robot journalism could be responsible for replacing some journalists, even if not right now or even suddenly - because of it yet struggling through its own early stages of maturity - but quite possibly in the future.

The digital media era and the concept of multiskilling journalists has led to the production of poorer quality journalism, which was personally observed while conducting the practical part of this thesis. This part includes building a webzine that contains a maximum of four feature stories, of course, supported by photos, infographics, sound bites, and a video reportage on the same topic. I observed during this stressful week that there is a big risk of producing less or poorer quality journalism. The findings from this study confirm that which was already experienced by myself, and was confirmed by previous research studies including that which is written in the theories of digital journalism, that more multitasking journalists produce less quality journalism. The impact of the introduction of automated journalism does not differ

that much from that of the introduction of digital journalism, in that both cause a decrease in the quality of journalism, due to the fact that both draw focus to the production of a higher quantity of news.

The software robot is still in its learning phase right now. However, the predictions floating about regarding the replacement of journalists in the future, happens only if algorithmic journalism developed tremendously, such as if it learned to teach itself to produce higher quality journalism without the need of a human journalist to assist. In this case, journalists will probably save time and be able to concentrate more on writing longer stories.

The risk of choosing this methodology is in the potential loss of objectivity, while choosing only three professionals might not be enough to draw a general conclusion but rather a broader picture of the topic. This study may not be representing a large scale of journalists and does not include the audience but rather the journalist's and manager's perceptions about automated journalism. Presenting the views of a large population sample of journalists may yield a totally different result. However, the findings of this study can lead to further research in order to develop a deeper understanding of how journalists experience working with automated content.

This research paper opened with a quote from Kotecki and it will end with the same quote. The role of a journalists has always been to select and filter the facts and then check it and analyse it. With automated text, robot journalism took all of these roles and left only the analysis to journalists, which awakened questions regarding fault if the robot selects a fact that it is not suppose to select or when the robot journalist presents text with some mistakes. Would blame fall on the robot or the journalist and what if there is dual authorship?

I spoke with many journalists for my practical and for my theoretical parts of this thesis and I asked them whether they see robot journalism as a threat or as an opportunity? What I understood - and what this study shows - is that algorithmic journalism is seen as both a blessing and a curse. Another finding, which I think is important for journalists, is that students of media and communication, and in academia, should expedite the development of this field of education within journalism studies in order to stay abreast of technology, a necessary investment due to the rapid pace technology has always enjoyed. A few such master programs within data and programming exist already in other western countries, but we need also to increase such programmes in Sweden as well. Not only as a master program,

but also in the early stages within media and communications studies. In the results, very new technology replaces some jobs but also creates new opportunities for other products and services that, in turn, generate a new breed of jobs. Sadly, these are typically received with either pessimism or an exaggerated welcome. Yes, “as a rule of thumb, the more human your job feels, the safer it is” - Kotecki, 2015.

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9 Appendices

Here are the questions that I used to conduct my study

- **How does digitalization affect the individual journalist?**
- **What are the consequences of multi-skilling journalist?**
- **Describe the current conditions of the typical work of a journalist?**
- **What can journalists do in response to the uncomfortable conditions they experience?**
- **What is robot journalism?**
- **Why drives the need to employ algorithmic journalism?**
- **What kind of text does a robot generate?**
- **What is personalized news and why is it important?**
- **What is the downside of personalized news?**
- **Will algorithmic journalism replace human journalists? And Why?**
- **How much news can a journalist produce each day?**
- **What are people's reactions when they read automated text?**
- **What are the ethical considerations of automated text?**
- **What is the cost of such software?**
- **What can journalists do, going forward, in order to keep their jobs?**