

COMMUNICATING SCIENCE

MOTIVES AND METHODS FOR THE COMMUNICATION OF
SCIENCE IN THE 21ST CENTURY

A qualitative study of selected parts of the Swedish Science Communication establishment, press releases, Expertsvar and the practice of research blogging.

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ABSTRACT

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Title: Communicating Science – Motives and methods for the communication of Science in the 21st century – A qualitative study of selected parts of the Swedish Science Communication establishment, press releases, ES.se and the practice of research blogging.

Background: In today's fast moving world, the communication of science and technology is playing an increasingly important role for the relation between science and the public. Both journalists and researchers have their own agenda when communicating as public interest, corporate science and the competition for funding increases. At the same time, the conditions on which stories about science can be told have dramatically changed with the 21st century media landscape.

Purpose: The motives for communicating science and the conditions on which to do this are changing. There is a gap of academic research on this matter. This thesis will attempt to fill this gap and will do so by exploring new motives to communicate science taking its starting point in existing and emerging practices for both researchers and Universities to communicate science with media and the public. As it takes on a purely qualitative approach, the hope is to lay out a path with suggestions for further quantitative studies.

Delimitations: Science Communication constitutes many different tools through which the communication can mediate. These extend the whole spectra of sensory experience,

ranging from science festivals where one can touch and feel, to documentaries where one can hear and see, to articles and blogs where one can read and discuss. This thesis focuses on the latter, written science communication, mainly because of the changing conditions that have risen as a result of the rise of ICT and the new media landscape. It focuses on the press release as a 20th century tool for knowledge dissemination, contemporary models like ES¹ and more interactive models such as research blogs that have emerged during the 21st century.

Discussion and conclusions: The conditions for researchers, University press staff and science journalists to communicate science to the public have undergone dramatic changes as a result of the evolution of ICT. At the same time, the motives for which to engage in science communication and science journalism are also changing. This part of the thesis discusses the implications of these changes. It can be concluded that a great deal of science reporting has been migrating from traditional media to social media, such as blogs. However, the blog cannot replace traditional media and seems to be better suited for communicating the scientific process rather than scientific results. It also helps researchers to build their academic network and develop their writing skills, which is something that is becoming increasingly important.

As a consequence of a tougher business climate, science journalism is in decline as big newspapers cut their costs by closing down their scientific departments. At the same time, the information bureaus of the Universities are growing. With increased competition for funding and corporate interests in science, the incentives to communicate outwards are shifting from altruistic towards now being more pragmatic. Although, many researchers display an altruistic willingness to communicate what they are doing, some of them have political agendas that may remain hidden due to the lack of balance between the University Information Bureaus on the one hand, and science journalism on the other.

¹ ES (Expert Answer) is a Swedish match-making service, which helps journalists find research opinions for their material.

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1. INTRODUCTION

1.1. BACKGROUND

THE BIRTH OF AN IDEA

During the academic year 09/10 I was living in Madrid as an exchange student. I have always considered myself an information addict. This period of my life surely didn't prove the opposite. I was starting to get more and more fascinated over the vast amount of interesting and inspiring information that was available on the web. You just had to take some time and look. I became more and more addicted to watching talks and seminars on TED.com, longnow.org and other free platforms that exist for spreading valuable ideas to the world. However this also gave me a growing sense of frustration. I felt that here was all this beautiful information about us, the state of our planet and our future challenges, presented right in front of me, and yet, nobody that I knew seemed to be discussing these things. Didn't they know? Hadn't they seen? Or did they just not care? In a way of connecting to my friends and others on sharing these thoughts, I started a group on Facebook. On this group I posted discussion topics such as; natural resources, space exploration, sustainable energy etc. After a while, however, as do many groups on social networks, the activity decreased and never reached past the honeymoon state (as it is labelled in group dynamics and psychology), before it finally died out completely. This made me realise that I was targeting the wrong group of people. The ones that really "live in the future" and have an urge to engage in cutting-edge science and technology discussions, like the ones I was trying to initiate, are in most cases academic researchers. Although this assumption turned the focus of my layman-like research towards universities, the basic idea to initiate a community for discussing global problems, challenges and potential solutions, still faced a major problem. It was not until later (when I formally started working on this thesis), with guidance from my tutor at Lund University, Gustav Holmberg, I realised that it was not a matter of finding the right people for these discussions, but rather choosing the right medium in which the discussions could flourish. Where new ideas could take off, bounce around, and evolve.

As the evolution of my own ideas was growing into something more substantial and tangible, I was also becoming more convinced about the societal needs of a medium to make science more transparent. A place where not only scientists could communicate across disciplinary borders, but also where the academic and non-academic parts of society could meet in a more continuous, transparent and interactive manner.

1.2. PURPOSE OF THE THESIS

The purpose of this thesis is to, from a sociological, historical and technical standpoint, investigate motives and methods for the communication of science in the 21st century media landscape, with emphasis on the practice of research blogging. Data has been collected through synthesis of academic literature, document analysis, a seminar on Science in the Media arranged by the Science Festival, studies made by VA (Public & Science) and semi-structured interviews with a range of stakeholders within the science communication establishment. With an explorative approach, the thesis will study the different models used for the communication of science in text. These include press releases, direct contact researchers-journalists and research blogging. It is important to bear in mind that all these models involve social interactions between academics and non-academics. In what contexts, how and to what extent do researchers use these models as a way to communicate outside of academia? How are these activities related to the researchers general opinion about discussing science with lay people? This reasoning has led to the following questions, which will be explored throughout the paper:

RESEARCH QUESTIONS

- How does the current practice of science communication and science journalism relate to how science has been communicated in the past?
- What constitutes today's motives for researchers and universities to communicate with non-academics?

- In what contexts and how are the tools; research blogs, press releases and Expertsvar.se used in today's written science communication and science journalism?

The conclusions drawn from these empirical studies will also be used as market data for the development of www.sparklingscience.com, with the aim to enhance and facilitate communication and collaboration across national, cultural and epistemic borders, both within and outside of the academic setting. Sparkling Science will constitute a social media platform for scientists, journalists and the engaged public and will not be further addressed in this thesis.

1.3. STRUCTURE

The thesis will start by introducing relevant literature, which will serve as foundation to guide the researcher in the right direction. The two main concepts on which the literature study will be built regards Science Communication and what is generally known as Public Engagement in Science and Technology, which from now on will be represented by the abbreviation PEST. The literature that will be addressed regards Science Communication and PEST approached from different angles, starting with the historical perspective using case studies, while then moving on to current research on Science Communication in general and the research blog in particular. It is a necessity, however, that these topics are closely linked to the thesis' *purpose*. A more detailed explanation as to the motivation for the choice of topics can be read under the section *delimitations*.

PART 1: LITERATURE STUDY

The structure of the literature study will be three parted, starting with describing *WHAT* Science Communication is by giving an overview of how science and society has interacted in the past. It will then describe *WHY* Science Communication is important by referring to case studies on how different research fields can suffer when PEST is lacking. Finally it will try to address *HOW* PEST can be enhanced by reviewing

contemporary research on knowledge-intensive blogs. This will then bridge over to the empirical part of the thesis where the literature will be complemented by insights from the interviewed stakeholders and third party studies made by the Swedish Institution Public & Science (VA).

PART 2: METHOD

This part of the paper constitutes methodologies for the selection of literature and data for the empirical research. The research will be of an explorative and qualitative nature. The little quantitative data that has been used stems from third party reports. Main methodologies used are semi-structured interviews and content analysis.

PART 3: EMPIRICAL RESULTS & DISCUSSION

This section includes synthesis and discussion of literature and empirical results. This process will follow the methodologies specified in part 2 of the paper. The analysis of the research questions proposed under section 1 will be based on the literature study and the empirical insights.

The data will be presented by interpretations and analysis of interviews, e-mail, blog entries, and quotes from recorded seminars and third party reports. The interview material will be complemented by transcribed quotes from this year's plenary session on Science in the Media² arranged by *Vetenskapsfestivalen* (Science Festival) and from third party studies conducted by *Vetenskap & Allmänhet* (VA), and Faculty Focus.

PART 4: CONCLUSIONS

By using the insights from the last section this final part will try to shed some light over the research questions introduced under the introduction. It will also give suggestions for further research.

APPENDIX I

Three different interview guides have been used for the semi-structured interviews; one for the interviewed researchers, one for the journalists and one for the press staff at Lund University.

APPENDIX II

Includes a list with information on all the people interviewed.

² <http://urplay.se/164621>

1.4. DELIMITATIONS

Science Communication is a broad field covering many different tools through which the communication can mediate. These extend the whole spectra of sensory experience, ranging from science festivals where one can touch and feel, to documentaries where one can hear and see, to articles and blogs where one can read and discuss.

Because of the versatility of this communication tool-box, delimitations needs to be made in order to be able to reach substantial insights that can fit within the scope of this paper. The thesis focuses on written science communication, mainly because of the changing conditions that have risen as a result of the rise of ICT and the new media landscape. It focuses on the press release as a 20th century tool for knowledge dissemination, contemporary models like ES³ and more interactive models such as research blogs that have emerged during the 21st century. It would be in place to mention that because of the blog's highly versatile nature it cannot simply be lumped into one category of written science communication. Due to the ability to link to and embed external content, blogs are many times used as portals for all kinds of media, such as video, audio and text. However, this was not the case in the early days of the 21st century when the blogs first started appear. Blogs are also versatile in the sense that they are not restricted by editorial guidelines. The look and feel of a blog can differ greatly, depending on the writing style and personal agenda of the author behind it. Many researchers also use blogs to communicate with their students or discuss purely personal issues. What is discussed in this thesis, however, only relates to the communication and promotion of science to media and the public, and does not involve the communication between researchers and their students. In relation to blogs twitter is often used to promote content. With this said, twitter as a tool for science communication has not been studied in this paper.

³ ES (ES) is a Swedish match-making service, which help journalists to find researchers to interview or provide quotes for their material.

1.5. CONCEPTS AND ABBREVIATIONS

1.5.1. CONCEPTS

SCIENCE JOURNALISM

Compared to investigative journalism, which strives to reveal truths and expose unethical behaviour, science journalism strongly identify with its sources (scientific results) without questioning. According to Meyer, the contract between scientists and science journalist has always been very strong, which is also the main root for those who criticize it (Meyer, 2006).

Today, this definition aligns more with the view of 'traditional' science journalism, which views journalists simply reporting about science. But as science is no longer a disinterested activity and increasingly involves political and corporate agendas its relationship with science journalism is changing. Thus, science journalism is an evolving concept and there are more definitions on what it should be rather than on what it is. This is something that we will talk more about this under *section 2.3.1*.

SOCIAL MEDIA

Social media is a term that is used extensively by stakeholders of the new interactive web (also referred to as the web 2.0). A recent definition of the concept is given by Andreas Kaplan and Michael Heinlein (Kaplan & Haenlein, 2010): Social media can be seen as *"a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content"*. Compared to mass media, social media promotes dialogue and is highly interactive.

TRADITIONAL MEDIA

Can be defined as everything that is not social media and that involves one or several information brokers, such as journalists, PR people or other stakeholders in the content creation process. These stakeholders can act to modify the information before it is presented through broad casting or what is normally referred to as mass media. This

mainly involves TV, newspapers and radio. This thesis will only include newspapers which articles are often based on one or several press releases.

1.5.2. ABBREVIATIONS

PUS – Public Understanding of Science

PEST – Public Engagement in Science and Technology

VA – The Swedish organisation Vetenskap & Allmänhet (Public & Science)

ES – The Swedish organisation ES (www.ES.se) - helps journalists to find researchers to provide comments and opinions to articles in the creation of content for traditional media.

2. LITTERATURE STUDY

2.1 PART 1: SCIENCE COMMUNICATION – WHAT?

2.1.1. SCIENCE, SCIENCE COMMUNICATION AND THE PUBLIC UNDERSTANDING OF SCIENCE (PUS)

As the concept Science is used extensively throughout the paper it is important that we have a clear picture of what it implies. A good summary on the concept of science is given below:

“Science (from Latin: *scientia* meaning "knowledge") is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe”⁴

The crucial thing here is testability. Astrology, for example also offers explanations to the observed reality that are, on the contrary to Science, not testable through empirical experiments and results. Prominent ‘science sociologist’ researcher and philosopher Karl Popper discusses the main differences between science and pseudo-science in his book *Conjectures and refutations: the growth of scientific knowledge*. It is however outside of the scope of this paper to further elaborate on the philosophical implications that arise when discussing the meaning of science and the scientific method. Simply put, science can be seen as our best testable explanation of the Universe as it is today. This means that each theory can be overthrown by another on the basis of new evidence. It is this constant unstableness of Science that also drives it forward.

It would also be in place to give a brief definition on the concept of Science Communication and PUS? On Wikipedia one can read the following: “Science Communication generally refers to public media aiming to talk about science with non-scientists”⁵. This involves several practices, such as science journalism, science exhibitions, science policy and science media production. Science Communication and PUS demonstrates a somewhat causal relationship. The better the communication, the

⁴ <http://en.wikipedia.org/wiki/Science>

⁵ http://en.wikipedia.org/wiki/Science_communication

better the PUS. PUS can be seen as a movement, which grew out of concern from within academia to bridge the knowledge gap between science and the rest of society. Although concerns like these were nothing new and in fact, according to Ziman, they were expressed in organisations like the British Association as early as the beginning of the 19th century. They were to culminate much later however, in a report issued by the Royal Society Committee in 1985. (Ziman, 1991). This was the beginning of PUS as a new field of research. Questions raised were; what do people say about science, how do they use scientific knowledge and how is science supplied to them? This last question clearly shows the relatedness of the two concepts, the communication and understanding of science. The importance of working to enhance PUS will be discussed further under part 2 of this framework. We will now introduce some case studies on the relationship science-society as to show how things have played out in the past.

2.1.2. SCIENCE AND SOCIETY – HISTORICAL CASE STUDIES

It would be wrong to claim that conducting science has been an isolated activity before the 20th century. What some describe as the secluded laboratory is doubtfully representative to reality. As Ekström argues, if anything has been strongly emphasized it is the bonds between politics, economy and science (2004, ss. 12-15). In fact, it is only until the last half of the 20th century that the view of science, as a secluded activity only for the academic elite, has grown stronger (Bowler & Morus, 2005, ss. 367-390). Ekström means that it is the increasing demands on science transparency during the last centuries that has worked to enhance the myth of the secluded laboratory by painting the picture of a dichotomous society with knowledge production and the communication of it as two separate entities (2004, ss. 12-15). Many case studies actually show that media play a big part in the production of new knowledge, through its bridging relationship between science and politics. A classical example of this would be research fields that are viewed as controversial, for example stem cell research or fields that involve animal testing, which both draw attention to media, giving rise to a more explicit form of communication to the public.

From a historical perspective, the field of science communication or the popularization of science started long before the emergence of popular science literature in the beginning of the 20th century. The communication medium has taken on many forms, of which often involves public scientific figures. Rodell gives us the case study on the national hero and engineer John Ericsson, 1803-1889 (2004, ss. 189-217). Ericsson was a practical scientist and inventor who paved the way for modern mechanical engineering. His two greatest inventions were the propeller and the hot air engine. He was also a part of building the Göta Kanal. The case study Rodell brings us of this great man mainly regards his funeral, which gained enormous attention in media. Ericsson was truly considered a national hero, through his successful inventions. The glorification of his persona worked as a communication medium in itself. He was the ultimate champion who, despite growing up in a poor and rural area, through his genius and endless persistence had succeeded and brought great wealth to the country. All major newspapers followed his funeral arranged by the royal court. Everyone was interested in reading about his life and achievements. When a scientist and inventor converge to legend status and heroism, it is probably the ultimate tool for science communication. It increases science' legitimacy and enhances its position in society.

Although the case of Ericsson's funeral shows us how scientific public personas can gain momentum in media, it was still a very passive form of communication (he was after all dead when his media coverage peaked). In contrast to this, Holmberg gives us examples on scientists took on a more active role and used media as a tool and ally for their own agenda (2004, ss. 91-107). This was for example the case in Swedish meteorology during the beginning of the 20th century. More extrovert and media trained scientists such as Nils Ekholm and Svante Arrhenius were beginning to take the scene. They were using stakeholders and organizations operating on the border between academia and society, such as the Physics Society of Stockholm. Both Ekholm and Arrhenius used these type of arenas, complemented by media tools like press releases as means to gain political support for what they were doing, which in Ekholms case, was working on a system for predicting storms. In this sense, politics was a strong factor dictating what parts of scientific research were shared with the public and those that were not. However, the most important insight Holmberg gives us from this case, is probably the way in which the public were acting as "co-producers" of Ekholms research. Ekholm was highly dependent on the public judging his storm predictions, and

if these kept failing he would ultimately lose funding for his research. This dependency on a non-scientific public clearly states the active role that science communication has in the production of new knowledge.

2.1.3. THE CONCEPT OF POPULAR SCIENCE

Popular science literature started emerging during the beginning of the 20th century and the general opinion has been that it constitutes a medium in which science is translated to a broader public. But what exactly does the concept popular science mean? As Bowler and Morus argues, the two words seem to represent the very opposite of one another, and scientists seem rather disconnected from the popular as well. According to Bowler and Morus, the general trend amongst scientists is to worry about PUS but with the argument that the public should be more educated so that the scientists can get on with their jobs, and not that the scientists themselves should be more engaging (2005, ss. 367-390). Furthermore, the way popular science is used today paints the picture of a dichotomous society rather than that of coproduction of knowledge between stakeholders both from within and outside of academia. Ekstrom calls this "the linear model of diffusion" and means that it is one of the contributors of the false view of research as a secluded activity. He even goes as far as not using the term and instead talks about science popularization (2004, ss. 15-16).

We will however continue to use the word popular science as to further being able to problematize the concept. As described under the last section, there has been many and are still many ways in which science has been and is communicated today. We have seen exhibitions, public lectures, stories of public figures and national heroes, literature, television and now quite recently an increased activity on the web. The problem with popular science as a concept mainly lies within those mediums that prohibit interaction (mass media), because in this case the perception of a linear model of diffusion will be enhanced. In fact, before the 20th century, when public lectures were a more common medium than literature, the possibility of interaction was greater. As Bowler and Morus points out, during the 18th century scientific societies started emerging with the sole purpose of integrating science into civil society and often

appeared in the coffeehouses of London and by 1739 there were as many as 551 of them (2005, ss. 367-390). Even right at the beginning of the scientific revolution popular science began emerging as a sort of civic activity, even though it was not called popular science at the time. This was during the sixteenth and seventeenth century and took form as a lecture-room culture, consisting of natural philosophers such as Francis Bacon. These men gave paid lectures where they explained the Newtonian principles and the mechanical philosophy to a middle-class educated public. They claimed that promoters of science should be “men of the world rather than cloistered academics” (Bowler & Morus, 2005, ss. 367-390).

Today, this interaction and co-production of knowledge in physical mediums are not as common. However, this does not necessarily mean that interaction has ceased to exist. Rather, it is implicitly expressed over time through the relationship media-politics-public. Because politicians decide (excluding corporate science) what type of research to fund, they of course will be weary of funding research that might conflict with the opinions of their voters. In this sense popular science today can be used as a vehicle for researchers to change the opinion of the public, and thus enhance their position on funding related issues by giving the politicians greater incentives to support their research.

As discussed, the concept of popular science is not restricted to literature but can also be practised through physical meetings such as science fairs, seminars and debates where the public is invited. In the context of popular science these tools do not necessarily align with the linear model of diffusion. Instead they are interactive tools, which invite debate and engagement from the public. Martin-Sempere et al, claims that particularly the science fair, is perhaps the best form of practised popular science (Martin-Sempere, Garzon-Garcia, & Rey-Rocha, 2008).

2.3. PART 2: SCIENCE COMMUNICATION – WHY?

2.3.1. PERSONAL MOTIVES

Academic culture is to some extent reflected in the scientist's motivations, or the lack of them, to engage in public communication. Recent findings from a study on 1600 scientists, working on Universities in the UK, state that: "communication to the public is generally not seen by scientists as a basic part of their work, and is an activity regarded by scientists as neutral or even counter to their prospects for promotion" (Corrado et al., 2001). This is for example reflected in the scientists concerns of losing credibility among colleagues when attracting too much publicity. It is also a cause of lack of public media training and understanding of what the public actually wants. Contradictory to this, more and more scientists are actually concerned and see it as their duty to educate the public about scientific principles and values. The same study showed that most scientists feel this way. However they also feel they are not the best-equipped people to pursue such a duty (Corrado et al., 2001).

These results were replicated in a study on Science fairs in Spain between 2001 and 2004. Graded on an interval scale of 1-5, on what influenced the scientists' decision to participate in the fair, variables regarding scientific culture and the communication of science (originally 4 variables put together through PCA) scored the highest, with an average of 4,1. The variable Scientific Duty did not show significant correlation with these and showed a score of 4,2 (Martin-Sempere, Garzon-Garcia, & Rey-Rocha, 2008). These results are indeed hopeful and should serve as a foundation for developing new complementary tools for science communication, in order to help scientists better practise what they feel, as these studies have shown, is their sense of duty.

However noble these motives might be, one should not neglect the possibilities of hidden personal agendas, or the role of external stakeholders such as funding institutions and corporate interests. As corporate science is increasing every day, there is a general concern about the credibility of science communication. This will be discussed further under part 3 (*section 2.3*). As have been noticed, the organizations that scientists are part of have many practical reasons for embarking on science

communication activities (Office of Science and Technology and the Wellcome Trust, 2001). Such motives would be raising the organizations international profile and promoting for recruitment and increased fundraising. There is no question that Universities feeds on publicity. Appearing in media constitutes a reference point for the societal interest in what Universities are doing. Ultimately it is the taxpayer's money that they are spending (all Swedish Universities are state owned). In fact, as recently as in 2009 politicians recognized the communication of science as crucial for a democratic and healthy society. What was earlier stated in the state law as public outreach, regulating the activities of higher education in Sweden, was reinforced in 2009 by a new paragraph, which was denominated Tredje Uppgiften (The third mission). This refers to what has always been the two main missions of Universities, namely to do research and to educate. The third mission stresses the equal importance of communicating science to the public. Below is an excerpt to what was added to the state law of higher education in Sweden, translated to English.

“Within the assignments of the institutions for higher education in Sweden shall be included collaboration with the surrounding society, informing about ones activities and work towards utilization of research results. Law (2009:45)⁶

The fact of the matter that a law has been put in place does not, however, constitute enough incentives by itself for researchers to engage in science communication. Interviews in this study have shown that some researchers feel somewhat alienated by the concept because of the lack of other incentives. The Swedish organisation VA is therefore trying to redefine the concept in a report from 2009 as *Omvärldsdialog och Engagemang* (Vetenskap & Allmänhet, 2009). Another report proposed by the same organisation gives suggestions on what these other incentives should be and how they can be put into practice (Vetenskap & Allmänhet, 2011). This will be further discussed under section 4.

⁶ <https://lagen.nu/1992:1434#K1P2S2>

2.3.2. SOCIETAL MOTIVES

Society shapes what knowledge is being produced through its relationship with science and its understanding of the scientific method. As Oudshoorn argues in her analysis of the relationship between research on male contraceptives and the media, a negative notion on a specific research field created by media in the past can linger on, damping the discretion of what a particular research field can and cannot do in the future (Oudshoorn, 1999). In this sense Science Communication is closely intertwined with the concept of PUS and the politics of science.

Although, concerns have been raised about the public's ignorance of science, Ziman argues that scientific illiteracy does not necessarily correlate with the public's understanding of the state of practical affairs (Ziman, 1991). However, those generally better informed about science also tend to take on a more supportive attitude towards it. According to the Surrey survey, how supportive one is of science can also be measured in one's perception about the stereotypical scientist. For example, those who view scientists as anti-social tend to be more cynical towards the scientific establishment, whereas those who view scientists as ambitious and productive tend to have greater faith in the good that science can do for society (Ziman, 1991). This is important because attitudes can change for better or for worse depending on the use of science communication and how public figures are portrayed, such as the (positive) case of John Ericsson. An obvious example of bad use of science communication is that where scientists in basic medicine research are portrayed as anti-social and non-empathetic torturers of animals through animal testing. The following is an example of an extremely negative (but selling) headline: "Researcher wanted to amputate the legs of mice – got rejected"⁷ This kind of sensational journalism can cause great harm to important but controversial research fields. As was discussed about male contraceptives, the negative notion of a particular research created by media can linger on, and thus, make it harder to justify similar research programs in the future. Although, the polarized debate this kind of sensational journalism creates mostly does harm, scientific controversies are positive in a sense that they raise the awareness on the importance of a well-informed and engaged public. For example, the quite recent controversy on genetically modified

⁷ <http://www.aftonbladet.se/nyheter/article12870626.ab>

food helped reinforce this awareness (Office of Science and Technology and the Wellcome Trust, 2001).

When discussing the importance of PUS, one may wonder, how does the ideal scientific public sphere then look like. Gerhards and Schäfer proposes two normative models; "science-dominated scientific public sphere" and "contextualized scientific public sphere" (Gerhards & Schäfer, 2009). The first one is based on public scientific debate, where expert academics set the criterias for what is important, whereas the second model proposes a public debate where science is put in the context of non-experts. Respecting and understanding the role of the public sphere in scientific debate is crucial to democracy and welfare. One may argue that it is unfortunate when important (but controversial) research is hampered due to lack of support from the public. On the other hand, if the public does not understand what certain research implies and why it is conducted, then maybe society isn't yet ready to advance in this area. However, the general concerns about the lack of PUS, still has its root in this problem, and layed the grounds for what is called the deficit model (Irwin, Wynne, 1996). This model assumes that public reseliance to certain scientific fields is due to deficit of knowledge. Combined with the general idea that scientific knowledge is superior to other forms of knowledge, eliminating this knowledge deficit would work to increase the legitimacy and public support of science. With regards to the superiority of scientific knowledge, science should merely be translated and supplied through mass media to the public, who then would act as passive receptors. This closely reassembles what Ekström conceptualize as the linear model of diffusion, discussed in part 1, and which he fervently criticizes (Ekström, 2004).

There have in fact been a growing amount of criticists for the deficit model, since it does not fully explain how science is anchored in society. This brings us to the second normative model, put forth by Gerhards and Schäfer, the "contextualized scientific public sphere". This model sees the public as engaging co-producers of knowledge, a concept based on interaction which has already been briefly discussed in part 1. As Holmberg proposed in his case study on swedish meterology, mass media is not used for merely translating and "transporting" scientific knowledge but rather as a political tool for gaining the support of the public, who are seen as co-producers of this knowledge (Holmberg, 2004). Accoring to Gerhard and Schäfer, there are also those who dispute

the high status of scientific knowledge because scientists are rarely as objective as the ideal picture of the scientific method claim them to be (Gerhards & Schäfer, 2009). This criticism is based on several social studies on science, claiming that there are strong social and environmental factors that influences how the scientist communicate his/her science, which may in some cases imply bias. This has ultimately led to the emergence of a new program, complementary to PUS, namely, the Public Engagement with Science and Technology (PEST), in which the role of the public is seen as equally important. Furthermore, Gerhards and Schäfer states that, although comments by scientists and in political documents mainly fall under the science-dominated model, it is a general concencous amongst those writing about the science-media relationships that we are moving from PUS towards PEST.

2.3. PART 3: SCIENCE COMMUNICATION – HOW?

2.3.1. SCIENCE JOURNALISM

Some argue the distinction between science communication and science journalism to be negligible. In fact, according to prevailing conventions, no distinction is made at all (Meyer, 2006). This is however a cause of how science journalism is practised. Compared to investigative journalism, which strives to reveal truths and expose unethical behaviour, science journalism strongly identify with its sources without questioning. According to Meyer, the contract between scientists and science journalist has always been very strong, which is also the main root for those who criticize it. Again, this aligns with the notion of a deficit model, where science is merely translated and transported to the people, without questioning the reliability of the source. Daniel Greenberg is a journalist who has been documenting science and politics for over 40 years. He depicts a scientific society with traits very much like the population at large, neurotic and continuously worried over its own state of health. What's disturbing about Greenberg's stories is how some scientists, when they feel cornered by political agendas, for their own survival chose to abandon the standards that constitutes the very core of the scientific method, namely, "respect for data, scrutiny of methods and critical

assessment of arguments” (Greenberg, 2001). An insight into the every day work of researchers is thus essential to understand that it is not only the externally imposed ideals of science that drives it forward, but equally much the personal agendas of the people behind it. The fact that state-funded researchers are dependent on politics is something that science journalism should depict more often. In this sense there is a need for science journalism to become more investigative.

Although this may sound counterintuitive to the journalistic ideal of objectivity, since science share the same ideal science journalists simply put their trust in the scientists to fulfil this through the scientific method. There is no doubt that every scientist strives for objectivity, and thus, it is taboo for science journalists to question the scientist. It would be like questioning one of your hard working colleagues. For example, the American historian and journalist Altschull refers to the values of science, within American culture and journalism, as quite “sacred” and “untouchable” (1990).

As science constitutes a community who share ideals and norms, it has been trusted to serve the best interests of its advocates (society). The well renowned science sociologist, Robert K. Merton has developed normative models for this scientific ethos, including the ideal of shared knowledge (referred to as communism) and disinterestedness (1968). As the ideal of shared knowledge is flourishing, the ideal of a disinterested science is, according to Meyer, not (2006). Because these ideals have served as a foundation for the contract between science and society, when one of them is losing ground, the contract is broken. The implications of a disinterested science is that there should be no commercial interests or personal agenda to the scientists research, as such interests would harm the notion of objectivity, on which their journalistic peers so heavily rely. However, as corporate science is gaining ground, especially within the medical sciences, economic interests are moving closer and closer to the researchers laboratory. This has even provoked a call for journalism as an academic discipline (de Burgh, 2003) providing science journalists in the medical field with tools to investigate conflicts of interest, and reliability of the scientist as a source, consequently increasing the level of investigative work (Miranda, Vercellesi, & Bruno, 2004). Meyer also argues that, as the science-society contract is broken, a call for more investigative science journalism is emerging, even from within the journalistic community itself (2006).

2.3.3. THE SCIENCE COMMUNICATION TOOL-KIT

A report from the Office of Science and Technology (OST) in the UK Identified two conflicting standpoints on how science communication should be used. On the one hand there are the people who believe it should be used for informing the public about scientific facts. On the other hand there are those who believe it should be used for informing about the legitimacy of the scientific method, or simply put, how the scientific process works (Office of Science and Technology and the Wellcome Trust, 2001). The Oxford physicist and public figure, David Deutsch, discusses the importance of understanding the scientific method and how it brought with it the scientific revolution. He does this in a public talk at TED by highlighting the difference between religion and science in the way that they view the world.⁸

The tools used to communicate science are extensive. There are physical meetings, such as science festivals and fairs. There are public lectures and debates, social and mass media, exchange schemes, public consultation, international networks, intergovernmental dialogue etc. (Office of Science and Technology and the Wellcome Trust, 2001). In order to understand how all these tools are used, a good start would be to examine the relationship between science and technology (applied science). Bowler points out that, "Science on television, for example, is usually presented as the sum of its technological applications" (Bowler & Morus, 2005). According to Bowler, the dominant view on the relationship between science and technology has been that it is strictly hierarchical, just like the relationship between science and the media, discussed earlier in this paper. This means that scientific theories are developed in isolation of technology, and then used by technologists/engineers to create some useful application. Once again, this linear type of model has proven to be oversimplified, in a much more complex reality. In fact, science and technology are so intertwined and dependent on each other, that from a practical standpoint, the renowned sociologist Bruno Latour claims they cannot and should not be separated (Bowler & Morus, 2005, ss. 367-390). He displays this by denominating the two as techno-science.

⁸ http://www.ted.com/talks/david_deutsch_a_new_way_to_explain_explanation.html

Applied science is also an easy way to engage people in the physical medium, such as through science festivals and fairs. When it comes to how to create engagement, which is a growing concern reflected in the PEST movement, what some call “hooks” are an effective way to gain the attention. “Hooks” meaning the parts of technology that have an impact on peoples everyday lives. What tools to use in what contexts is not trivial. It is, however not within the scope of this paper to analyse all these tools. Focus instead lies on written science communication, such as blogs and press releases.

2.3.4. RESEARCH BLOGS AND THE NEW MEDIA LANDSCAPE

During the last 5 years we have witnessed a boom in social technologies, tools for self-archiving and self-publishing (self-publishing is what will be discussed here). To name a few there are forums (topic dependent), social networks such as LinkedIn, Facebook and Mendeley. Then there are blogs, twitter, wikis, YouTube and other tools for sharing bookmarks, links, and pictures. To name a few of these, there is delicious for sharing bookmarks, digg and reddit for sharing links and Flickr for sharing pictures. All these technologies are as most new technologies a double-edged sword. They have the potential to reduce knowledge gaps in society and contribute to increased democratization of knowledge. They can also produce an overflow of information, which makes it hard for the user to filter and pick relevant content. This issue has also led to a boom in filter technologies where, what we see and hear is filtered by advanced algorithms provided by companies such as Facebook and Google, based on our social activity on the web. Then there are technologies such as stumbleUpon, which utilizes this social layer of filtering content more explicitly with regards to what like-minded people like and do not like on the web. However attractive these filtering algorithms might seem, some actually raises warnings that we might get trapped in what Eli Pariser calls the “filter bubble”, where all information you consume on the web has been specifically tailored to fit your world view, and thus never provokes or challenges your current perceptions.⁹

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http://www.ted.com/talks/eli_pariser_beware_online_filter_bubbles.html?utm_source=newsletter_weekly_2011-05-03&utm_campaign=newsletter_weekly&utm_medium=email

As social technologies are improving the conditions for communication in general, we are beginning to see its effect on the communication of science. Alok Jah who works as a science reporter at The Guardian gives one example of this. He refers to American studies that was made a couple of years ago, showing that 10% of all the blog traffic is related to science, whereas only 1% of all news entries are.¹⁰ The trend seems to be that social media is gaining ground within the scientific community. Another, more recent example is the reference management system and social network for academics, Mendeley, which during the last 6 months has grown from 500,000 to over 1 million connected researchers.¹¹ Also when it comes to tools for self-archiving of publications the trend towards open access is clear, as can be seen by freely accessible self-archiving databases such as arXiv.org and Open Access Journals such as Plos.org. Although, this section will not discuss all the social technologies mentioned above, nor the tools for self-archiving of scientific publications, it is important to bear in mind that the general trend is towards increased openness and transparency.

The emergence of the blog as a tool for self-publishing has drastically changed the conditions on which science can be communicated. One important feature of the blog in this context is the possibility for seamless interaction with previously unknown stakeholders and laymen, which also provides a basis for the researcher to network and promote his or her research. However, findings from a Swedish dissertation on research blogs, shows that the motives to blog as a researcher can be much broader than that. It can for example serve as a way to share knowledge, promote creativity and give the blogger a sense of being part of something bigger (Kjellberg, 2010).

Lilia Efimova, in her dissertation on blogging in knowledge intensive environments, claims that blogging in many cases also provide practical means for those who have to deal with vast amounts of information on a daily basis (Efimova, 2009). The blog can provide structure, gather and make all your fragmented thoughts in the past searchable in the present. In the case of a researcher, the blog might provide a legitimate space to write down thoughts on potential research projects, which might not be relevant for the current research but which needs to be captured and codified for future use. This is normally called dormant information. Looking at the blog from this perspective it is very much a logbook than it is a tool for networking. Further investigation on this aspect of

¹⁰ <http://urplay.se/164642> (27:45)

¹¹ www.mendeley.com

the blog shows us that its personal nature can be a root of conflict with external stakeholders who might have encouraged the blogger to start blogging in the first place. This is often the case with corporate blogs where the content of the blog might conflict with the agenda of the company. Efimova exemplifies this in her study on corporate blogs at Microsoft (Efimova, 2009).

Viewing the blog as a practical tool in ones work does not however remain with its potential to codify dormant information. It also has the potential to attract like-minded and intelligent people. When interviewing blogging researchers, Efimova finds that these people are also frequent readers of blogs, as a way to keep track of their professional interests (Efimova, 2009). In a way, this can be compared with the management practice of business intelligence. Many researchers read blogs as a substitute to traditional media because it gives them the opportunity, not only to interact, but also to continuously (and with less effort) stay up-to-date about the persons and topics that concerns them. Subscribing to interesting blogs gives you the possibility to tailor your own newspaper, based on RSS-feeds from those sources that best match your professional interests. However, Efimova argues that, while the filtering possibilities of the RSS-tools are often praised, many times they can also induce information overload (Efimova, 2009).

One general misconception about blogging is that its purpose is to draw attention and attract followers. This might be true for those blogs where the author only blogs for an audience and not for him/herself, as is sometimes the case with e.g. blogs about politics and fashion. The perception that blogs only regard public affairs is simply false. In fact, even if no one follows your blog, it still gives you the opportunity to discuss with yourself by commenting on earlier posts. This is called self-linking and, according to Lilia Efimova, it is a common practice in knowledge intensive environments. "(...) Blogging makes it a conversation. I come to the idea next day and can discuss it with yesterdays Lilia" (Efimova, 2009). At the same time, every new entry is an invite to interaction. In this case the blog is the only tool so far that can provide a personal and communal space for its writers simultaneously.

As we have seen, blogs are versatile. Their personal nature means they are not context dependent like forums, which is something that encourages unconditional writing. Their potential to create communities of bloggers makes them an attractive tool for

networking. Often, broad discussions can take place in the blogosphere, which are unknown to the blogger who initiated the discussion. In the blogosphere discussions naturally become fragmented because bloggers often choose to comment as a post on their own blog rather than a comment on the other blogs post. The motivation for this, according to Efimova, is because a post on your own blog becomes searchable whereas commenting on a post on another blog is not (Efimova, 2009). Brad DeLong has compared the academic blogosphere with an invisible college, with regards to this fragmented nature of discussion.¹² Consequently the downside of this is the difficulties it creates in tracking the discussions in the academic blogosphere for those who would like to follow it. There are currently several initiatives that aim to solve this problem. 2 of these are described under the following section.

2.3.5. RESEARCHBLOGGING.ORG AND TRACKBACKS

Researchblogging.org¹³ is an initiative which aims to make the "invisible college" more visible. Some argue that even though the amount of research blogs might increase, this does not guarantee that what the researchers actually write about is relevant for enhancing PEST or science communication. Yes, the blogger might be a researcher, but what is to say that he or she does not posts irrelevant things about for example what he or she had for breakfast this morning? The fact is that if that would be the case then this blogger would not have that many readers from academia and there would not be much discussion to talk about.

The problem still remains. How do we identify those researchers who are serious about their posts, discussing serious research with seriously concerned peers? How do we distinguish between those who just use their blogs as tools for political leverage as opposed to those concerned individuals who wants to initiate a discussion, or highlight some new research they believe to be important? Researchblogging.org is actually solving this problem by simply providing an icon, which the bloggers can use selectively for their posts. The icon marks the post as a comment on one or many peer-reviewed

¹² www.academicblogs.org

¹³ www.researchblogging.org

research papers and forces the blogger to add a footer with links to these papers. What is so brilliant about this is that it provides the bloggers with the possibility to keep their blogs as a personal space, while being able to selectively choose which posts to make visible in a more serious context, such as that provided by researchblogging.org. The site then aggregates all the posts from feeds of connected blogs containing this icon, and indexes them with regards to topic and time. The outcome of this is a kind of virtual blogosphere of aggregated comments on peer-reviewed research.

The trackback method aims to accomplish the same, but takes on a different approach. The example used here is the trackback method of the self-archiving platform arxiv.org¹⁴ Instead of marking your posts with an icon to state that it is a “serious post about peer-reviewed research”, you simply just add a snippet of code, provided by arxiv.org to your blog homepage. Then every time you link to a publication that is found at arxiv.org, the site adds your post as a comment to the archived publication. Each publication then becomes an aggregator of comments on that very same publication. What you end up with in the case of arxiv.org is what initially was a fragmented discussion in the academic blogosphere now collected into one unity, based on the publication that each blog post has linked to.

2.3.6 INCREASED TRANSPARENCY THROUGH OPEN ACCESS?

Some researchers claim that, as little as 10 years ago, scholars and scientists did almost all their reading through paper journals issues, whereas now the majority of these are downloaded as electronic publications, out of which 20,4% is self-archived or published in Open Access (OA) journals (Björk, Welling, Laakso, Majlender, Hedlund, & Guðnason, 2010). The concept of Open Access is that the work published is fully accesible to anyone with an Internet connection. Self-archiving is a form of OA where the author decides to publish his or her work on a web-archive, available for anyone to download, read and distribute. [Arxiv.org](http://arxiv.org) constitutes one of many such archives, and was started at the physics department of the Cornell University. This type of personal

¹⁴ <http://arxiv.org/help/trackback>

publishing is often legally protected by tailored copyright licenses provided by creative commons¹⁵.

Scientific progress strives as new discoveries are based on the previous discoveries of others. In this sense, knowledge can be seen as an open flow of information, facts and conclusions, accumulated over time by many individuals. As free and open access to scientific discoveries made by others are deeply beneficial to science as a whole, openness and sharing lies in the tradition of academic research. There is, and has always been, a deep-rooted scientific tradition of acknowledging the research of others as new discoveries are presented. Many researchers also believe that “it is not just about public access rights or the general dissemination of knowledge: It is about increasing the impact and thereby the progress of research itself”. (Gargouri, o.a., 2010, p.3).

It can be considered rare for someone from the general public to take time to read an academic publication. So how does open access relate to science communication if no one other than academics read academic publications? Well, as was discussed in the previous section, the emerging ICT and new media has made it possible to relate publications with texts in blog posts that are more accessible to the public. So the fact that the publications are there, and that they are accessible to anyone, might give the readers of research blogs a sense of increased scientific transparency even though they don't take the time to read the linked article.

¹⁵ www.creativecommons.org

3. METHOD

3.1. BASIC METHODOLOGY

Research methodology is a broad concept, which includes both what and how data is collected. Data can be divided into primary and secondary data. Primary data refers to data that has been uniquely collected by the researcher. Secondary data refers to data that has already been produced by someone else.

The collection of theoretical information (secondary data) has been done through relevant literature, books, articles and other academic publications. The methodology used for gathering secondary data from literature has been that of the snowballing approach where one main disputation, journal article or book has constituted the starting point for each of the three sections (WHAT, WHY & HOW) and from which more references has been collected.

The information channels that have been used for the literature study have been LibHub at Lund University, open public libraries (such as plos.org) and to some extent Google Scholar. Although Google Scholar works as a good complementary search portal, LibHub at LU and plos.org are the preferred tools because they guarantee good and accredited sources.

Data can also be quantitative, qualitative or a mix between the two. How primary data is collected can be divided into three main categories. As a researcher one can choose between an exploratory, descriptive or normative approach. The exploratory approach means that the researcher does not have a clear picture on what he/she will study and what will be the outcome of the study. Suitable tools when conducting explorative research are qualitative interviews and case studies. When conducting descriptive research, the researcher has a clear hypothesis that he/she can test using statistical analysis of quantitative sets of data. The normative approach is more common within the social sciences since it tries to answer how things should be, and not how they are.

These three main categories describing the general research approaches one can choose from also contains subcategories dealing more specifically with how the data is

collected and what specific tools that can be used for each method. There are 3 main approaches to how data is collected; the case study analysis, the cross-sectional analysis and the time series analysis. The case study contains fewer participants that are tested on different variables, whereas the cross-sectional analysis deals with a sample of participants that are representative for the target population of the study, and where each participant are tested on the same variables. The time series analysis constitutes a type of cross-sectional analysis but with time as an additional variable to the study. All these approaches also have more or less suitable tools that can be used. For descriptive quantitative research, web-surveys and structured telephone interviews are most suitable whereas semi-structured interviews is a better tool for a qualitative case study analysis. The primary data used in this thesis is based on semi-structured interviews.

3.2. SEMI-STRUCTURED INTERVIEWS

3.1.2. SAMPLING OF INTERVIEW PARTICIPANTS

The idea with the interviews was to get as good a representation as possible of the most important stakeholders within the science communication establishment. These are the researchers (blogging and non-blogging), the communication staff at Lund University and science journalists. In order to mitigate the bias created by interviewing research bloggers, non-blogging researchers were also interviewed and asked how they view the blog. It is generally known that those who already blog tend to be much more positive about blogging than those who do not blog. All interview participants are from Lund University, with the exception of 2 journalists (one which has been a researcher at LU) at the Swedish Research Council in Stockholm. The criteria used for the sampling was that the participant needed to be a stakeholder in science communication and that he/she was believed to be able to provide input to any of the three research questions. Empirical data for ES was gained by interviewing the head of the organization. Input on the role of press releases was partly provided by the 2 non-blogging researchers and 2 communication staff from the press department at LTH and the Faculty of Medicine.

Amongst the interviewed there is an over-representation of blogging researchers. This has made the research slightly skewed and is a cause of a shift in the focus of the research work, from only studying blogging researchers to adopting the wider perspective of studying the whole science communication (written) establishment.

One of the interviews was conducted by a third party organisation and was the online published interview with the founder of Seed Media Group (SMG), Adam Bly, regarding PUS and new types of science communication.¹⁶ SMG are the creators of the research blog aggregator researchblogging.org. Although interviews always contain interviewer bias, one needs to be extra sceptical about an interview filtered and published on a homepage.

3.1.3. ASSESSING THE QUALITY OF A QUALITATIVE INTERVIEW

When working with semi-structured face-to-face interviews there is a lot of external input that might affect the answers of the interviewed participants. The interviewer can for example be affected by, what is called interviewer bias, defined as the tendency for the interviewer to steer the interviewed in a desirable direction that fits with an already defined research agenda. The interviewed can also be affected by the tone and way in which the questions are asked, facial expressions of the interviewer etc. All these factors contribute to a reduced quality of the data.

To assess the quality of the qualitative interview there are a number of factors to look at. Below is a list of the major points to look at:

- Internal validity – Defined as the level of representativeness of the interview material to the true opinion of the interviewed. Internal validity of a qualitative interview can be tested by printing the transcribed interview and sending it to the interview participant (respondent validation) so that he/she can comment on his/her own answers and validate his/her opinion.

¹⁶ <http://bigthink.com/adambly>

- External validity – Defined as the ‘thickness’ of the descriptions given by the interviewed. Has the interviewed provided the researcher with material substantial enough to be used in other contexts?
- Reliability – Defined as the possibility for other researchers to assess the reliability of the data. Is there an audit trail that describes everything that the researcher and the interviewed have said during the interview? Has the interviews been transcribed and made available for others?
- Objectivity – Is the researcher objective in his/her way of approaching the interviewed or is he/she modifying the questions in order to confirm an already established research agenda?
- Authenticity – Does the study give a fair representation of the overall opinion of each of the interviewed?

As for this thesis in many cases I did not really know what I was looking for until I was conducting the interview. Although I used a template with bullet points that I wanted to cover, most of the times I let the interviewed talk freely and so I was rather steered by them than the other way around. I believe that this contributed to high level of objectivity. Because of my own lack of previous knowledge I was not steered by previous research and had no particular agenda. The study was completely explorative and I had no hypothesis to prove. The level of authenticity of the empiric material can thus be considered high. During the process of conducting the interviews I started off recording all my interviews and transcribing them. However, I felt that this was causing the people I interviewed to not open up as much as I wanted. I therefore started taking notes instead of recording. Notes and transcriptions have not been made available in this paper so the level of reliability of the interviews could have been higher. Since I stopped recording, however, my interview material got richer, providing me with substantial material to help answering my research questions. Consequently, the level of external validity can be considered to be high. As for the internal validity I did not conduct any respondent validation due to lack of time.

3.3. DOCUMENT ANALYSIS

To be able to draw more accurate conclusions in the discussion of the results of this research, the empirical material based on the interviews and third-party studies have been complemented by additional insights from blogs and seminars, posted on the web.¹⁷ When working with secondary data, which quality has not been reviewed in academic journals, one needs to be extra sceptical about possible hidden agendas of the author behind it. In what context has the author published the content? What is her/his purpose? Can the quality be guaranteed? What is his/her reputation amongst other stakeholders? As for the seminar on Science in the Media, one should ask oneself: What is the purpose of this seminar and are the participants representative for all stakeholders within the area that is being discussed? If not, then this may be a possible source of bias. For this particular seminar, it was arranged by the Swedish organisation *Vetenskapsfestivalen*, which is a conglomerate consisting of Universities, Science Councils, Foundations and Corporate Interest Groups, all working together to increase the public interest and engagement in Science. As it does not include any organisation representing the interests of the journalistic community, this seminar obviously will contain bias.

Actually, there is always going to be bias, and this is true for the individual bloggers as well. For example, pretty much all blogging researchers writing about research blogging have displayed positive and encouraging attitudes towards this activity, where those interviewed who do not blog are naturally more sceptical. This issue relates to the purpose of the content one is producing. As was seen with *Vetenskapsfestivalen* its purpose is to promote science, blogging researchers writing about research blogging will be naturally inclined to promote the practice of blogging.

Having scrutinized the purpose of the content that has been used as empirical data for this thesis, the next step would naturally be to scrutinize the quality. This is something that will be done throughout the discussion part of the thesis.

¹⁷ See section 6.2

4. EMPIRIC MATERIAL

4.1. DISCUSSION BASED ON INTERVIEWS, DOCUMENT ANALYSIS, SEMINARS AND THIRD PARTY STUDIES

4.1.1. PUBLIC UNDERSTANDING OF SCIENCE - AND THE ROLE OF SCIENCE COMMUNICATION

Before analysing the different tools for science communication and how they affect the content of what is being communicated, a reminder of why science communication is important would be in place. In the latest report from the Swedish organisation VA (Public & Science) the following is stated:

“For many years the scientific community remained an autonomous, self-contained system separate from the rest of society. This situation has changed over recent decades. Dialogue between science and society has become increasingly important for research institutions across Europe and beyond (...) It is the task of the university to interact with society, to inform society about its research results and so ensure that the work of the university is also of use to society” (Vetenskap & Allmänhet, 2011)

Adam Bly, the initiator of researchblogging.org and the founder of Seed Media Group, express his opinion on this matter in an interview posted on bigthink.com¹⁸. One fact that he continuously stresses has to do with the current conflict between the PUS and the PEST fields of research. That is, where PUS stresses the importance of scientific literacy in terms of data points, PEST focus on the public engagement in science and technology and their role in society. Ultimately, this boils down to the on-going debate of; what is science literacy, or more so, how should it be defined to fit the conditions of modern society?

¹⁸ <http://bigthink.com/adambly>

Bly stresses the importance of the cultural aspects of science and the understanding of what science is, rather than any data point that comes out of science. Our contemporary view on science has been shaped, merely by the output of science. As Bly puts it, “science is somewhat viewed as a manufacturing resource for society in a way that we forget that it is actually human beings with emotions and personal interest that constitute the input.”¹⁹ Without the scientists we would be nowhere. Therefore, in order to understand science we must understand the people behind it, the culture, the values and all those underlying forces that constitute the foundation for the scientific method and why it has worked so well.

When discussing this with an interviewed researcher it became clear that the public lack of understanding of the scientific method constitutes a barrier on educating the public on the scientific facts. The interviewed researcher stressed that, if society thinks in terms of black and white, they forget that scientific progress strives on its unstableness. Meaning, there are no absolute truths. There are the best guesses, which only lasts until they are overturned by new evidence. If society doesn't understand this basic principle of scientific progress, then they will lose confidence in the people behind it every time another proves some theory wrong. To quote one of the interviewed researchers: *“One problem with going out to the general public with information, is that they want the catch and I want to say maybe I'm right maybe I'm wrong. I don't want the information to be black or white because in science there are no ultimate truths”*. Bly also stresses this fact: *“being able to change ones mind with new evidence, it is the very essence of the scientific method, a tool that we build, as human beings, in order to understand things and move towards truth.”*²⁰ Cissi Askwall, who works at the Swedish organisation VA, gives a summary on recent studies about public attitudes towards science and scientists.²¹ For those who show a low level of confidence for the scientific establishment one of the reasons is: “When one researcher says this, and another says that, how are one supposed to trust anyone?” As discussed, this general attitude from the public stems from a fundamental lack of understanding of how the scientific method works.

¹⁹ <http://bigthink.com/adambly>

²⁰ <http://bigthink.com/adambly>

²¹ <http://urplay.se/164643>

A recent study made by the same organization has shown that Swedish scientists believe in the importance of dialogue between science and society but that practical tools to engage in this issue are lacking (Vetenskap & Allmänhet, 2011). According to the study, ever since the change to the University statute on collaboration with society (in Sweden called the “third mission”) the discussions about how and why Universities and researchers should engage in science communication has been many. The new Swedish statute that was put in place in 2009, however, does not include any practical incentives for the researchers to communicate outwards. When asking the interviewed researchers about what generally stops them from engaging in Science Communication activities the most common answer is that it takes up too much of their time. When asking one researcher about his general opinion on this new statute he answers, “It's all dependent on getting academic funding. In reality if you're bringing in money to your institution, then you don't really have to bother with fulfilling this statute”.

As mentioned in the literature study there are already researchers who have an intrinsic motivation to engage in science communication. Some of the most common motives are highlighted in a report from 2009 made by VA (Vetenskap & Allmänhet, 2009). The report is a summary of a seminar conducted on dialog and engagement between research and the public. Some of the arguments put forth during this seminar regard moral issues. As expressed by one of the participants: “If one conducts research funded by the state or EU, as many do, then it should be seen as an obligation to talk about this research when the surrounding society wonders” (Vetenskap & Allmänhet, 2009). Another interviewed researcher in this study says communicating ones research is not only a good way of disseminating important academic knowledge, but can also be a way to help the research community to come up with the most relevant questions to be explored for future research. In this way the research would be more anchored in society. Others believe that communicating ones research should not only constitute a sense of duty, but should also be an enjoyable activity. However, those that do not possess the natural aptitude for communication and public relations, but still feel obliged to do so as they see it as their sense of duty, can and should be encourage by a defined system of external incentives. VA proposes 4 bullet points on what needs to be put in place.

1. Practical incentives such as money, promotions and merit points
2. Professional help stemming from new communication arenas, communication staff and media-training
3. Stories with emotion that people can relate to
4. Leadership from organisations, institutions and the University top management.

According to chief editor Patrik Hadenius, at the popular science magazine *Forskning & Framsteg*, some motives to communicate outwards are more pragmatic and less altruistic than the ones highlighted in the studies made by VA. According to Hadenius, who started at *Forskning & Framsteg* 15 years ago, there has been a shift towards more and more researchers willing to communicate outwards but that this change is mostly due to the increased competition for funding amongst the researchers.²² This shift is causing us to rethink the role of science journalism and communication, which naturally brings us to the next section of the discussion.

4.1.2. THE ROLE OF SCIENCE JOURNALISTS AND COMMUNICATION STAFF

To be able to understand how academic knowledge migrates to the non-academic society it is crucial to understand all components in this knowledge diffusion. At Swedish Universities today a new category of employees have emerged as a result of the increasing external pressure to communicate outwards, especially with regards to the statute "The third mission". These constitute the communication staff, where each institution has their own information bureau, very much like in a company. When asking a senior professor in theoretical genetics on how he views this new category of workers, he reveals some of his own scepticism. *"I believe it was better before, when there was a more direct contact between the researchers and the journalists. First, the communication staff mostly does not have a journalistic education. Second, the more*

²² <http://urplay.se/164620>

steps in which a piece of information is treated, the greater the chance of getting something wrong". The same professor also says he is working on an article to highlight this problem. He refers to scientific news, which content got so modified that the original idea did not resemble much with what was finally written and which also contained several errors.

Although this might be an exception, there is a general trend of scepticism towards those involved in communication activities from the research community. According to VA studies, journalists tend to have a much greater trust in researchers than it is the other way around. For example, as much as 42 % of Swedish researchers have little trust in journalists working for quality daily newspapers and about the same amount (44%) display very little trust for those working for tabloids (Vetenskap & Allmänhet, 2005). A reason for this gap of trust could be explained by the fact that the majority of researchers are not trained in how to deal with media. One interviewed researcher who consider himself as experienced with dealing with journalists express his opinion on this matter: *"Those who say that you should use media to communicate the truth are often too naïve because the truth is always modified. You have to be super-professional and media trained to communicate your message the way you want it to be. It is not enough just 'being yourself'"*. Another interviewed researcher in medicine expresses his concern on the polarized debate on animal testing. As was mentioned under *section 2.3.2* animal testing can attract sensationalistic journalism, which can cause great harm to a specific research field and consequently increase the level of distrust that researchers feel towards journalists. The headline of this particular article was: "Researcher wanted to amputate the legs of mice – got rejected"²³. The interviewed researcher goes on explaining *"My colleague who was subject to this very negative article now recieves death threats from animal activists. I wrote a letter to the editor trying to get our side of the story published but I got no reply"*. This example also shows one important thing that might constitute a reason for the low level of trust that researchers display in journalists. That is, the journalist never takes responsibility or has any control over the headlines for a particular article. As explained by John Burklow, head of communication at the National Institute of Health, during a seminar on Science in the Media:

²³ <http://www.aftonbladet.se/nyheter/article12870626.ab>

*"When the journalist bring a science to the editor, the editor feel a pressure to make it sensational so that it attracts an audience"*²⁴

An interviewed professor in theoretical genetics gives his opinion on this: *"One shouldn't demand of every researcher to be very experienced with media, but one shouldn't be dumb and naive when dealing with media because that will increase the risk of something going wrong"*

When some studies point towards a positive attitude from researchers to communicate outwards, the reluctance that some researchers feel towards outward communication involves a wide spectra of reasons. Through interviews and the use of studies from VA an attempt has been made to illuminate some of these reasons. The lack of incentives is one, the lack of control of content is another. Further research is suggested explore the relationships and attitudes between researchers, journalists and communication staff. Out of the 2 interviewed press staff at different institutions at Lund University, both of them are of the opinion that researchers generally view outward communication as something very important which they take very seriously. Consequently when talking to the researchers themselves, the views differ. The reason for this might be that those reluctant to communicating their research generally don't have any contact with the University press staff so what this group of communicators experience does not constitute the whole picture. One of the interviewed press staff estimates that around half of the press releases created are initiated by the researchers themselves while the other half are initiated by the communications department. From the journalists perspective the view on the communication staff at the Universities are much more positive. According to Hadenius, *"(...) the information bureaus at the Universities are often better at giving us good information about new research results than are the researchers"*. Admitting to be generalizing slightly, Hadenius is of the opinion that the researchers often contacts the magazine when they have received funding or when they need funding, and not so much when they have some new discovery to talk about.²⁵ Again, this aligns with researchers tendency to be extra careful in going out with new research results before they have been extensively scrutinized and peer-reviewed.

²⁴ <http://urplay.se/164622>

²⁵ <http://urplay.se/164620>

As discussed under *section 2.3.1.* a problem that can work to reduce objectivity and increase bias stems from the other side of the story, namely the fact that journalists, especially science journalists, shows such great confidence in researchers (Vetenskap & Allmänhet, 2005). Where the lack of researcher's confidence in journalists can inhibit the communication of important information, the lack of scrutiny and investigative science journalism can be used by those researchers trained in dealing with media to create bias. As Bly points out *"(...) we forget that it is actually human beings with emotions and personal interest that constitute the input of science"*²⁶. Like journalists, scientists have personal agendas and those more involved in communication activities might use media as a tool for their personal interests. Under *section 2.2.2.* Holmberg gave us a historical case study illuminating this way of approaching media. It shows that there are always two sides to every story. There is perhaps a need for a more balanced relationship between science and media where scientists need to be more confident and experienced when dealing with media and where media need to be more investigative of possible hidden agendas of the researchers subject to reporting. In fact, the concept of science journalism is not cut in stone, but something that is very much evolving. Alok Jah, science reporter at the Guardian, gives his opinion on the role of science journalism on a seminar on science in the media²⁷: *"Science journalism should be a platform that invites bloggers, science experts and other lay men in the production of new articles"*. In addition to what science journalism should be, Jah problematizes the current situation on what it is and the lack of funds from major newspapers that in many ways inhibits further development within traditional media and demands new ways on how science can be communicated. *"Our challenge in the last few years has been how to relate to the new media landscape"*. Jah further elaborates on the problems of today's situation on science journalism:

"There are a declining number of science journalists in the world. In the US especially, it seems every newspaper has got rid of their science specialist. I think CNN doesn't even have scientists in their environment team anymore, which is unbelievable to me for a global news organization (...) The newspaper decides to cut costs in places where they think people aren't interested. Those are places such as science"

²⁶ <http://bigthink.com/adambly>

²⁷ <http://urplay.se/164642>

This is however somewhat contradictory since international studies have shown that the public interest in science is relatively high, especially in the US, where as much as 90% of the sampled survey participants considered themselves interested in science (Vetenskap & Allmänhet, 2004). These findings reassemble the current situation in Sweden. According to Karin Bois, science editor at *DN*, science does no longer have its own department at the newspaper because of the tough financial situation. Even though the public interest for science has not gone down, this is where the costs have been cut.²⁸ The same goes for *SvD*, the second big daily newspaper in Sweden. The decline of science journalism is further problematized and discussed in an article in *Nature*, “Supplanting the Old Media?”, by Geoff Brumfiel (Brumfiel, 2009). *“As newspapers employ fewer people with science-writing backgrounds, these press offices are employing more. Whether directly or indirectly, scientists and the institutions at which they work are having more influence than ever over what the public reads about their work.”* This lack of balance between pure communication activities and journalistic work is a worrying trend for many people. Bora Zivkovic, author of *A Blog Around the Clock* on *ScienceBlogs.com* and an online community manager for the Public Library of Science journals, means that a press release that is slightly rehashed by somebody in the newsroom and then just goes in the paper is sensationalistic and wrong. As she expresses it, *“(...) it erodes the public trust in scientific endeavour.”* (Brumfiel, 2009). Deborah Blum, who won a 1992 Pulitzer Prize and who now teaches at the University of Wisconsin at Madison, expresses a similar kind of worry: *“Science is like any other enterprise, it’s human, it’s flawed, it’s filled with politics and ego. You need journalists, theoretically, to check those kinds of things.”* (Brumfiel, 2009).

Coming back to the question of what is science journalism and how science journalists should treat research, there seem to be a consistency between literature and empirical results. Under *section 2.3.1* it was discussed how the increase of corporate science and competition for funding has broken the contract between science and society based on the previously assumed but no longer valid disinterestedness of science. Scientists clearly have their own agenda and their motives are not always as altruistic as society would want them to be. However, if science journalists are trained in acknowledging this shift and become more investigative the balance can be restored. Hadenius sums this up well:

²⁸ <http://urplay.se/164619>

"They need funding and of course that's why they want to be more positive with communication activities (...) I'm not sure how big the shift is. Perhaps it's sound that the researchers actually have to compete for funding, which they did not use to have to do. Perhaps it's good but the balance must be right. The point here is that as a science journalist you of course must be aware of this happening"

Even when there is a general consensus on what is science journalism, the question still remains: How do we communicate science in this rapidly shifting media landscape? When big stakeholders in traditional media are cutting costs and more and more content migrates to blogs and other social media platforms, how should researchers, communication staff and journalists relate to this and how should they communicate in the future? As put forth by Alok Jah, when only 1 % of the content from traditional media involves something related to science, more than 10% of the content on social media does. There are no clear facts on how science journalists view research blogging. However, some insights have been gained when interviewing journalists for this paper. One journalist says that *"as a journalist I don't really care what the research blog says, although it can give me 2 things: To use the researchers skills as a communicator and to follow the on-going discussion and what is being said"* When answering the question *"Have you ever quoted a researcher in an article with regards to what he/she has said on his/her blog?"* it becomes clear that there are still some conflict between journalists and the blogging researchers.

"I would feel that it wouldn't be serious, as long as it's not a very well-known and famous researcher (...) If I have talked to a researcher personally I would feel more comfortable with quoting from his/her blog if he/she has told me to do so"

This is a natural consequence of the journalistic ideal of source protection and the practice of getting your own, unique source. Also, the journalist probably would want to talk to the researcher before quoting him/her from his/her blog in order to secure the quality of the content. Researcher Åsa Larsson writes on her blog: *"Science journalists have sometimes expressed scepticism towards research blogs, because they partly constitute a competitor in the publishing of results and news"*.²⁹ However, as we have already seen, there are clear indicators that researchers avoid publishing scientific findings that have not yet been peer-reviewed.

²⁹ <http://tingotankar.blogspot.com/2011/05/research-blogs-view-more-presentations.html>

In this next section we are going to talk about the practice of research blogging, creating press releases and helping journalists to find the right researchers to interview for their articles. We will also discuss the role of blogging scholarly metrics and blog portals based on trackbacks and quality aggregators such as researchblogging.org, as a way to quantify the academic blogosphere and secure quality content.

4.1.3. HOW COMMUNICATE? - RESEARCH BLOGS, PRESS RELEASES AND EXPERTSVAR.SE

WHY BLOG?

To answer this question one could start with the more generic question: Why communicate research to lay men? Again, according to Tina Zethraeus at SLU, *“Swedish researchers are generally accommodating and very aware of the need to communicate outwards”*³⁰

One interviewed blogging researcher says he started blogging out of curiosity, because he had been reading a lot of blogs at the time. Another emphasized the blogging practise connection to ones personality. *“I believe that to a certain degree one needs to be extroverted to start and maintain a blog. I see myself as a classic exhibitionist”*. For others blogging can be a way to deal with the feeling of isolation. Åsa Larsson has blogged as a researching archaeologist for 4 years and also worked to promote and implement research blogging. In a seminar on Science in the Media in 2011 Larsson gives her view on why she started to blog. *“I had been more or less completely sick and tired of my subject (...) I was isolated, had lost all skills of communicating. Blogging helped me to start communicate again”*³¹ She goes on asserting *“blogging helped me get a feeling of the purpose of my research”* and that it was a way to *“meet a lot of people and get a lot of ideas”*. This last point stresses the blog as a tool for networking. As one interviewed blogging researcher says *“I see the reading of blogs as a way to get the information directly from the source, like a complement to reading the news (...) it*

³⁰ <http://urplay.se/164643>

³¹ <http://urplay.se/164643>

has been a way for me to keep myself up to date of what is going on within my field”.

Going back to the initial question why blog, some might also start out of inspiration from blogging colleagues. As with this case many times it starts with reading other blogs, then getting more and more curious about the medium. Another way to get a first feel for the blog is to be invited to blog as a guest blogger. However, it should be argued whether this really constitutes blogging since the whole idea of a personal space is removed on institutionalized blogs. One interviewed researcher was invited to guest blog at the Swedish research portal forskning.se. He accepted the offer out of curiosity, but later came to reject the medium as stiff and boring. This will be further elaborated under the section *Blogging in an institutionalized setting*. After having conducted several interviews with blogging researchers it became clear that the blog serves 3 main purposes:

- Personal space for documenting thoughts and ideas
- Tool for networking and self marketing
- Space for developing ones writing skills

BLOGGING AS A PERSONAL SPACE FOR DOCUMENTING THOUGHTS AND IDEAS

The blog, as we have seen, is a versatile tool, that can be used in many contexts. Some people merely use it as a substitute for keeping a log on your research activity. Others are more focused on writing for their readers. The personal traits of the blog may create conflict when blogging within an institutional setting. As was mentioned in the dissertation of Efimova, this is especially true when blogging in a corporate context. Blogs that are hosted by institutions often reduce the incentives to blog, simply because the blogger doesn't feel he owns the writing space, which also is an inhibitor for writing in a more free and personal manner. As one interview participant mentioned, *“I don't like blogging in an institutional setting, first because the layout of the blog tend to be stiff and boring and second because, as a consequence of this, it doesn't feel like mine”.* Consequently, many bloggers enjoy writing in blogs with a personalized layout that they feel is their property and nobody else's. A similar problem occurs when publishing posts on group blogs. Group blogs, to quote, *“create more pressure to write, which harms spontaneous posting”.*

It is also not uncommon to maintain a blog simply because of practical reasons like traceability of one's thoughts. As one blogging researcher in political economics puts it: *"Blogging forces me to take notes in a more systematic manner, which contributes to increased traceability and decreased aimless surfing, which saves rather than takes time"* Critics to the blog claim that it is a waste of time documenting ideas that very seldom will be used anyway. However, this is the case with most ideas and the possibility of documenting them in a blog works as a sort of "intellectual fishing net" that catches embryos of ideas which might evolve into something bigger, as Drezner metaphorically puts it (Drezner, 2009).

The blog has always been a subject to misconceptions. Åsa Larsson gives her view on some of the fears associated with blogging *"We are always concerned about being considered as light-weighted unserious clowns (...) it will take time to come over this"*.³² Dan Cohen, a prominent research blogger, writes in his blog from 2006, *"Despite the fact that tens of millions of people now have blogs, the genre is still considered by many—especially those in academia—to be the realm of self-involved, insecure, oversexed teens and twenty some things"*.³³

As we have already discussed, this constitutes the far end of the spectra on how the blog can be used. The other extreme is to only write for yourself, which will not give you many readers. Finding the balance of putting a little extra effort on the style and structure of your posts, while still writing in a natural way is hard. One interviewed researcher says; *"when writing stuff on the web you can't just write anything. You must think twice about what you're writing. This is of course time-consuming"*. Another misconception about the blog is that you have to be a frequent writer in order to maintain your blog. This may be true regarding non-academic blogs but within the academic blogosphere it is certainly not. Through twitter and RSS-feeds you can easily get notified about specific blog posts, and you never really have to visit the blogs yourself to check if there are new updates. As Dan Cohen puts it, *"With blogging, there is no requirement for frequent posting, and I subscribe to many scholarly blogs that have infrequent, but substantive, posts"*.³⁴ Barbara Ganley gives a similar observation:

³² <http://urplay.se/164643>

³³ http://www.dancohen.org/blog/posts/professors_start_your_blogs

³⁴ http://www.dancohen.org/blog/posts/professors_start_your_blogs

“Blog to reflect, Tweet to connect.”³⁵ According to one blogging researcher, sceptics often ask: “Doesn’t it takes up a lot of your time? I then answer no, provided that I haven’t decided that it should be a marketing thing. Now it’s more like a notebook, which forces me to take notes more systematically. This rather saves than takes time”

From a more generic perspective, the notion of openness and transparency associated with the blog can conflict with the more pragmatic aspects of doing research. Not to say that the academic society is not open, rather it has always been very result oriented so that before you have your results, backed up with evidence and vetted through extensive peer reviewing, openness might invoke fear of losing your intellectual property to others, or staking some claim that might turn out to be false. Larsson talks about this conflict. *“For the blog, the process is more important than the result (...) but we are taught by the university to keep the research process mostly under wraps (...) at the end of it we should have some written result, water proof and published in some academic journal”.*

BLOGGING AS A TOOL FOR NETWORKING

Many researchers read other researchers blogs so if you want to make a name of yourself and extend your network within academia, blogging is a good tool. According to one interviewed researcher a common motivation boost for keeping up the frequency of the posts is the statistics of your readers. A common tool used for this is Google analytics. Wordpress also provides statistics for tracking your readers. A common trait is to get very focused, almost obsessed, on your readership statistics once they start rising. A blogging researcher in history of medicine explains that when he realised the extent and geographical spread of his readers, he became very focused on adapting his writing in order to attract more readers. This, however, drained his motivation to blog, and he felt that he was losing the very essence of why he started blogging in the first place. Shortly after, he went back to writing more for himself than for his readers.

Another blogging researcher explains that his blogging has led to a great deal of new contact, mostly through people commenting on his posts. For another of the interviewed

³⁵ <http://www.nytimes.com/2008/11/23/fashion/23slowblog.html>

blogging led to a professional relationship that eventually ended in the co-authoring of a book.

Alex Soojung-Kim Pang writes in his blog about research blogging, that for most academics blogging should be a natural extension of their daily work, which is; write, quote, network and argue³⁶. He also claims that many researchers have realized how the blogging practice can be used to enhance their credibility. The analogy goes; transparency=credibility, or, *“if you are willing to be so open about what you do then, the logic goes, you must be good”*. The blog can also be a good platform for starting debates, and thus attract readers and people who comment. One of the interviewed researchers says that before he started blogging he wrote debating articles for newspapers. These articles have now migrated to his blog instead. To extend ones academic network, talk to and argue with peers is something that researchers do all the time. Only, for the majority of them, it does not take place in cyberspace but face-to-face on conferences and scientific fairs. Cohen means that extending your network through blogging is a way for researchers to *“build their personal brand: to widen the reach of their ideas, to increase name familiarity, whatever you want to call it”*³⁷. It has also been shown that more and more researchers use twitter as the main channel to promote content on the web, which in many cases involves content on their own blogs, or blogs of other researchers. A report on the presence of higher education on Twitter from 2010 shows an increase from 30,7% (2009) to 35,2% (2010). Out of these an estimated number of 57,8% described themselves as professors or instructors and over 30% said they had been working in higher education for more than 20 years (Faculty Focus, 2010). What is especially interesting is the way this group of academics use the medium. Compared to an identical survey conducted by Faculty Focus in 2009, the amount of people in higher education that uses twitter as a way to share content with their peers has risen from 21,8% (2009) to 49,1% (2010). This is a clear indicator that social media is beginning to (or has already) establish itself as a mainstream communication medium within academia. The report includes interviews with active users of twitter out of which one says “Twitter has been a tremendously useful tool for me in connecting with other professors” Another says “I’ve reached more people and have had more exposure as

³⁶

<http://web.archive.org/web/20060207234329/http://blog.redherring.com/MT/archives/main/000603.html>

³⁷ http://www.dancohen.org/blog/posts/professors_start_your_blogs

an academic tweeting and blogging about higher education than I have ever had with my more traditional research and publishing” (Faculty Focus, 2010).

Academics are intellectual beings to their nature and many of them have interests in other fields outside of their own. However, as the prominent physicist and thinker C.P. Snow showed in his famous lecture “The Two Cultures”, academia can be quite balkanized. This is of course especially true with regards to the social and the natural sciences, which is what Snow refers to as “The Two Cultures”. Looking at the blog from this perspective, it is a medium with great potential to mitigate this balkanization by strengthening the internal connections of a sometimes quite segregated scientific community. As one interviewed researcher points out: *“Blogging has led to new relationships with researchers, though not from my own discipline but from other research fields that also interests me.”* This is also important from a professional point of view, as the importance of interdisciplinary communication tends to increase with the increased complexity and diversity of research projects. An example is the Human Brain Project, which involves research groups from 12 different disciplines, all of which need to be able to communicate with each other.³⁸

BLOGGING AS A SPACE FOR DEVELOPING WRITING SKILLS

Journalists and frequent writers engage in the blog practice in a way to “refine their craft”³⁹. One of the interviewed blogging researcher says: *“The blog has helped me to develop my educational authoring capability”* However, most academics fail to view the blog in this manner. Why is it that they avoid this medium that essentially satisfies many of their professional needs, such as networking, quoting, writing and arguing? Larsson finds the answer in the academic process of writing publications. In a sense, researchers view their own writing as a culmination of various months of research work, to be organized into words. Writing a scientific article is rarely an interactive process involving non-academics. Naturally, many researchers take their own writing very serious and have come to associate it as something demanding, rigorously scrutinized by their peers. As Larsson puts it: *“We are trained to view our writing as the culmination*

³⁸ http://www.humanbrainproject.eu/in_brief.html

³⁹ <http://web.archive.org/web/20060207234329/http://blog.redherring.com/MT/archives/main/000603.html>

*of a work presenting the results – preferably rock solid and untouchable*⁴⁰. The schooling of academic writing therefore, in a way, needs to be untrained when operating in the blog medium. According to an interviewed researcher at Lund University who do not have a blog, there is a general fear of being misquoted, which is especially true regarding more controversial research, as is the case within certain disciplines within the Life Sciences. The opinion of another researcher, who occasionally participates in a group blog, aligns with the non-academic view on the blog as a good way to practice ones own skills in writing popular science.

The barrier created by the schooling in academic writing might be made less significant for bloggers who have a more personal relationship with their blog. This was expressed by one of the youngest interviewed blogging researchers who views his blog as a personal tool rather than something associated with his work. The interviewed also meant that writing in a more personal manner is not as time consuming as writing more substantial posts on other research, which then demands more linking, quoting and substantiating ones opinions.

So why promote research blogging from a societal perspective if the researchers are only going to blog about personal issues? This is not the argument here. It is very hard, if not impossible, to write about peer-reviewed research in a personal manner, without feeling some kind of external pressure. The argument is therefore to start your blog with some less scientifically substantial posts in order to get you going and help you develop your writing skills. Ones you feel more comfortable with your blog and your writing it is easier to start writing more serious posts. One interviewed blogging researcher especially stresses the importance of unconditional writing, namely the feeling that it is ok to write down and post something that comes to mind and that not all posts need to resemble some abstract of an academic article. This is for example the case at researchblogging.org, where many of the bloggers started off with personal reflections on everyday issues, to move towards more serious posts about peer-reviewed research. When reading blogs at researchblogging.org it becomes evident that many bloggers still write personal and less substantial posts, which is why researchblogging.org is such a good tool because it only aggregates those posts marked as posts about peer-reviewed research. As we have discussed earlier, once

⁴⁰ <http://tingotankar.blogspot.com/2010/06/vetenskapsbloggskolan-del-3.html>

you take away the freedom of the blogger to write whatever he/she feels like writing you have removed the very essence of the blog, namely a personal space to reflect and discuss on issues that concerns you. This is possibly one of the main reasons why more institutionalized blogs, such as guest blogs and group blogs have less motivated bloggers, as expressed by some of the interviewed researchers.

As one develops a style of writing that is engaging, it becomes evident that blogging can work as a good tool to maintain and develop relations with the public. One blogger who blogs on a group blog in an institutionalized setting stresses *“We have to attract publicity, and reach the core of those who are interested in what we are doing”*.

BLOGGING IN AN INSTITUTIONALIZED SETTING

One can again stress the importance of the blog working as a personal space. The feeling that the blog belongs to you as a blogger is extremely important with regards to your motivation to write. Blogging in an institutionalized setting can not only kill off your own motivation but also create resentment towards the blog in general. As one interviewed former guest blogger points out:

“This whole blogging thing doesn’t at all feels as hip anymore. It just feels like a pre-packaged product ordered by the university”. Another interviewed stresses the fact that many research bloggers are quite mobile in their work and don’t always stay at the same University. Having an institutionalized blog then creates mobility problems in the occurrence of transfers between Universities.

One interviewed non-academic working with public communication for the ESS project in Lund expresses his difficulties in attracting researchers to blog at the ESS blog, which he manages. *“You invite them, try to persuade them, and if they come they get tired after a while and then never come back”*. If you don’t feel that the blog is something that you have created, something that belongs to you, then blogging will just be like writing any other article for a real newspaper. What would you choose then? Something you know will have an impact, such as a newspaper, or a blog that you have no idea who reads? Sites like newsmill.se are in fact lowering the border between the blog and the article. More and more articles have extensive commentary fields and on newsmill.se anyone can start a public debate on the basis of an article. In this sense other tools that

have greater impact can easily substitute the blog. The interviewed guest blogger expressed his frustration on the lack of readership statistics when blogging in an institutionalized setting: “*Frankly, are there anyone who actually reads my posts?*” Once again, the lack of personalization and readership statistics tends to kill off motivation.

PUBLIC DEBATE ON RESEARCH BLOGS – THE NEW MEETING POINT BETWEEN SCIENCE AND POLITICS?

Despite the criticism on institutionalized blogging in the above section, one university that has managed considerably well in inviting their researchers to blog under the University’s domain is SLU, which is an abbreviation for *Svenska Lantbruksuniversitetet* (The Swedish University of Agricultural Sciences). What distinguishes SLU’s platform from other less successful institutionalized blogging platforms is that they have stated a clear purpose:

“The Swedish University of Agricultural Sciences, SLU, works to enhance the knowledge about the earths biological resources. It is about topics that are in the middle of the public debate, and frequently occurs in media. Within SLU, open debate is encouraged. In this blog researchers at SLU can, with a scientific approach, contribute to the debate with personal opinions and comments”⁴¹

SLU has chosen to use the blog as a medium to spark a public debate about genetically modified crops. The majority of the posts are about the implications of the latest research on GMO’s (genetically modified organisms). In the literature study of this thesis we saw how swedish meteorologists Ekholm and Arrhenius used traditional media as an ally for their own political agendas. It appears that the blog can work as a similar tool for the researchers at SLU.

One interviewed researcher in this thesis is a frequent blogger at the “The Climate Scam”, which is a controversial blog about Global Warming.⁴² With regards to science and politics he says that being exposed as a researcher within the public debate on controversial and political issues can also backfire and decrease your chances of getting funding. Today there are political forces that would like to support research that

⁴¹ http://blogg.slu.se/forskarbloggen/?page_id=326

⁴² <http://www.theclimatescam.se/>

confirms global warming as a humanly caused phenomenon. The researcher says: *“There are many here that don’t have the guts to say what they think. If someone for instance is open with his/her climate-scepticism then he/she might have a hard time getting funding.”* The opinion of this particular blogging researcher shows that not all researchers care about political agendas and that some actually goes against what would favour them from a political perspective. In both cases, however, it is clear that the blog as a medium promotes interactivity and dialogue, which are indeed favourable attributes for sparking and maintaining public debates on scientifically controversial issues. An alternative platform to the blog that has proven to work well for this kind of purpose is newsmill.se. Further research is suggested on how this platform is used by researchers with regards to political controversies.

BLOGGING RESEARCHERS AND ALTMETRICS.ORG – OPORTUNITIES FOR THE FUTURE?

Drezner highlights some criticism for the blog as a medium. “Blogs may be more like private journals with mega- phones than reasoned contributions to public life” (Drezner, 2009). He then goes on, problematizing this criticism with the fact that academics and public intellectuals makes their voice heard and actually manages to draw attention from the public and media through their serious posts (Drezner, 2009). As has been argued blogs constitute a personal space for the researcher and need to do so for the researcher to be emotionally attached to his/her blog. So how can a University leverage on the growing academic blogosphere for science communication purposes? Once again, researchblogging.org provides a perfect platform for this. The insights from interviews and literature suggest that Universities should try to avoid institutionalized blogs because this kills off motivation. With the platform provided by researchblogging.org the researchers can keep their personal touch on their blog and then choose which posts to highlight at researchblogging.org, as serious comments on peer-reviewed research. As was discussed earlier, the way this portal aggregates serious comments on peer-reviewed research works as a very good complement and discussion initiators. This aligns with Drezner’s argumentation that “Blogging is not a substitute to other publications: done correctly, it is a powerful complement” (Drezner, 2009).

Lund University has been experimenting with encouraging their researchers to blog and many research projects today have communication staff running blogs and inviting guest bloggers. When interviewing a blogging representative for the ESS-project working with PR and communication, he explained that most of the times when he managed to get some researchers at ESS to write at his blog, they would normally write 1 or 2 posts and then never come back. As Swedish Universities are interested in getting their researchers more engaged in outwards communication, practical incentives to communicate are hard to implement if there is no clear structure on how to measure and quantify communication activities on the web.

As a result of the growing social Web new fields are emerging within bibliometrics, which involves new approaches to measure the impact of scientific publications. Defined on Wikipedia, "Bibliometrics is a set of methods used to study or measure texts and information (...) Historically bibliometric methods have been used to trace relationships amongst academic journal citations."⁴³ Today, reference management systems such as Mendeley and Zotero are aggregating academic journals to the cloud and integrating citation statistics with readership statistics and seamless social interaction. Mendeley is now the world's largest library with over 100 million academic publications.⁴⁴ It is also a social network for academics, where it is possible to follow your professional interests and spot trends by following academic colleagues, groups and tags. Like Facebook, Mendeley has an open API (Application Program Interface), shared under a creative commons license, which allows third party organizations to extract data and build applications on top of their platform. Non-profit organization altmetrics.org is using this possibility in an attempt to redefine the traditional ways on how academic impact is measured, based on peer-review and citation statistics.

In a way this relates to the communication of science because it allows single paragraphs or comments to data and findings to be peer-reviewed before an academic paper has been published, also referred to as semantic publishing.⁴⁵ This can in turn be linked to researchblogging.org and trackbacks in order to measure those who are most active in the discussions on the blogosphere related to academic publications.

Altmetrics.org is an initiative run by Dario Taraborelli researcher in cognitive science

⁴³ <http://en.wikipedia.org/wiki/Bibliometrics>

⁴⁴ www.mendeley.com

⁴⁵ http://en.wikipedia.org/wiki/Semantic_publishing

and social computing at the Wikimedia foundation, Jason Priem, PhD student in Information and Library science at the University of North Carolina-Chapel Hill, Paul Groth, assistant professor in knowledge management and computational science at VU University of Amsterdam, and Cameron Neylon, Senior Scientist in Biomolecular Sciences at the ISIS Neutron Scattering facility at the Science and Technology Facilities Council (STFC).

The most common approach to measuring activities on the Web is through the relatively young field of Webometrics. The term was first coined by Peter Ingwersen in 1997 (Almind & Ingwersen, 1997). According to Björneborn and Ingwersen Webometrics is "the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the Web drawing on bibliometric and informetric approaches." (Björneborn & Ingwersen, 2004). With a continuously evolving web, new opportunities have emerged to combine academic bibliometrics with webometrics, in order to create a standardized framework to measure communication and impact in a more diverse manner. This is the goal of altmetrics.org, a project that is still at a very embryotic state. The initiative is motivated by three observed problems, linked to the traditional filters of: peer reviewing, citation count and JIF (Journal Impact Factor). The latter is a measurement of the average citations per article. Relevant to this thesis is the way in which citation count can be complemented with a measurement of aggregated comments to journal articles because these comments are often more accessible to the public (see *section 2.3.5. Researchblogging.org and trackbacks*). The following is an excerpt from the manifesto of altmetrics.org and describes the problems with citation count. The h-index is a way of measuring the academic impact of a researcher through citation count and was proposed in 2005 by J.E. Hirsch (Hirsch, 2005).

"Citation counting measures are useful, but not sufficient. Metrics like the h-index are even slower than peer-review: a work's first citation can take years (...) These metrics are narrow; they neglect impact outside the academy, and also ignore the context and reasons for citation."

Readermeter.org is a tool built by altmetrics.org, based on the open API of Mendeley in an attempt to redefine the h-index, based on bookmarks instead of citations. When academic content is migrating to the cloud, more and more opportunities and challenges like these will be presented in how to measure both academic and non-academic impact

of researchers publications and research blogging. As already mentioned, altmetrics.org is not yet based on any research but is rather an urge to those academics involved in bibliometric and webometric research to further explore these areas. As researchblogging.org manages to make academic knowledge more accessible to the public, the conditions for a complementary system of merit, based on outwards communication rather than pure academic impact through citation count and traditional peer reviewing, are continuously improving.

Although, many of the opportunities discussed above involve purely quantitative measurement frameworks. This is not enough as the status and impact of one blogging researcher might differ from that of another. If two researchers both write a post that link to another researchers blog, it will affect the status of this blog differently. Let's metaphorically say you are the brand Nike. You will then of course gain in status very differently if Usain Bolt walked around in your shoes and posted it on his blog, then if some random person did the same thing. Consequently, purely quantitative measures of researchers activity on the web will fail to measure the status of these blogging researchers as a consequence of the relations to their peers and the kinds of people that read, comment and link to their blogs. One interviewed researcher that has been blogging since 2002 gives a similar opinion on this matter:

“All blogs are not created equal but some bloggers have naturally higher status than others; if these link to or comment on your blog then it means a lot for the creation and maintenance of a high status within the blogosphere.” It basically boils down to a PR thing. As quoted from the same researcher: *“If Andreas Lokko or Fredrik Strage (prominent Swedish music and film critics) writes something positive about a new band then the status of this band will increase amongst certain groups of ‘pop-geeks’ rather than their status stemming from current sales or the amount of times they’ve been mentioned in the media”*

BLOGGING AS A SPACE FOR PUBLIC INTELLECTUALS – THE COFFEE HOUSE 2.0?

As was discussed in the literature study, during the 19th and 20th century we witnessed an increasing rise in public intellectuals. These were men of the public who could take on any scientific issue and debate it in a public setting. The ideal of the public intellectuals to be “men of the people”, communicating interest in scientific development,

remains the same. However, there are those who argue that these public intellectuals are in decline. One of the big arguments is the increasingly disinterested public and the lack of PUS, and that this allowed the public intellectuals to “screw up” because no one cared or knew the difference anyway. This is however somewhat contradictory to the natural state of the intellectual blog, which provides an endless commentary field for rigorous vetting from other intellectuals and readers of the blog. Screwing up in the blogosphere means a potential furious debate, which provides the tools for a collective intelligence and engagement rather than intellectual alienation. Also, Drezner highlights survey results, which says that laymen view academics as more accessible on their blog than meeting them face to face (Drezner, 2009). These are indeed promising results when viewing the blog as a trigger for the democratization of academic knowledge.

Researchblogging.org was introduced earlier in the paper. It constitutes a portal that finds and selectively aggregates posts from its connected blogs that discusses peer-reviewed research. As the appearance of public intellectuals has appeared to decrease, it could very well be that some of these have migrated to the blogosphere. Further research is needed on this. What can be concluded however, is that researchblogging.org constitutes the perfect platform for the new “coffeehouse 2.0”. Not only does it allow the bloggers to keep their personal touch, it also highlights serious posts about peer-reviewed research and invites the public to join in on the discussion. Furthermore, there are substantial guidelines on the website regarding what constitute a serious post. If these guidelines are not met in a specific post aggregated to the site, this post can then be flagged and discussed publicly, within the research blogging community.⁴⁶ This proves Drezner’s argument that you can’t really screw up in the academic blogosphere. One interviewed researcher said he follows scientific progress and read about other research and than his own on research blogs. In this way, subscribing to blogs works as a substitute to reading the news. The question is, who reads the posts aggregated to researchblogging.org? In order for it to evolve into a “coffeehouse 2.0” it need to be able to attract the general public. Further research is needed on this topic. One interesting aspect would be to study the traffic on researchblogging.org. If granted permission by Seed Media Group, who manages the

⁴⁶ <http://researchblogging.org/news/?p=53>

portal, a quantitative study could be made on who reads what and from which country, what posts attract most readers from the general public and so on?

It is not within the scope of this paper to discuss all forms of science communication (see delimitations), as there are many. It is within the scope to discuss written science communication such as press releases, ES and research blogs. This next section will put the blog into the context of these other tools. It will also scrutinize the push and pull-model (press releases vs. ES) based on interviews with the responsible for ES and communication staff responsible for press releases at LTH and the faculty of medicine, both employed by Lund University.

BLOGGING VS PRESS RELEASES

In a way, blogging could serve as a good substitute for press releases since the information comes directly from the source and the communication invites dialogue. The blogging researcher also has direct control over the headlines of his posts, he has access to readership statistics and he has direct control over the context in which his posts are published. However, researchers very seldom write about new research breakthroughs and results on their blogs. For those stakeholders interested in this type of information, press releases still serve a purpose. Also, much more effort needs to be put into one's blog to attract enough readers. Newly started blogs thus need time before their posts start having impact. In this sense, a blogger also needs some form of intrinsic motivation to keep up with the blogging even though he or she does not have any readers. Press releases are good if a researcher lacks this motivation and only wants to publish something every once in a while. When interviewing a quite young blogging researcher in astrophysics, his general opinion about press releases was to quote *"quite 20th century"*, and thus a bit old-fashioned. However, within his field of research, the press release is not used very often, so the representativeness of his opinion can be questioned. However, it still points to the fact that it is an old tool, maybe not as suitable today as it was 50 years ago (more on this under the next section). Another interviewed non-blogging researcher at the Faculty of Medicine had a clearly negative attitude towards press releases. He was especially annoyed over the content and how it was presented. Firstly, the fact that the press releases are presented at the University web page can be questioned. What is the purpose of publishing at the

University home page, when e.g. researchers have received small grants, and/or promoting trivial progress? Secondly, the press releases that are important are published on databases, such as *Mynewsdesk*, *Eurekalert* and *Alpha Galileo*, so why publish trivialities on the University home page? The only thing this seems to do is to annoy researchers, who then lose faith in this way of communicating. It also makes some researchers reluctant to communicate outwards, since they now associate this with attention seeking and publicity stunts. As one of the interviewed researchers at BMC states: *“Unfortunately press releases are often about sensationalism, which can feel unpleasant”*. Further studies are recommended on what emotions researchers attribute to press releases and how this affects their general view on communicating outwards. Do for example the negative emotions toward press releases affect the view on other communication media?

Another important feature of the blog that distinguishes it from the press release is its fragmented nature. A press release is only a press release once and can neither be updated, nor fragmented. Even though on some press releases it might be possible to comment, the language in which they are written does not really invite discussion. Concerning the blog however, it is possible for certain aggregators to find serious posts and connect them to the peer-reviewed articles that they have been quoting. This does not only visualize serious scientific discussions going on in the blogosphere. It also makes the discussion transparent for those only searching for the quoted articles. As it says on researchblogging.org's homepage: *“Other services like PubGet index our database as well, so every time readers search for a journal article, they can also locate blog posts discussing the article”*⁴⁷

As was discussed earlier under *section 4.1.1* there is a lack of consensus regarding what is more important; educating the public about scientific facts (result-oriented) or educating the public about the scientific method (process- and value-oriented). Because of the transparent, interactive and personal traits that blogs possess, it can be argued that it is better suited for conveying research as a process rather than, to quote Bly from *section 4.1.1*, *“(...) as a manufacturing resource for society.”* This result-oriented view of science is better communicated through traditional media channels. Through the blog, there is a possibility for media and the engaged public to get to know the researchers and get a feel for the process of conducting research, the every day life and

⁴⁷ <http://www.researchblogging.org/static/index/page/about>

what it really means to be a scientist. The blogs can do this because they are highly interactive and transparent, which often make them feel genuine and personal and not some tailored product of a PR machinery (although this can of course also be the case as we have seen with institutionalized blogs). The need to make science more transparent, and how this can be done, is discussed by science communication researcher Alice Bell, in one of her blog posts from 2010.⁴⁸

“I thought I’d focus on an idea: an invite to take things ‘upstream’ (...) In essence, it’s an argument for showing more of science in the making, not just waiting for publication of “ready-made” peer-reviewed papers.”

Bell does not claim that this ‘taking science upstream’ should replace the traditional ‘down stream’ reporting of scientific results. What she is suggesting however, is for science journalists to become more engaged in the creation of stories about the scientific progress or this ‘science in the making’ as she calls it. It is not an issue of tripping over patents and publishing results before they have been peer-reviewed. As we have seen, researchers would never talk about premature data and results in their blogs anyway. It is rather a call to tell the stories about the people behind science. We will discuss this further under *section 4.1.4*, with the example of the Norwegian documentary hit *Brainwash*. Bell argues that telling stories about the scientific progress is not about data but about people and that the media community should rethink what they think the public wants and finds interesting. Again the characteristics of the blog fit very well with this communication shift from data to people. Bell sums this up well:

“(...) I think upstream science journalism offers something sell-able. It’s based on theatre after all. It swaps that cliché of ‘scientists have found’ for ‘scientists are doing’. It focuses on ‘scientists find interesting’, ‘scientists wonder’ or ‘scientists are excited by’.”⁴⁹

The content of a press release can differ from time to time and the only regulating factor is, according to press staff at Lund University, current praxis on how to write one. Due to the Swedish law of “medelarfrihet” any employee at the University has the right to publish information about any subject they like, although it always goes through the press staff that works as a filter⁵⁰. The freedom to write about any subject is of course

⁴⁸ <http://alicerosebell.wordpress.com/2010/09/03/taking-science-journalism-upstream/>

⁴⁹ <http://alicerosebell.wordpress.com/2010/09/03/taking-science-journalism-upstream/>

⁵⁰ <http://sv.wikipedia.org/wiki/Meddelarfrihet>

also true for the blog; however, the blogger is more dependent on his/her readers. The content of a blog is in this sense regulated by its readers, whereas the editor regulates the content of a press release more. In contrast to the perception of the interviewed researchers, press staff claim that the content of a press release does not relate to awards and grants, but only to new scientific discoveries that might be of interest to society. On the question regarding the researchers attitudes toward press releases, interviewed press staff experience both negative and positive reactions, but with a positive trend. As corporate interests are moving closer to the labs, some press releases can be very biased and work as PR for the researchers newly founded company. *“Before, there was a clear scepticism towards these kinds of publicity stunts – and to some extent there still is – to appear too much in media can for many viewed as unprofessional and unserious”*. Another interviewed press staff claims that *“most researchers sees the task of communication science results to the public very seriously and are very sympathetic towards press releases”*. To get the full picture, however, qualitative studies through discourse and content analysis are suggested combined with a questionnaire directed at the researchers exploring general attitudes towards press releases.

Also worth mentioning is that the praxis on how to write a press release and what it should contain can differ from institution to institution. At the Faculty of Medicine for example, there are clear guidelines declared by the highest administrative authority of the faculty.

According to a media study from 2010 for the faculty of medicine, conducted by a third party organization (infopaq) and shared by one of the interviewed press staff, the quality measure of their press releases reached 23%. The quality is measured by a combination of quality attributes times potential readings, which gives an estimate of the number of people who have read and remembered the press release. The quality attributes consists of text focus, pictures, text quantity and media bias. To measure what's being said about the University on the blogosphere, the University uses text analysis software provided by the third-party organization Meltwater. The problem with blogs is that readership statistics is owned by the blogger (except for institutionalized blogs) and so when Universities wants to measure impact it is not as straightforward as when measuring impact through traditional media.

PRESS RELEASES AND ES = PUSH VS PULL

Press releases symbolises a sort of push-model, where academic knowledge is translated and transported to press release databases, with the hope that, some external stakeholder will find it and use it somehow. The problem with this model is that it becomes very time consuming when the rate of scientific progress is accelerating. An interviewed press staff at the faculty of medicine approximated the work of creating a press release to 4 hours. The same faculty creates, according to the interviewed, around 55-60 press releases a year, which ends up in around 240 hours of work. There is simply too much new research to cover, and how can the universities know what would have the greatest impact on the public. A consequence of this is that many of the press releases never get used. This is an enormous waste of time and could be done more effectively. The state-funded organization *Expertsvar (ES)* has been working with a new approach for the last 10 years. *ES* consists of a network of press staff at University's information bureaus throughout the country and journalists connected to their service. It is a free service for the journalist but the information bureaus has to pay an annual fee for their employees to be able to use it. Whenever a journalist is in need of expert knowledge for his/her article, he/she can write a request or question to *ES*. The staff at information bureaus throughout the country that are connected to the service then tries to find an appropriate researcher for the journalist to contact, and then answer the journalist's request by providing him/her with contact details for one or more researchers. According to a study made by VA a little more than 30% of science journalists in Sweden use the service (Vetenskap & Allmänhet, 2005).

Compared to press releases, *ES* constitutes more of a 'pull-model', where science journalists pull out the academic knowledge by asking questions to science communicators who then find appropriate researchers to answer these questions. In this way, people whose job it is thinking about what the public enjoys reading about (the journalists) are the ones who decide what knowledge to translate into accessible format for the public. This increases the level of utility compared to press releases.

However, this approach cannot substitute the potential for interaction that the blog gives us. Thus, it should only be seen as another complementary tool, just like all the other tools. Also, press releases are generally more effective for communicating new research results, whereas *ES* works better for utilizing academic knowledge to provide expert comments to news. This is especially true with regards to articles about big

events, such as the unrest in Libya, the nuclear disaster in Fukushima or the massacre at Utöya. According to an interviewed journalist who is responsible for ES, these events normally lead to significant peaks in the demand for expert opinions. However the interviewed also means that the reason a journalist would send us a request in the first place could sometimes stem from he/she reading a press release and wanting to know more about it. He goes on exemplifying how the procedure can play out. The following is an excerpt from the interview:

“A few years ago a tremendous debate was sparked regarding an issue with potato chips, because the communication staff and the researcher had not contemplated enough on the message of the press release. This led to a lot of journalist contacting us wanting to know more about the details of the finding. When you work as a communication staff it is important that you are critical to the purpose of the press release. Sometimes time and effort is lacking and the communication staff don’t always realize the researcher’s motives with going to the press”

This proves the problems that can be created as a consequence of the majority of the communication staff not having a background in journalism, and thus lacking this journalistic way of scrutinizing and looking for hidden agendas.

POTENTIAL REASONS FOR WHY THERE ARE NOT MORE BLOGGING RESEARCHERS AT LUND UNIVERSITY

Many see blogging as an additional activity, disconnected from their daily research. In this sense one of the main reasons not to blog is simply because it takes too much time. The problem is that it mostly takes a while before the blogger attracts readers. Up until then it is hard to motivate the blog as part of your research. Although as we have seen, it could very well serve as a substitute of keeping an offline logbook.

When in theory blogging should provide a personal space for embarking on ones own thoughts and ideas, many researchers feel that once you put it in a blog, you can’t just say anything that comes to mind. To some extent you always have to adapt and edit the content. This seems to be a great barrier because many researchers don’t have the time or motivation to do this.

Another problem seems to be the difficulty to write for an audience that is invisible. This is especially prominent when writing in institutional guest blogs such as one of the interviewed researchers did in 2010. This researcher was frustrated with the fact that he didn't get any readership statistics so he couldn't know if anyone was reading his posts at all. He also struggled with the fact that there were no direct interaction and feedback from this invisible audience. He therefore came to the conclusion *"I am more of a lecturer than a blogger"*.

One important factor at play regards the discipline to which the researcher is connected. In her dissertation on research blogging, Sara Kjellberg did a content analysis of 68 research blogs. Only 16 of these were from the natural sciences and medicine (Kjellberg, 2010). There seems to be a general tendency to be more restrictive with openly discussing and sharing research within these disciplines. When asking an interviewed researcher in medicine why he did not have a blog, he answered, *"I think I'm very careful when it comes to sharing information. First I don't want to discuss research openly that has not yet been peer-reviewed. Second, people that communicate publicly I associate with unserious researchers who are too involved in politics"*. Also basic research in medicine can be sensitive and sometimes controversial, hence *"There is a need to be careful about spreading research result too early"*.

In general however, it is a little peculiar that there are not more researchers at Lund University that have a blog. After all, Lund has quite a strong tradition of science popularisers and popularization activities. Examples of these are Bengt Lidfors, Knut Lundmark, Hans-Uno Bengtsson, Bodil Jönsson and the famous TV-series Fråga Lund. Quantitative studies are therefore suggested to explore how researchers general attitudes towards blogging may differ depending on Universities, in order to find out if there are some other, perhaps cultural, factors at play.

4.1.4. HOW COMMUNICATE? – THE IMPORTANCE OF STORY TELLING

How to communicate science does not solely relate to finding the right medium in relation to the purpose of what is being communicated, which the previous section has tried to explore. We can conclude that the press release is a good vehicle for transporting new scientific discoveries to the public, described in this paper as a push-model. In contrast, the pull-model used by ES to "pull out" expert opinions to produce content for traditional media works as a sort of matchmaking tool between researchers and journalists and has proven to be especially useful for the dissemination of academic knowledge related to world events (e.g. expert opinions on Fukushima, the unrest in Libya etc.). In the middle of these 2 approaches the research blog plays an important role in the promotion of a more transparent and continuous dialogue between science and society, cutting the middlemen in the brokerage of academic information.

However, to quote from former researcher and science populariser Henrik Brändén's blog: "*(...) to be able to make readers, listeners and viewers interested in scientific content, one should not only report news from the world of science but create engaging stories*"⁵¹ To find ground for this statement we can look back on the story of John Ericsson, scientists, engineer and national hero. As this case illustrates, people's emotions play a big part in how they relate to science. If a national hero is a scientist then this can have a long-lasting positive effect on the public confidence for the whole scientific community. Not to say the communication staff should work actively with media to create more of these heroes. For the stories to be anchored in society they must be initiated by those who represent the public, namely the science journalist and public intellectuals and not only the science communication establishment, guarding the wills and motives of the researchers. Science journalist and blogger Tomas Lindblad expresses his concern about this conflict of interest with the whole science communication establishment on the one hand, and the community of science journalists on the other. With the establishment he refers to the Swedish daily newspaper *DN, Forskning & Framsteg, SR's vetenskapsredaktion*, Universities and other federal institutions. This is important to point out because in many cases these

⁵¹ <http://henrikbranden.se/2011/05/11/vad-ar-vetenskapsjournalistik/>

actors are often the ones creating the stories. When it comes to telling stories and reporting science *“it is not healthy for science journalism to sit in the lap of the research community.”* As a comment to the seminar Science in the Media used in this paper, Lindblad goes on expressing his concern:

*“The panel consists of chief editors, communicators and government officials. I would have hoped to discuss journalism, amongst other journalists. I might be extremely cynical but my view is that when it comes to ‘science journalism’ it is mostly just an establishment coming together (...) to talk about how important it is to report science”*⁵²

However, at the same seminar Norwegian comedian and scriptwriter Harald Eia talks about his recent show on nature and nurture of human behaviour, which got a lot of attention just because it distanced itself from the agenda of the science promoters and took its starting point in the public's interest. The show was aired in spring 2010 and called Brainwash. The idea was to tell a story about science, which intrigued people the way a movie does. Eia means that in many cases, science in the media assumes that science in itself is interesting enough in a way that it is sufficient to just report the exciting scientific findings, without any dramaturgy to it. This point of view is reinforced by Alok Jah, science reporter at the Guardian, who says *“Scientists think that the benefits of science are obvious. They're not, not to those outside of the scientific community.”*⁵³

Brainwash was a huge hit and got 500.000 viewers, which is about 10 % of the Norwegian population. It is a proof that people are more open to science when it's communicated around some conflict that creates drama. The conflict in this case lied in the conflicting opinions of sociologist and behavioural genetic researchers, where sociologist tended to refute scientific findings about human behaviour that were based on biology. Eia puts himself in the middle as a 'science detective' trying to solve the mystery of what side is right and what side is wrong. The show is not anti-science but it conveys the message that “scientific arrogance does not pay off”. By doing this it also conveys the fact that many scientists are motivated by a political agenda and that science should be more of a disinterested activity, driven by the original ideals of curiosity, scepticism and openness to new things. In an engaging way, Eia also manages to teach the public about the ideals of the scientific method, without focusing

⁵² <http://tomaslindblad.blogspot.com/2011/05/festivalstamning-i-goteborg.html>

⁵³ <http://urplay.se/164642>

too much on scientific facts. This is something that Adam Bly, initiator of researchblogging.org, talks a lot about. According to Eia, the show sparked enormous debate because many of the sociologists felt attacked, but after the heat had died down it was in fact very well received by the scientific community, describing the show as “brutal but necessary”.

What Eia has showed is that a little bit of drama is a good way to make science more intriguing. Where *Brainwash* is a story of scientists with conflicting opinions, another good way to engage is to tell stories rooted in people’s everyday lives. Something that touches people and that people can relate to. John Burklow, head of communication at the National Institute of Health, the largest medical research center in the U.S., uses this approach frequently: *“We try to explain how research touch peoples everyday life.”* When asked, what’s the most important target group when you communicate, he answers *“I would say the patients and their families”*. The intention of this paper is to focus on the communication of science in text. Scientific story telling, however, is perhaps more appropriate for novels and video format since these are not as restricted when it comes to length and time. The state owned Swedish TV channel SVT runs a program *Vetenskapens Värld*, which works very much with connecting science to people’s everyday life. By relating science to everyday situations, it becomes easier to play with people’s intuitions, as Eia puts it *“to show them that their intuitions are either right or wrong.”* All prominent scientists who have managed to excel as science communicators use this method more or less. To name a few there is the American astronomer Carl Sagan and physicist Richard Feynman and the British physicist Charles Percy Snow. C.P. As was mentioned earlier, Snow is probably most famous for his lecture and article *The Two Cultures*, where he, like Eia, depicts an increasingly balkanized knowledge society, divided into the epistemic groups of the sciences and the humanities. This thesis has focused on the communication of science to non-academics but as this shows, it has become equally important to improve the internal communication across disciplines within the scientific community.

5. CONCLUSIONS

5.1 COMMUNICATING SCIENCE – WHY & HOW?

This thesis has been dealing with motives and methods for the communication of science in the 21st century. By using lessons on how science has been communicated in the past, it has made an attempt to shed some light on how science is communicated today and how the motives and conditions have changed as a consequence of a growing scientific community and a changing media landscape. The purpose has been to provide qualitative insights to 2 of the 3 research questions introduced in the beginning. The first research questions has been used as a foundation for the latter, upon which the discussion has been based.

1. How does the current practice of science communication and science journalism relate to how science has been communicated in the past?
2. What constitutes today's motives for researchers and universities to communicate with non-academics?
3. In what contexts and how are the tools; research blogs, press releases and Expertsvar.se used in today's written science communication and science journalism?

5.1.1. MOTIVES (RESEARCH QUESTION 2)

Science can no longer be seen as a disinterested activity. The increase of corporate science has invoked a need to redefine the role of Science Journalism. Increased competition for funding and researchers with corporate interests puts greater pressure on the communication between the researchers, communication staff and the science journalists. It is no longer “healthy for the science journalists to sit in the lap of the research community”. There is an unbalance between the University information bureaus and the decreasing amount of science journalists how are becoming

increasingly dependent on content produced by the Universities. During the last 2 years, studies have shown that the public confidence in the research community has been declining. The same study shows that one reason for this is an increased public awareness of researchers having political agendas.

When science journalists show great confidence in scientists, the opposite is not true. One reason for this being the case could be that scientists in general are not trained in how to deal with media. If this causes researchers to turn to the Universities information bureaus instead of a more direct contact with the journalists is unclear, but the communication staff should be more critical with regards to the researchers motive of going out with a press release.

As all Universities in Sweden are state owned, the economic incentives to allocated resources to PR and communication activities are not as great as for privately run Universities. Swedish Universities are driven to improve their outwards communication as a consequence of the new statute in the law for higher education (the third mission). However, the researchers claim there is a lack of incentives to engage in communication activities and that it takes up too much of their time for little credit. Recent reports from VA proposes improvements on this matter (Vetenskap & Allmänhet, 2011), but the whole idea of a formal system of merit for outwards communication is still at a very embryotic stage.

5.1.1. METHODS (RESEARCH QUESTION 3)

This thesis has studied 3 tools to communicate science; the press release, ES and the practice of research blogging. All these tools have proven to be more or less suitable depending on the purpose and the context in which the information is being communicated. We have also seen new methods emerging to measure level of activity in the public scientific discussion. Researchblogging.org, trackbacks and altmetrics.org are recent initiatives and potential platforms to create a system of merit based on the level of open discussion and communication of ones research. They all build upon the evolving web and new social media, which according to a report from 2010 have taken hold of the academic community, as now more than a third of all persons involved in

higher education are on twitter and where more than half of these are professors. According to Alok Jah, science reporter at the Guardian, American studies have also shown that where 10% of all blog traffic is related to Science only 1% of all news entries are. When traditional media is down sizing or shutting down their science departments, it seems that a lot of the scientific content is migrating to social media.

When some argue that the appearance and activity of public intellectuals is decreasing, there are indicators that the academic blogosphere constitute the 21st century response to the 18th century coffee houses in London. Some argue that the blogosphere is the new medium for today's public intellectuals.

When press releases manage to communicate new research result, the research blog is an opportunity to invite to a more transparent and continuous dialogue. As both literature and research for this thesis has proven, researchers will avoid talking about new results in their blogs until they have been published and peer-reviewed. However, researchers are more willing to publish results before they have been published in an academic journal (but after it has been peer-reviewed) using the press release as a medium. At the same time, there is still a lot of knowledge locked up in a difficult academic language that does not necessarily relates to new research results, but that can be useful to provide a better understanding to contemporary events and news. In this case, ES constitute an effective tool to extract this knowledge and "transport" it to the public. The interview with the head of ES has showed that there is a high demand from the journalistic community for expert opinions as the number of requests ES receives peaks during big world events, such as the unrest in Libya and the nuclear disaster in Fukushima. With regards to the communication of academic knowledge, it can be concluded that the press release represent a sort of push model of science communication, ES a pull-model and where the blog is interactive and invites dialogue. All 3 are complementary to each other and are more or less suitable depending on the type of information, the purpose of publishing and the context in which the information is being communicated.

5.2 SUGGESTIONS FOR FURTHER RESEARCH

Through interviews and the use of studies from VA an attempt has been made to illuminate possible reasons for why some researchers display reluctance toward outwards communication. The lack of incentives and time is one, the lack of control of content and bad media training is another. Further research is however suggested explore the relationships and attitudes between researchers, journalists and communication staff, and how this affect the researchers general willingness to engage in communication activities. It is also recommended to specifically conduct qualitative studies, tentatively through discourse and content analysis, combined with a questionnaire directed at the researchers exploring general attitudes towards press releases.

As the appearance of public intellectuals has appeared to decrease, it could very well be that some of these have migrated to the blogosphere. Further research is suggested on the backgrounds of those people engage within the academic blogosphere. Newsmill.se is frequently used as a platform for public debate. It would thus be interesting to study how researchers and public intellectuals use this platform to spread their ideas and take part in the open debate.

We have been talking a great deal about aggregated blog posts about peer-reviewed research provided by researchblogging.org. The question is, who reads these posts? In order for it to evolve into a “coffeehouse 2.0” it need to be able to attract readers from the general public. More quantitative research is suggested to study where the readers of the blog posts at researchblogging.org come from.

Even though the portal researchblogging.org has around 1800 blogs, not a single one of them seems to be from Sweden. In fact, most seem to stem from the U.K or the US, which invokes the possibility of there being other cultural factors at play. Further research is suggested here to study the correlation between regional academic culture and motives to communicate outwards through the practice of blogging.

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6.2 EMPIRIC MATERIAL

6.2.1 SEMINAR: SCIENCE IN THE MEDIA

Purpose of seminar: How does science journalists work today, and what is the media doing to satisfy the public interest in research? The seminar Science in the Media discusses how science is communicated in the media today and in the future.

Coordinator: VETENSKAPSFESTIVALEN

Date: June 2011

Place: Gothenburg

Source: <http://urplay.se/164643>

Speakers:

- Tina Zethraeus, head of communications at *SLU* (Swedish University of Agriculture)
- Cissi Askwall, general secretary of Vetenskap & Allmänhet (Public & Science)
- Karin Markides, principal of Chalmers
- Mats Svegfors, CEO, Sveriges Radio
- Åsa Larsson, Blogging archeologist
- Alok Jah, science reporter, The Guardian
- Patrik Hadenius, chief editor, Forskning & Framsteg
- Harald Eia, comedian and script writer of the documentary Hjernevask (Brainwash)
- John T. Burklow, Associate Director for Communications and Public Liaison, National Institute of Health (<http://www.nih.gov>)

6.2.2 PUBLISHED INTERVIEW

Published interview: <http://bigthink.com/adambly> - Bigthink is a knowledge forum for global thinkers and leaders discussing the "big picture" of global events and complex issues in order to better understand the patterns and interconnectivity of modern society.

Interviewed: Adam Bly, Founder of Seed Media Group and initiator of researchblogging.org

APENDIX I

INTERVIEW GUIDE (SWE)

INTERVJU-GUIDE FORSKARE

Generellt om olika kommunikationsmedier:

- Barriärer i processen att gå ut med pressmeddelanden? Tror du att forskare ibland drar sig för att boka möte med pressansvarig? Skillnader mellan bloggar och pressmeddelanden som kommunikationsverktyg.
- Sekretessfrågor? Vill man hålla viss del av forskningen hemlig?
- Kulturella barriärer. Hur ser du på pressmeddelandet som kommunikationsverktyg?
- Vad använder man idag för medier för att nå ut till näringslivet och andra forskare? Hur fungerar detta tycker du?
- Hur håller du dig uppdaterad om vad andra forskare från andra universitet och andra länder gör just nu?

Läsare av forskarbloggar:

- Följer du andra forskarbloggar? Hur gör du detta? Hur hanterar du flödet av information?
- Läser du bara bloggarna, eller kommenterar du också ibland? eller skriver ett inlägg på din egna blogg om du har en sådan?
- Har ditt engagemang i andra bloggar lett till utvecklandet av en mer personlig relation, eller har du mest utvecklat informations-baserade relationer med dem du interagerat med på nätet?

Det egna bloggandet:

- Hur länge har du haft en blogg?
- Vad var det som gjorde att du blev intresserad av att börja blogga?
- Har bloggen haft en betydelse för dig som forskare? Kan du beskriva hur?
- Hur mycket tid lägger du ner på bloggandet? - Har du ett nätverk i bloggossfären – hur ser det ut?
- Reaktion du får när någon får reda på att du bloggar.

INTERVJU-GUIDE INFORMATÖRER

- Finns det några formella riktlinjer för vad pressmeddelanden får innehålla?
- Publiceras alla pressmeddelanden på Universitetets hemsida? Om nej, varför? Vilka kriterier måste de uppfylla för detta?
- Vad finns det för verktyg för media-tracking? Kan du ge mig en uppskattning på hur många procent av alla pressmeddelanden som faktiskt används av någon?
- Kan du se någon skillnad i slutprodukten (den publicerade artikeln) beroende på om den härstammar från pressmeddelanden eller från ES?
- Villen typ av kunskap/information är vanligast förekommande i ett pressmeddelande?
- Hur ser forskare på pressmeddelande som kommunikationsverktyg?
- Hur mycket tid läggs generellt ner på att skapa ett press-meddelande + hur många produceras på BMC per månad?
- Vem brukar ta första initiativet till ett pressmeddelande? Informatören, forskaren eller någon annan?

INTERVJU-GUIDE JOURNALISTER

Om pressmeddelanden och ES:

- Kan du ge en uppskattning på hur många procent av alla svar som används i något medialt sammanhang? (riktad till Ingemar på ES)
- Vilken typ av kunskap är vanligast förekommande i ett pressmeddelande och hur skiljer detta sig från det som kommer fram via ES?
- Hur ser forskare på pressmeddelande som kommunikationsverktyg?
- Tycker du om att basera en artikel på ett pressmeddelande? Brukar du skriva om pressmeddelandet till dina egna ord?
- Har du skrivit artiklar som baserats ena gången på ett pressmeddelande och andra gången på ES? Känner du att det har blivit någon skillnad i typen av kunskap som kommuniceras via de båda medium?

Om forskarbloggar:

- Vad är din generella syn på forskarbloggen med avseende på vetenskapskommunikation?
- Hur ser du på forskarbloggen som verktyg för att producera vetenskapliga artiklar?
- Har du någonsin citerat någon forskare i en artikel med avseende på vad han/hon skrivit i sin blogg?
- Har det hänt att du kommit i kontakt med en intressant forskare via hans eller hennes blogg, som du annars inte hade kontaktat?

APENDIX II

INFORMATION ABOUT THE INTERVIEWED

BLOGGING RESEARCHERS

Gustav Holmberg – Professor in History of Science at the Research Policy Institute of Lund University and blogger at www.gustavholmberg.com

Peter Stilbs – Professor in physical chemistry at the Royal Institute of Technology in Stockholm and co-author of the blog www.theclimatescam.se

Andreas Bergh – Professor in political economy at Lund University and blogger at <http://www.andreasbergh.se/>

Bengt Olle Bengtsson – Professor in Genetics at Lund University and guestblogger at www.forskning.se

Thomas Söderqvist – Professor in the History of Medicine and blogger at <http://www.corporeality.net/museion/>

Thomas Lennartsson – PhD student at Lund Observatory and former blogger at www.1arinteettstorttal.wordpress.com

Sara Kjellberg – Teacher at the Division of ALM and Book History Department of Arts and Cultural Sciences at Lund University and blogger at <http://sakj.wordpress.com/>
(holds a PhD)

NON-BLOGGING RESEARCHERS

William Agace – Professor in Mucosal Immunology at the Dept. of Experimental Medical Science Lund University

Ragnar Mattsson – Professor in Reproductive Immunology at the Dept. of Experimental Medical Science Lund University

COMMUNICATION STAFF

Karl McFaul – Communication Officer at ESS (European Spallation Source) and blogger at www.karlmcfaul.com

Kristina Lindgärde – Press staff at the Faculty of Engineering Lund University

Jonas Wisbrant - Press staff at the institute of Computing at the Faculty of Engineering Lund University

Katrin Ståhl - Communication staff at the center for Biomedical Research (BMC) at Lund University

SCIENCE JOURNALISTS

Ingemar Björklund – Science Journalist and responsible for ES, employed by The Research Council (www.vr.se)

Eva Barkeman – Science Journalist and responsible for the research Portal www.forskning.se, employed by the Research Council (www.vr.se)