# 1. Introduction

This book has its origins in a project developed during the Digital Methods Summer School of 2007, the first annual summer program on methods and tools for social research with the web at the University of Amsterdam, titled ‘New Objects of Study’. One week of the summer school was dedicated to ‘Controversy Mapping - Citizen Equipment for Second-degree Objectivity’ and the keynote speaker was the famous sociologist and philosopher Bruno Latour.[[1]](#footnote-1) Via Skype, Latour provided an introduction to the mapping of controversies, based on the educational program he had developed at Sciences Po in Paris.[[2]](#footnote-2) He started by outlining how to define and detect a ‘good’ controversy. A controversy is a ‘shared uncertainty about facts’, that manifests publicly through a range of attitudes. Latour includes consensus and agreement among the attitudes surrounding a controversy, and considers consensus an extreme moment in a controversy when actors abandon the controversy or agree.

Controversies can form and develop through hot arguments or cool disputes, depending on their intensity and the relative numbers of positions in disagreement over certain time periods. There is no such thing as a solid or fixed state of any controversy, or, for that matter, of consensus. Consequential to this temporal definition and its appropriateness to scholars’ ongoing relation to controversy as a *research object,* and as a specific kind of *research* *practice,* Latour suggested that researchers should best be prepared to jump right into the middle of a controversy and describe what they encounter there. A ‘good' controversy (i.e., a controversy most suitable for analysis) takes place across heterogeneous sources (e.g., academic journals, newspapers), and includes people from different disciplines. This range of actors can be studied through their specific vocabulary (the so-called *actor language*). It matters significantly in approaching the research of a controversy as to whether it is ‘live,' past or present, and how many people are involved (and how many of them are scientists). One should beware that some controversies may be too big to research, involve too many actors, or too many points of contestation (the example Latour gave here was that of genetic manipulation). In such cases, it is best to choose a sub-controversy from a larger one. Furthermore, Latour stressed that researchers should describe all these dynamics of a controversy *without translating* what they observe into a more common or analytically familiar language. Steering clear of predefined keywords and categories enables researchers to better ‘follow the actors’ and log actors’ language, connections, and formats (Latour, 2007).[[3]](#footnote-3)

In Latour’s approach, the actors of a controversy may be found at a specific event or gathering, in a collection of writings, an e-mail exchange, and so on. For my first experiment with a controversy mapping research practice, which I conducted with Esther Weltevrede, we looked at animals most frequently depicted and mentioned in the climate change debate on the web.[[4]](#footnote-4) Looking at three different online spaces: the news (accessed through Google News), the web (accessed through Google Web Search) and the blogosphere (accessed through Technorati, the dominant blogosphere search engine at the time), we created word and image clouds of those animals resonating most in the climate change debate. These ‘issue animal’ hierarchies proved distinct per space, and this was the case in the textual as well as in the image analysis. The web gave attention to a wide variety of endangered species, giving way to those affected by global warming as well as global cooling. The News favorited the polar bear, and also presented a new animal: the cow, which is not so much affected by global warming but one of the causes, as cows emit methane. The blogosphere showed a strong preference for the polar bear too. But a closer look at the actual imagery revealed that many polar bear images were of people dressed up as polar animals during activist protests. This also explained the appearance of the dogs in the data set: the activists’ pets taken along to protests. The study pointed out that each online content space had its own hierarchies and needed research approaches adapted to its specificities, a finding that was worth exploring further.

## Climate Change as a Globally Encountered Controversy

During the summer school of 2008, I chose to pursue the study of the climate change controversy further . In March of the same year, the Heartland Institute, a Chicago-based conservative public policy think-tank, had organized the first international conference of climate change skepticism. The conference was titled *Global Warming Is Not a Crisis!*, and featured event elements common to any scientific event: seemingly esteemed keynote speakers, parallel sessions, and online proceedings.[[5]](#footnote-5) The conference website stated that over 200 scientists from leading universities had participated in the event. For this controversy mapping exercise, I partnered with Andrei Mogoutov, the developer of a software tool for ‘scientometric analysis’ called ReseauLu, to examine the scientific publishing and citation networks of prominent speakers at this event.[[6]](#footnote-6)[[7]](#footnote-7)

Our first query related to the apparent eventfulness of the inaugural Heartland conference. We wanted to know whether the scientific research and publication ‘profiles’ of climate skeptics were different from the profiles of non-skeptical climate scientists. More specifically, were the skeptics, beyond this specific conference, co-participants in a broader scientific community dedicated to climate science? Or was it more accurate to understand them as a separate or differently networked or trained community (or on their way to becoming this), as the Heartland conference appeared to propose? In addition to this scientometric analysis, together with another summer school participant Bram Nijhof, I also *followed* the conference actors through to their personal websites to see whether these scientists wrote skeptical articles on topics *other* than climate change. This second research question is somewhat related to the first, and also straightforward: Should these actors best be considered as professional *climate science* experts that happened to be skeptical about specific findings or projections of climate change science data*?* Or were they skeptics in relationship to various controversies *as such*—writing critically or presenting as skeptics on a variety of subjects?Lastly, with Nijhof, I analyzed the hyperlinking behavior of these actors and their resonance within the top search engine results for the query of ‘climate change’.[[8]](#footnote-8) Upon discovering in these studies that the most prominent climate actors were skeptics first and foremost (as discussed in detail in chapter 3), this geared me towards further studies of the controversy and its actors and ultimately led to the formulation of this book project.

## Conducting National Analyses

In 2010, I was contacted by Denis Delbecq, a French climate journalist writing a dossier of several long-form articles about climate skepticism for the French environmental journal *Terra Eco*. Delbecq had come across my analysis of the Heartland actors on the mappingcontroversies.net platform and expressed interest in a similar collaboration with him that would apply these methods to an analysis of French climate science actors. He provided a list of prominent climate scientists (both climate skeptics and non-skeptics), including names of individuals and representative organizations. We used this data to conduct both hyperlink analysis (looking at the hyperlinks from the actors’ websites) and resonance analysis(querying the prominence of these actors in the Google.fr search results for the query ‘changement climatique’). Our results were published in *EcoTerra* and on Delbecq’s blog, and resulted in the outing of a famous French skeptic, who had until then operated under a pseudonym.[[9]](#footnote-9)[[10]](#footnote-10)

Soon after, in October 2011, the Royal Dutch Academy of Sciences (KNAW) published a report titled ‘Climate Change: Science and Debate’, aiming to articulate the current state of global climate science by delineating topics of consensus from those of controversy.[[11]](#footnote-11) In response to these developments in the Netherlands, I collected a list of non-skeptical actors from the contributors to the KNAW report, and a second list from the line-up of a skeptical gathering that was organized at Nieuwspoort in the Hague in critical response to the KNAW report, to conduct an analysis of Dutch climate skepticism similar to that of the French.[[12]](#footnote-12) This made it possible to start to compare the two national situations. The Dutch study is discussed in detail in Chapter 3.

It was at this point that I found myself in the very midst of the controversy I was invested in researching, arguably in full accordance with Latour's directive that researchers jump straight into the middle of their controversy object as it unfolds. Following the publication of my work on these national climate change debates, Dutch skeptics, perhaps prompted by media monitoring tools of their own, started e-mailing me and including other scholars in their communications to me in cc (the ‘carbon copy' setting in email). In one email, I was kindly asked for a headshot, so this person could identify me on his blog along with his review of my article. Another email described as ‘hurtful' my linking of Dutch skeptics' work to research by Oreskes and others that discussed the financial ties of skeptics to fossil fuel and other sponsoring industries. Still, others wrote to ask why I had not just contacted them directly to learn the ‘truth' about climate change, or posed my queries directly to them regarding their specific methodological approaches and tactics, assumedly to bypass the public nature and impact of my research findings. Somewhat overwhelmed by these direct responses but also by their tone, I decided not to write back at this time.[[13]](#footnote-13)[[14]](#footnote-14) I wanted to continue my research without getting to know the actors personally and interfering with my ‘objects of study,’ given that observational distance is (also) necessary for both of the approaches which I will introduce later in this chapter, namely ‘content analysis’ and ‘digital methods,’ to keep their status as *non-intrusive* methods.

## Formulating the Case Studies

As I further developed my research on the climate controversy on the web, I also sought the most suitable means to study a controversy of this nature that has no single communication channel but takes place across online platforms, resonating not only in mass media but also in search engine results, Wikipedia, Twitter and beyond. Important to note here is that these platforms have grown exponentially in the period of 2008 and 2015, the time during which I studied the debate, but that their status or role in controversies has never been systematically examined. Furthermore, during the same period, traditional mass media have had many struggles but have not disappeared. Rather, they have become part of, folded into, and entangled with the platforms and sources encountered when analyzing controversies through networked content. I considered that in order to understand specific controversies, as well as methods for the analysis of networked content through which they travel, media studies research would benefit from a deeper knowledge of the function or position that online platforms have in a controversy, and their entanglement with traditional mass media content. Hence, I decided to formulate case studies that could capture the climate change debates flowing through and across these online platforms.

To map and analyze the state and resonance of climate change actors and discourses through medium-specific digital methods, I included the use of websites through hyperlink analysis and search engine results, Wikipedia through interlinked articles and Twitter through its hashtags. Thus, my platform-specific case studies make use of different methodological approaches, taking the research outlook from controversy analysis and tools and methods developed in digital methods in order to further attune content analysis to networked digital media content. In the next section, I will address this research outlook provided by controversy analysis and very briefly discuss its roots in ‘science and technology studies’, before I formulate my main thesis and outline the case studies.

## Traditions in Controversy Analysis

Controversy analysis, as previously mentioned, originated in science and technology studies (STS), and focuses especially on *scientific* controversies. Scientific controversies are said to ‘destabilize’ a system or convention of scientific truth claims, and in doing so reveal underlying dynamics of science and technology and their relations with a wider society that under normal circumstances tend to remain hidden.[[15]](#footnote-15) STS scholars Trevor Pinch and Christine Leuenberger describe four influential approaches, which partly overlap chronologically, within STS-informed controversy analysis.[[16]](#footnote-16) Firstly, the ‘Priority Dispute studies’ problematize claims towards who was the first scientist to make a particular scientific discovery. A second approach looks at the negative impacts — real or potential — of scientific and technological innovations (consider for example the political, social and ecological aspects of nuclear energy and genetic modification). A third key area of STS, as Pinch and Leuenberger note, is the Sociology of Scientific Knowledge (SSK), which emerged in the 1970s and operationalized the ideal of ‘symmetry’ to urge social researchers to ‘use the same explanatory resources to explain both successful and unsuccessful knowledge claims’.[[17]](#footnote-17) This principle can be applied especially well to scientific controversies, where different scientists each claim to present the truth and to refute the research methodology, argumentation, or outcomes of other(s). Symmetrical analysis enables the researchers of a controversy to study both (or all) sides of the story, including the scientific claims made by actors internal to the controversy object, by using ‘the same sorts of sociological resources’.[[18]](#footnote-18) Fourthly, Pinch and Leuenberger identify ‘modern science and technology studies’ that build heavily on SSK to regard controversies as ‘integral to many features of scientific and technological practice and dissemination’.[[19]](#footnote-19)

While STS has a strong tradition and methodological framework to study scientific controversies, it does not explicitly outline or champion specific digital methods for studying the digitally networked aspects of scientific knowledge communities. As the climate debate is not limited to offline media but also manifests itself across web platforms, there is a direct need for further methodological specificity. To analyze online networked content as part of a scientific (or other) controversy, we need to recognize the elaborate socio-technical formations—and transformations—of controversies in online networked content that impact the work and communities of scientific (and extra-scientific) truth-claims. Two of the schools of thought and practice I build my research techniques upon at this point, controversy analysis (as developed in education at Sciences Po, Paris) and ‘issue mapping’ (as developed by the Digital Methods Initiative at the University of Amsterdam) offer digital means of controversy analysis from similar scholarly traditions but with a distinct angle.[[20]](#footnote-20) While the Parisian school stems from STS and operationalizes Actor-Network Theory to zoom in on a *controversy*, the Amsterdam approach builds on science and technology studies to track *issues* more broadly, be they controversial or not.[[21]](#footnote-21)[[22]](#footnote-22)[[23]](#footnote-23)[[24]](#footnote-24)[[25]](#footnote-25)

This book makes integrative use of controversy analysis as well as digital methods (and tools) for issue mapping to conduct an analysis of the climate controversy across online platforms. As I outline in detail in the next chapter, a highly relevant research technique for both qualitative and quantitative analyses of mediated content precedes my work here, developed to study media content in the field of communication science under the name of ‘content analysis’. Content analysis was incepted to study given or demarcated bodies of content (often referred to as ‘texts’ but not limited to that format), to analyze both formal features (e.g. the shot lengths of a television show, or the column widths and word counts of a printed text, etc.) and ‘textual’ meanings (broadly defined) including themes, tropes, recurring topics and terms, all in order to make inferences about societal perceptions, cultural change, and trends in public opinion. A famous pre-web longitudinal content analysis study referenced in the scholarly literature is the *Cultural Indicators* program (of the 60s through 90s) by George Gerbner et al. that used weeklong aggregations of the prime-time television footage to record all representations of violence and construct ‘violence profiles,' for this material. These representations were then interpreted and turned into ‘cultural indicators,' which referred both to trends in network television's dramatic content and to viewer conceptions of social reality.[[26]](#footnote-26)[[27]](#footnote-27) Content analysis has since been described as ‘indigenous to communication research and [as] potentially one of the most important research techniques in the social sciences’.[[28]](#footnote-28)

It is essential to emphasize that I understand content analysis to have always been inclusive of *potentially* all content types. By taking mass media as its most prominent raw data source, however, this kind of scholarship tended to be ‘dominated by content analyses of newspapers, magazines, books, [radio] broadcasts, films, comics, and television programming’ as one of its key scholars, Klaus Krippendorf pointed out.[[29]](#footnote-29) Krippendorf, who I take to be centrally informative for my own work, has made explicit since content analysis’ earliest methodological formation that (more or less publicly communicated) data of any kind could potentially be studied through content analysis. He mentions varieties of media ‘content’ as diverse as ‘personal letters, children's talk, disarmament negotiations, witness accounts in courts, audiovisual records of therapeutic sessions, answers to open-ended interview questions, and computer conferences’, and even ‘postage stamps, motifs on ancient pottery, speech disturbances, the wear and tear of books, and dreams’. More theoretically, as a major proponent and methodological innovator of this field of media research, Krippendorff’s assertion that ‘anything that occurs in sufficient numbers and has reasonably stable meanings for a specific group of people may be subjected to content analysis’, is a key driver of my own development of ‘networked content analysis’.[[30]](#footnote-30)

If, in practice, content analysis has mostly focused on neatly demarcated sets of texts or other media materials such as television shows, the specificity, dynamism, and networked nature of digital media content poses a myriad of new methodological challenges and opportunities to contemporary content analysts. Digital media content can be published or created on the World Wide Web, and enriched with opportunities for navigation and interaction. It can be networked by in-text hyperlinks (creating a so-called ‘hypertext’), or by suggestions of related articles or other recommendation systems, or pulled into social media by prevalent ‘Like’ and ‘Share’ buttons on websites, urging users to link content to their own user profiles.[[31]](#footnote-31) Online content is *networked*. It is dynamic rather than stable; it often changes over time or moves from the front page to the archive. Social media further scatters content, offering a ‘live feed’ that is referred to as the qualitative and quantitative *real-timeness* of social media data, the content of which can be linked to, copied onto other networks, and archived across the (social) web.[[32]](#footnote-32) These social media platforms each format, rank, and serve content in unique ways, which makes it important to start developing adaptive, digital methods that are attuned to the diverse specificities of these platforms.

Content analysis of such networked content may ask where the ‘content’ that is under analysis ends if all content is (more and less) meaningfully hyperlinked to other related content on other web pages. Indeed, how is it possible to demarcate a website? Is it methodologically appropriate to apply the techniques of content analysis that worked for printed newspapers like the *New York Times* or *The Guardian*, and for television formats such as *CNN* or *Al Jazeera*, to online news sites like www.nytimes.com and www.guardian.co.uk, let alone to a content search engine and aggregator like Google News? The answers to these questions as they have been offered by content analysis scholars throughout different phases in the history of the web are described extensively in Chapter 2, and can be summed up as broadly presenting two distinct approaches. The first, as described by McMillan, argues for standardization of methods towards the analysis of web content, which McMillan characterizes as a ‘moving target’.[[33]](#footnote-33) A second approach is formulated by Herring in response to McMillan, who proposes to combine traditional content analysis techniques with methodologies from disciplines such as linguistics and sociology to offer a more workable response to the challenges offered by ‘new online media’.[[34]](#footnote-34)

While these two approaches each offer ways forward for the analysis of web content, they are not concerned with the vast differences between different web platforms—the specific technicalities of which contribute significantly to the meaning of networked content. It is important to note that web content currently exists in and through the platforms and engines that produce it, which means a clean separation of content from its carrier is no longer feasible.[[35]](#footnote-35) Different web platforms and search engines each carry their own (often visually undisclosed) formats and formatting; they have their own scenarios of use and their own terms of service; further, they also output their own results and rankings. Consider the example of Wikipedia, the collaboratively written encyclopedia project on a wiki, where each article has a page, sometimes other language versions, a discussion page, user statistics, a ‘history' or archive of all previous versions of the article, all of which can be used in comparison with the current version of the article, as bots at work continue to edit text and undo vandalism. Differently for Twitter, the social network slash micro-blogging tool, user-broadcasted messages are bound by a limit of 140 characters per Tweet. They can include images, links to URLs, tags of other users (whether directly connected as ‘followers' or not), and hashtags to network and aggregate individual content around specific events, issues, opinions, and themes. Content can include retweets of someone else's message (in several distinct ways, as described by Bruns and Burgess), which generates yet another layer to the networking of content.[[36]](#footnote-36)[[37]](#footnote-37) These specificities of how platforms and engines serve, format, redistribute, and essentially co-produce content is what I refer to as the *technicity* of content.

## Central Thesis: Accounting for Technicity

Controversy mapping, digital methods, and content analysis, in combination, offer means to study a controversy on the web that include this factor of technicity in the analysis of networked content. In this research, I will put forward such methods and techniques that take as their point of departure that the medium of the web now not only serves but also co-produces online content. The novel challenges posed by the dynamics of web content does not mean we have to dispose of content analysis altogether. On the contrary, as content analysis from the outset has been potentially inclusive of all varieties of content in and across contexts, its methods need to be amended only slightly — building on digital methods and controversy analysis — to suit the technicity of web content. I will argue that content analysis in its earliest form still offers model methods and approaches that, with appropriate amendments for the digital age, can be updated to stand as a strong methodological ground for what I name and develop here as ‘networked content analysis’.

The central thesis of this study is that different web platforms and engines serve content with different technicities, which I argue are a crucial aspect of the object of study (i.e., web content) and should, therefore, be included in the analysis.[[38]](#footnote-38)[[39]](#footnote-39)[[40]](#footnote-40)[[41]](#footnote-41) How can these insights from digital methods inform the application of content analysis to web content? As I am persistently emphasizing, developing means of collecting and analyzing digital media content across platforms starts with the problematic realization that each platform or engine has its own *technicity* and thus requires specific methods and analytical tools. To retain the strengths of content analysis for contemporary humanities and social research, and further develop techniques that better adapt to the specificities of networked content, the question central to this book is: how can technicity be meaningfully included in the analysis of online content?

In operationalizing this inclusive approach, I analyze the content of specific platforms alongside their technicity, for example, the user's access to read/write/link/archive capabilities, and identify the queries or tools that are necessary to demarcate and analyze content relevant to controversy objects that traverse these specific websites and platforms. Neither controversy analysis nor content analysis offers platform-specific techniques, which is why the addition of digital methods and tools is necessary for the analysis of such an interdisciplinary and popular, volatile public debate that is so widely distributed across platforms. In this way, I conduct what I consider to be useful, propositional forms, and methods of networked content analysis towards the study of the climate change debate online.

## Networked Content Analysis of the Climate Debate

Climate change is defined by the United Nations Framework Convention on Climate Change (UNFCC) as the ‘change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods’.[[42]](#footnote-42) The UNFCC distinguishes between human-attributed climate change and natural climate variability, a complex distinction that lies at the core of what is one of the most contentious and world-changing controversy objects of our time. There are clearly many reasons that I could propose for choosing to work with this complex issue in my development of networked content analysis methods. Quite apart from the political and scientific urgency accorded to this debate, as a new media researcher,I am particularly interested in the fact that to study climate change as a controversy object is to engage with a wide variety of (offline and online) media and knowledge spaces. Climate change remains on the agenda of NGOs and governments alike. Scholars have named it amongst the greatest threats (or ‘risks,’ to speak with Ulrich Beck) of our times and as a crisis of formidable scale.[[43]](#footnote-43)[[44]](#footnote-44) This book does not contribute to climate *science* but instead focuses entirely on developing a networked content analysis of the climate controversy as it is specifically mediated and transformed by online platforms and actors, in order to gain insight in how such controversial debates evolve and how certain actors and viewpoints may resonate more forcefully than others. Accordingly, the next section will introduce prior studies in climate-related content analysis by Anthony Downs, building beyond the work that opened this introduction.

Before reappraising Downs, it is necessary to specify further my research outlook. Where my central concern here is to develop means to include technicity in the analysis of networked content, I am dealing with the specificity of the question by applying it to the topic of web content on climate change. Looking at how technicity can be included in the analysis of networked climate change content, I take to three online platforms that each represent a different web culture, if you will. The web as accessed through the search engine Google is for many Internet users the main point of access to web content.[[45]](#footnote-45) Twitter is one of the most prominent social platforms online, with its content available through an API. Wikipedia is the most-used online equivalent of an encyclopedia. As climate change is present across distinct sites of knowledge sharing, discussion and dissemination (science, news, popular media) it can be studied across platforms and analyzed in terms of: the variety and prominence of actors and sources (Google); the online dynamics of knowledge production (Wikipedia); and the sub-issues of climate change as shared online (Twitter).

Building upon the strengths of existing content analysis projects, my formulation of networked content analysis asks what may be learned from previous applications of content analysis. How has content analysis been amended since its very first application to web-based content? In applying networked content analysis to online climate change content, I will address how the issue of climate change can be studied there (via Google/Wikipedia/Twitter) and identify the specific technicities of such content. Given that the study of climate change across media has already been strongly attended to in earlier content analysis studies, I briefly discuss this research pre-history and its relevance to my own work in the next section.

## The Climate Change Debate as an Object of Study

Climate change as an issue has, in fact, been attended to with fine-grained content analysis methods since the early seventies. In his article *Up and Down with Ecology: the “Issue Attention Cycle”,* Anthony Downs described how the environment, like any societal issue, is subject to a rise and fall in public interest. He uses the notion of the ‘issue attention cycle’ to describe common dynamics in public attention that occur for ‘most key domestic issues’.[[46]](#footnote-46) Downs’ articulation of the issue attention cycle knows five stages: (1) the pre-problem stage, (2) alarmed discovery and euphoric enthusiasm, (3) realization of the cost of significant progress, (4) gradual decline of intense public interest and, lastly, (5) the post-problem stage.[[47]](#footnote-47) Downs sees the ‘remarkably widespread upsurge of interest in the quality of our environment’ as involving such an issue attention cycle, in which the ‘change in public attitudes has been much faster than any changes in the environment itself’.[[48]](#footnote-48) Downs’ work has been subjected to strong criticism, mainly on the linearity assumed by his proposed cycle model, and on the research’s focus more on mediation as such, over the mediation of this specific and urgent issue, as described thoroughly by McComas and Shanahan.[[49]](#footnote-49) With these qualifications, analysts of media content have taken up Downs’ approach and further extended its application to environment-related issues.

In what they refer to as a ‘(de)construction’ of the issue attention cycle for environmental issues, McComas and Shanahan compare the climate change news coverage of the major US newspapers, *The New York Times* and *The Washington Post*, between 1980-1995.[[50]](#footnote-50) Their research confirms the cyclical nature of attention to the issue of climate change, and even recognizes different stages that dialogue with Downs’ own, in which:

[T]he implied danger and consequences of global warming gain more prominence on the upswing of newspaper attention, whereas controversy among scientists receives greater attention in the maintenance phase. The economics of dealing with global warming also receive more considerable attention during the maintenance phase and downside of the attention cycle.[[51]](#footnote-51)

Where these researchers stress the importance of the ‘role played by narratives in driving media attention to environmental issues’, others have stressed how real-life events (such as extreme weather) are a crucial catalyst in the garnering of public attention for an issue of ‘celebrity status’.[[52]](#footnote-52) [[53]](#footnote-53) A concept that builds on this analytical approach to issue attention is the ‘news spiral’, which refers to the phenomenon that once the climate is in the news, this creates a general upsurge of interest in (and reporting on) other environmental issues.[[54]](#footnote-54) The retrieval and analyses of attention and news cycles fit into the ongoing methods and applications of content analysis at large.

Chapter 2 discusses the early disciplinary formation of content analysis and develops an approach towards networked content analysis. Content analysis has a strong history of use in communication science, where large bodies of text are analyzed for features or (recurring) themes, in order to identify cultural indicators or make other inferences about the text. To apply these methods to web content remains a challenging exercise to researchers of various scholarly disciplines, for, unlike traditional print media such as newspapers or books, web content is often dynamic. It is also networked, which poses problems for the demarcation of the content under study. To grapple with these technical specificities of web content, researchers either stay close to traditional content analysis techniques or choose to pull in methods from other disciplines and seek more extended paradigms of web content analysis.[[55]](#footnote-55)[[56]](#footnote-56)[[57]](#footnote-57) In this chapter, I will give an overview of these strategies preceding my research, and introduce novel means of networked content analysis that include the technicity of web content as part of the analysis and repositions content analysis (in the tradition of Krippendorff) as a medium-specific approach.

In the three case studies that follow this methodological discussion, I assess the climate change debate on different platforms. As the climate debate does not only take place across platforms, but also over time, the studies presented will assess diverse moments in the climate change debate, ranging from the first skeptical conference of 2008 to the ‘Paris Agreement’ of 2015. The aim of the study is not to present a neat chronology or timeline of the debate from beginning to end, nor, at the other extreme, to do away with historical analyses. The point of entry is less the debate’s transformation over time (or its timing), than its entangled relation to the platform and its specificities. How can we amend content analysis to attune to the technicity of networked content, knowing for instance that on the web, search engines rank content, websites are hyperlinked, and actors in one issue may also be working on another issues and publishing about this on their personal websites? And what does the platform, or the engine, do to the debate?

In Chapter 3, I analyze the networks of climate debate actors using search engines and scientometric analysis. This chapter uses search engines (ISI and Google) and hyperlink analysis to research the place and status of climate skepticism within both climate science itself and the climate change controversy as it takes place beyond the scientific literature. Here, the central question is how networked content analysis can be conducted *through* the web, taking into account the technicity of search engines. The case study zooms in on climate change actors and their prominence, as identified by search engines. It asks how the technical logic of search might be used to measure and compare the prominence of actors in a specific issue, in this case, by looking at the resonance of climate change scientists (both skeptical and non-skeptical) within a demarcated set of websites. Hyperlink analysis and search engines enable comprehension of the group formation of actors in the debate and measure their resonance within web sources on the issue of climate change. Traditional scientometrics paired with digital methods offer a detailed picture of the status, group formations and issue commitments of climate change skeptics, and questions whether their interest lies in skepticism itself or in climate change.

In Chapter 4, I discuss Wikipedia as a socio-technical utility for climate controversy mapping. The technicity of Wikipedia content makes it possible to refine further the techniques of networked content analysis, so as to enable matters of resonance, relational dimensions of content, actor engagement and controversy management to be studied within this encyclopedia project. Wikipedia, as a wiki-based encyclopedia platform, offers various levels of access to information on article histories and editors, enabling researchers to ‘follow the actors’ and close-read their positions, references and commitment to a specific issue. In this case study, I discuss how Wikipedia has been researched since its launch in 2001, and how dominant research practices have disregarded some of the crucial technical specificities of Wikipedia and the production, organization and maintenance of its content. I then zoom in on more recent controversy analyses, attending to the technicity of Wikipedia content by looking at discussions on the talk pages (for the article on Gdańsk/Danzig), and by conducting a comparative analysis of articles across language versions (for the case of the Srebrenica massacre). Lastly, I discuss a networked content analysis of climate change related articles, tracing its networked content and close reading its actor behavior. I discuss a climate change article ecology study from 2009 and the development of a Wikipedia controversy analysis tool developed in 2014 titled ‘Contropedia’. I propose here to treat Wikipedia as a data-rich site of social research, through a networked content analysis of climate change articles and their linkages.

In the final case study of Chapter 5, I conduct a networked content analysis of climate change-related Twitter messages (or ‘tweets’) to map the state of the climate change debate online. Here, I analyze Twitter data to consider four related climate change discourses: adaptation (to climate change), skepticism (towards the man-made origins and unprecedentedness of climate change), mitigation (the prevention of further climate change by minimizing its causes), and conflict (here taken to mean political unrest relatable to so-called ‘climate change vulnerability’).[[58]](#footnote-58) Given climate vulnerability has recently become a prominent and focalizing discourse within climate change, both in the scientific literature (as mapped out by the IPCC in 2014) and in news coverage around climate change, I will zoom in on this issue in more detail. Recently, new debates concerning climate change research and modeling have arisen as experts are increasingly drawing connections between climate vulnerability and human conflict. Major news media outlets increasingly contribute to circulating an understanding of climate change vulnerability as a potential factor in social unrest, including in Syria and Egypt, explaining how drought and water scarcity may have intensified the Arab Spring.Twitter already has a strong tradition of being repurposed to study events, uprisings and social responsiveness to the news.

In this chapter, to study Twitter’s climate content and include its technicity, I create keyword profiles and additionally zoom in on the hashtags used within a set of climate change tweets. A co-hashtag analysis of this set of tweets reveals an ecology of climate change-related sub-issues illustrating the current state of climate action and adaptation—a multifarious presence of vulnerability variables related to data sets on animals, habitats and more, affected by extreme weather conditions. In attending to a descriptive analysis of sub-issues within the climate change controversy, which has such complex social dimensions, this chapter exemplifies how controversy does not end once consensus on some aspects of the science is publicly secured.

Chapter 6 holds the conclusions, in which I discuss the findings of the various case studies on two levels: that of the methodological toolbox of networked content analysis as well as on the level of the controversy mapping itself, reiterating what the various case studies teach us about the climate change debate, and gather up implications for the practice of networked content analysis. Taking the lessons learned from the case studies on the study of the climate debate with Twitter, Wikipedia, and Google, I return to Krippendorff to revisit his foundational work and propose appropriately amended techniques and tools for networked content analysis. Subsequently, I discuss the challenges for future research. As the climate controversy plays out on many platforms that, in turn, *pull in* traditional mass media content, I show how combined and interlinked findings across platforms provide a more comprehensive mapping of a multi-platformed issue.

1. See also the summer school’s wiki page: https://wiki.digitalmethods.net/Dmi/MappingControversies. [↑](#footnote-ref-1)
2. B. Latour, 'Mapping Controversies', presented at the Digital Methods Summer School, University of Amsterdam, Amsterdam, 2007. [↑](#footnote-ref-2)
3. Tommaso Venturini, working with Bruno Latour in the Controversy Mapping educational and research program of Sciences Po describes ‘three commandments of observation’: ‘1. You shall not restrain your observation to any single theory or methodology; 2. You shall observe from as many viewpoints as possible; 3. You shall listen to actors’ voices more than to your own presumptions.’ T. Venturini, 'Diving in Magma: How to Explore Controversies with Actor-network Theory', *Public Understanding of Science* 19.3 (2009): 260. [↑](#footnote-ref-3)
4. Digital Methods Initiative, 'Issue Image Analysis', 2007, https://wiki.digitalmethods.net/Dmi/IssueImageAnalysis. [↑](#footnote-ref-4)
5. The Heartland Institute, 'First International Conference on Climate Change (ICCC-1)', 2008, http://climateconferences.heartland.org/iccc1/. [↑](#footnote-ref-5)
6. Scientometrics uses data sets of scientific publications and assesses these through citation analysis. More specifically, a scientometric analysis can extend from tracking citational behavior and referencing, to understanding these processes as constructing norms and rules of scientific writing, to considering how specific or groups of texts play out in an inter-referential network of influence and authority. P. Wouters, *The Citation Culture*, Amsterdam: University of Amsterdam, 1999. [↑](#footnote-ref-6)
7. See also A. Cambrosio, P. Cottereau, S. Popowycz, A. Mogoutov, and T. Vichnevskaia, 'Analysis of Heterogenous Networks: The ReseauLu Project', in B. Reber and C. Brossaud (eds.) *Digital Cognitive Technologies: Epistemology and the Knowledge Economy*, Hoboken, NJ: John Wiley & Sons, Inc, 2013. [↑](#footnote-ref-7)
8. These studies were published on the online research platform mappingcontroversies.net (as part of the EU 7th Framework project *Macospol*). S. Niederer, 'Climate Change Skeptics in Science', 2009, http://www.mappingcontroversies.net/Home/PlatformClimateChangeSkepticsScience. [↑](#footnote-ref-8)
9. D. Delbecq, 'A [F]rench Climate Skeptic Comes Out: He Is a Physicist', *Effets de Terre*, 2010, http://effetsdeterre.fr/2010/04/21/a-french-climate-skeptic-comes-out-he-is-a-physicist/. D. Delbecq, 'Dossier Climato-sceptiques', *TerraEco* (April 2010): 50–62. [↑](#footnote-ref-9)
10. D. Delbecq, and S. Niederer, 'Climatosceptiques et Climatologues, Quelle Place sur l’Internet?', 2010, http://effetsdeterre.fr/2010/04/12/climatosceptiques-quelle-place-sur-linternet/. [↑](#footnote-ref-10)
11. KNAW, *Klimaatverandering, Wetenschap en Debat*, Amsterdam: Koninklijke Nederlandse Academie van Wetenschappen, 2011, https://www.knaw.nl/nl/actueel/publicaties/klimaatverandering-wetenschap-en-debat/@@download/pdf\_file/20101047.pdf. [↑](#footnote-ref-11)
12. Nieuwspoort is a forum for political debate, situated next to the House of Representatives’ building in the city center of The Hague. ‘Nieuwspoort’, http://www.nieuwspoort.nl/over-nieuwspoort/. [↑](#footnote-ref-12)
13. The question of how precisely I was able to label and split these actors as either skeptical or non-skeptical climate scientists I consider valid. Here, I followed the Latourian logic of there being no groups without ‘group holders’ and ‘group talkers’. Bruno Latour, *Reassembling the Social*, Oxford: Oxford University Press, 2005. [↑](#footnote-ref-13)
14. Somebody may not be a climate expert in daily life, but when this person is one of the editors of a publication on the climate controversy and consensus (in the KNAW example), they at that moment perform to identify with a ‘group’ of climate experts. Similarly, when opposing Dutch climate experts organize an event at Nieuwspoort to refute a scientific report as ‘alarmist’, they perform as skeptical ‘group makers, group talkers, and group holders’. Latour, *Reassembling the Social,* 32. [↑](#footnote-ref-14)
15. T. Pinch and C. Leuenberger, 'Studying Scientific Controversy from the STS Perspective: Concluding Remarks on Panel "Citizen Participation and Science and Technology"', in *East Asian Science, Technology and Society*, 2006, http://fr.curriculumforge.org/TravaillongVincentr?action=AttachFile&do=get&target=Pinch+studying.pdf. [↑](#footnote-ref-15)
16. Pinch and Leuenberger, 'Studying Scientific Controversy from the STS Perspective’, 4. [↑](#footnote-ref-16)
17. Pinch and Leuenberger, 'Studying Scientific Controversy from the STS Perspective’, 12. [↑](#footnote-ref-17)
18. Pinch and Leuenberger, 'Studying Scientific Controversy from the STS Perspective’, 12. [↑](#footnote-ref-18)
19. Pinch and Leuenberger, 'Studying Scientific Controversy from the STS Perspective’, 5. [↑](#footnote-ref-19)
20. The third of which is content analysis, central to the next chapter. [↑](#footnote-ref-20)
21. N. Marres, 'Why Map Issues? On Controversy Analysis as a Digital Method', *Science, Technology & Human Values*, 0162243915574602, 2015, http://doi.org/10.1177/0162243915574602. [↑](#footnote-ref-21)
22. T. Venturini, 'Diving in Magma: How to Explore Controversies with Actor-network Theory', *Public Understanding of Science* 19.3 (2009): 258–273. [↑](#footnote-ref-22)
23. R. Rogers and N. Marres, 'Landscaping Climate Change: A Mapping Technique for Understanding Science and Technology Debates on the World Wide Web', *Public Understanding of Science* 9.2 (2000): 141–163. [↑](#footnote-ref-23)
24. Latour’s *Mapping Controversies* educational program has culminated in the Médialab Sciences Po in Paris in 2009, which develops digital tools and methods for Controversy Mapping. Sciences Po’s approach is ‘interdisciplinary’ and describes its work as ‘seeking to apply computational techniques in order to detect, analyze and visualize public contestation over topical affairs’. Marres, ‘Why Map Issues?’. [↑](#footnote-ref-24)
25. When analyzing controversy, researchers team up with programmers, data analysts, and information designers to create maps that make web content *differently* legible for further analysis. In my own research practice, I have worked in similar teams associated with the University of Amsterdam's Digital Methods Initiative, and participated in ‘sprints' as part of the EU-projects MACOSPOL and EMAPS, in which we analyzed controversies through web data. [↑](#footnote-ref-25)
26. G. Gerbner, 'Toward "Cultural Indicators": The Analysis of Mass Mediated Public Message Systems', *Educational Technology Research and Development* 17.2 (1969): 137–148. [↑](#footnote-ref-26)
27. G. Gerbner, 'Cultural Indicators: The Case of Violence in Television Drama', *The Annals of the American Academy of Political and Social Science* 388.1 (1970): 69–81. [↑](#footnote-ref-27)
28. K. Krippendorff, *Content Analysis: An Introduction to its Methodology*, first edition, Beverly Hills, CA: Sage Publications, 1980. [↑](#footnote-ref-28)
29. Krippendorff, *Content Analysis,* 404. [↑](#footnote-ref-29)
30. Krippendorff, *Content Analysis.* [↑](#footnote-ref-30)
31. C. Gerlitz and A. Helmond, 'The Like Economy: Social Buttons and the Data-intensive Web', *New Media & Society*, 2013, http://nms.sagepub.com/content/early/2013/02/03/1461444812472322. [↑](#footnote-ref-31)
32. L. Back, C. Lury, and R. Zimmer, 'Doing Real Time Research: Opportunities and Challenges', *National Centre for Research Methods (NRCM)*, *Methodological review paper*, 2012, http://eprints.ncrm.ac.uk/3157/1/real\_time\_research.pdf. [↑](#footnote-ref-32)
33. S. McMillan, 'The Microscope and the Moving Target: The Challenge of Applying Content Analysis to the World Wide Web', *Journalism and Mass Communication Quarterly* 77 (2000): 80–88. [↑](#footnote-ref-33)
34. S. Herring, 'Web Content Analysis: Expanding the Paradigm', in J. Hunsinger et al. (eds) *International Handbook of Internet Research*, Dordrecht: Springer, 2010, pp. 233-249. [↑](#footnote-ref-34)
35. Krippendorf stands out, as I emphasize in Chapter 2, in including this fact from the beginning, well before this research method had to deal with online networked content. [↑](#footnote-ref-35)
36. A. Bruns and J.E. Burgess, 'The use of Twitter Hashtags in the Formation of Ad Hoc Publics', in *Proceedings of the 6th European Consortium for Political Research (ECPR) General Conference 2011*, 2011, http://eprints.qut.edu.au/46515. [↑](#footnote-ref-36)
37. A. Helmond, *The Web as Platform: Data Flows in Social Media,* Ph.D. Thesis, 19 June 2015, University of Amsterdam, Amsterdam. [↑](#footnote-ref-37)
38. Here it is important to point out that the attention to the technicity of content at the core of my research necessitates the recognition of the spatial organization and geo-location of content, as well as dislocation and censorship, which all problematize the very idea of a ‘world wide web' of content assumed to be globally available. Internet censorship research has demonstrated how a user's geo-location is crucial to the availability of content, as served, for instance by the search engine Google. Research that critically comes to terms with these local differences in search engine results — which can be shown up by using a different language version of Google, or with VPN connections that access the web from other geo-locations — has been called ‘search as research' by Rogers, and presented at international search engine research conferences such as the *Society of the Query*. R. Rogers, *Digital Methods*, Cambridge, MA.: MIT Press, 2013. R. Deibert, J. Palfrey, R. Rohozinski, J. Zittrain, and J.G. Stein, *Access Denied: The Practice and Policy of Global Internet Filtering*, Cambridge, MA: MIT Press, 2008. [↑](#footnote-ref-38)
39. See also: R. König and M. Rasch, eds. *Society of the Query Reader: Reflections on Web Search*, Amsterdam: Institute of Network Cultures, 2014. What this research underlines is that the web may be ‘worldwide’ in its infrastructure, but it is not in its access to content. [↑](#footnote-ref-39)
40. R. Deibert, J. Palfrey, R. Rohozinski, J. Zittrain, and M. Haraszti, *Access Controlled: The Shaping of Power, Rights, and Rule in Cyberspace*, Cambridge, MA: MIT Press, 2010. [↑](#footnote-ref-40)
41. R. Rogers, E. Weltevrede, S. Niederer, and E. Borra, 'National Web Studies: The case of Iran', in J. Hartley, J. Burgess and A. Bruns (eds) *Blackwell Companion to New Media Dynamics*, Oxford: Blackwell, 2013, pp. 142-166. [↑](#footnote-ref-41)
42. United Nations, 'United Nations Framework Convention on Climate Change', 1992, https://unfccc.int/files/essential\_background/background\_publications\_htmlpdf/application/pdf/conveng.pdf. [↑](#footnote-ref-42)
43. U. Beck, *World at Risk*, Cambridge: Polity Press, 2009. [↑](#footnote-ref-43)
44. B. Latour, 'Waiting for Gaia: Composing the Common World Through Arts and Politics', *Equilibri* 16.3 (2012): 515–538. [↑](#footnote-ref-44)
45. The dominance of Google Web Search has been critically assessed by scholars including Carr, Lovink, and Vaidhyanathan. See: N. Carr, *The Big Switch: Rewiring the World, from Edison to Google*, New York, NY: W.W. Norton & Company, 2008. G. Lovink, 'The Society of the Query and the Googlisation of Our Lives: A Tribute to Joseph Weizenbaum', *Eurozine*, 2008, http://www.eurozine.com/articles/2008-09-05-lovink-en.html. S. Vaidhyanathan, *The Googlization of Everything: (And Why We Should Worry)*, Berkeley, CA: University of California Press, 2011. [↑](#footnote-ref-45)
46. A. Downs, 'Up and Down with Ecology: The Issue-attention Cycle', *The Public Interest* 28 (1972): 38. [↑](#footnote-ref-46)
47. Downs, ‘Up and Down with Ecology’, 39-40. [↑](#footnote-ref-47)
48. Downs, ‘Up and Down with Ecology’, 38. [↑](#footnote-ref-48)
49. K. McComas and J. Shanahan, 'Telling Stories About Global Climate Change Measuring the Impact of Narratives on Issue Cycles', *Communication Research* 26.1 (1999): 30–57. [↑](#footnote-ref-49)
50. McComas and Shanahan, ‘Telling Stories About Global Climate Change Measuring the Impact of Narratives on Issue Cycles’. [↑](#footnote-ref-50)
51. McComas and Shanahan, ‘Telling Stories About Global Climate Change Measuring the Impact of Narratives on Issue Cycles’, 30. [↑](#footnote-ref-51)
52. McComas and Shanahan, ‘Telling Stories About Global Climate Change Measuring the Impact of Narratives on Issue Cycles’, 33. S. [↑](#footnote-ref-52)
53. Ungar, 'The Rise and (Relative) Decline of Global Warming as a Social Problem', *The Sociological Quarterly* 33.4 (1992): 483–501. [↑](#footnote-ref-53)
54. M. Djerf-Pierre, 'When Attention Drives Attention: Issue Dynamics in Environmental News Reporting Over Five Decades', *European Journal of Communication*, 27.3 (2012): 291–304. [↑](#footnote-ref-54)
55. McMillan, 'The Microscope and the Moving Target'. [↑](#footnote-ref-55)
56. Herring, 'Web Content Analysis’. [↑](#footnote-ref-56)
57. C. Weare and W. Lin, 'Content Analysis of the World Wide Web: Opportunities and Challenges', *Social Science Computer Review* 18 (2010): 272–292. [↑](#footnote-ref-57)
58. In the EMAPS Digital Methods Fall Data Sprint of October 2013, we asked whether conflict could be seen as a fourth phase in the evolution of the issue of climate change, after skepticism, mitigation and adaptation. EMAPS, 'Vulnerability, Resilience and Conflict: Mapping Climate Change, Reading Cli-fi', *Electronic Maps to Assist Public Science Blog*, 2013, http://www.emapsproject.com/blog/archives/2293. [↑](#footnote-ref-58)