

Future Visions as Prolongation of the Past: The Framing of AI Futures in the Political and Media Discourse in Germany

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Abstract

This bachelor thesis sheds light on the emergence and diffusion of socio-technological future visions. The research focus is on the artificial intelligence (AI) future envisioned by the German government juxtaposed with the respective news media coverage of the German media. By means of a frame analysis, the theoretical expectation that future visions are strategically used to realise political objectives is examined. Moreover, the study includes the theoretical notion that the media adopt the government's frames and do not integrate alternative future narratives into the public debate. These theoretical predictions are substantiated in the framing of AI futures in policy documents of the German government and various articles of four different German newspapers. It is shown how the German government frames the emergence of the AI future as an unalterable, autonomous development. It was found that the German media amplify this framing regarding economic aspects of the AI future. However, the media partly expose the government's frames and uncover political interests that seek to uphold the present balance of power. Based on these findings, approaches to create alternative future visions which include fundamentally different political designs are sketched.

Table of Contents

| | | |
|----------|---|-----------|
| 1 | Introduction | 4 |
| 2 | Theoretical Framework..... | 7 |
| 2.1 | Envisioning AI futures | 7 |
| 2.2 | Framing Envisioned AI Futures..... | 8 |
| 2.3 | Diffusing Envisioned AI Futures..... | 10 |
| 2.4 | Concluding Remarks..... | 11 |
| 3 | Methods..... | 12 |
| 3.1 | Research Design..... | 12 |
| 3.2 | Case Selection | 13 |
| 3.3 | Data Collection..... | 14 |
| 3.4 | Data Operationalisation and Data Analysis | 15 |
| 3.5 | Concluding Remarks..... | 16 |
| 4 | Data Analysis | 17 |
| 4.1 | Framing the Quest for the German AI future..... | 17 |
| 4.1.1 | AI framed as key to the future | 17 |
| 4.1.2 | AI framed as German AI | 18 |
| 4.2 | Framing the Fulfilment of the German AI future | 20 |
| 4.2.1 | AI framed as panacea..... | 20 |
| 4.2.2 | Uncertainty framed as main menace..... | 21 |
| 4.3 | Framing the Diffusion of the German AI future | 23 |
| 4.3.1 | AI framed as economic promise | 23 |
| 4.3.2 | AI framed as a black box | 24 |
| 4.3.3 | Ethical AI framed as a fig leaf..... | 25 |
| 4.4 | Concluding Remarks..... | 27 |
| 5 | Conclusion..... | 28 |
| 5.1 | Answer to the Research Question | 28 |
| 5.2 | Suggestions for Future Research | 29 |
| 5.3 | Practical Implications | 30 |
| 6 | List of References | 31 |
| 7 | Appendix | 35 |
| 7.1 | A: Selected policy documents of the German government | 35 |
| 7.2 | B: Selected newspaper articles of the German media | 36 |
| 7.3 | C: Coding Guidelines | 40 |

1 Introduction

In November 2018, the German federal government published the “National Strategy for Artificial Intelligence” outlining its vision of the upcoming AI future. The strategy recognises that AI has developed “into the driver of digitalisation and autonomous systems in all areas of life” (Bundesregierung 2018b, p.10) and the declared objective is to make Germany the world’s leading AI location. The whole strategy runs under the quality label “Artificial Intelligence (AI) Made in Germany” and promotes the strength of German science. However, in general Germany is regarded as a latecomer in the field of digitalisation and the German industry regularly criticises the government for its hesitancy (PwC 2018, Eckert 2019). Privacy and data protection are important values in the German society which is sceptical of the benefits of AI technologies with around half of the population having safety concerns (Kinkartz 2019, Gansser 2019). To form their political opinions citizens largely rely on the news media which inform the public about the government’s AI future vision and comment on the initiated policy measures (Callaghan & Schnell 2001). However, the media do not only fulfil an educational function but are equally demanded to criticise and control political action (van den Heijkant & Vliegenthart 2018). Thus, it is the media’s task to open the discourse on the German AI future to establish a constructive conflict on the meaning and impact of AI. A sophisticated debate can be organised by explicitly recognising different interpretations of possible AI futures and by refraining from merely considering AI through existing political frames (Brennen et al. 2018). Therefore, this thesis seeks to explore whether politics and media in Germany provide and discuss a variety of possible AI futures using different frames.

The high level of uncertainty regarding emerging AI technologies makes the issue of an upcoming AI future especially prone to framing. No universal definition of AI exists, the impacts of AI technologies on society are uncertain and diverse scenarios of potential AI futures are drawn by powerful political actors (Horowitz 2018, Caruso 2018, Makridakis 2017). “New technologies [...] change the rules of society, people’s behavior and ultimately the way people perceive life” (Carbonell et al. 2016, p.152). Therefore, stories and ideas of emerging technologies are highly influential in shaping public opinion. To study different future narratives several concepts like “imaginaries”, “visions”, or “envisioned futures” have been developed (Meyer 2019). All represent widely shared expectations about the future that are depicted as possible, attainable, and desirable. In addition, they reduce uncertainty by providing orientation, coordination, and motivation. The German government plays a key role in shaping the future as it not only provides the financial and legal framework for the development of AI, but also steers the public debate. This focus on political communication processes highlights that ideas about the future are expressions of power and specific interests (Jasanoff & Kim 2015, Inayatullah 2012).

To analyse whether the German government strategically uses future visions to realise its political goals, this study applies the theoretical lens of framing. The information the public receives on AI futures is structured by primary frameworks which help individuals to make sense of a complex set of information (Goffman 1974). The four basic functions of frames are defining problems, diagnosing causes, making moral judgements and suggesting solutions (Entman 1993). Framing is highly relevant in the field of future studies because “the quality of solutions to perceived social problems depends on the adequacy of the questions” (Jasanoff 2016, p.13). Possible AI futures are defined by scientists, politicians and journalists who suggest solutions based on their problem definitions. Both the German government and the media shape public opinion and use frames to explain what AI means and how life will look like in AI futures. The new AI reality is characterised by the frames employed in politics and media and these frames become part of the public’s mindset influencing how new information on AI is perceived (Kim et al. 2017, Carbonell et al. 2016).

Despite the increasing importance of AI as a public issue, academic research falls short of systematically evaluating the public discourse. So far neither the German news coverage nor the political communication of the German government in the field of AI have been analysed in depth. Frame analyses of the German news coverage of emerging technologies such as biotechnology and nanotechnology have been conducted (Kohring & Matthes 2002, Donk et al. 2012) and the emergence of the envisioned future of the “Industrie 4.0” in Germany has been studied thoroughly (Meyer 2019, Caruso 2018), but no research on media images of AI futures exists so far. An analysis concentrating on the UK media coverage of AI revealed that the debate was dominated by industry interests and that journalists often uncritically considered AI as a solution to every problem (Brennen et al. 2018). Furthermore, the role of metaphors in the development of AI technologies has been analysed spotlighting that the evolution of technologies not only shapes metaphors in a society, but that the reigning metaphors in a society equally shape the evolution of technologies (Carbonell et al. 2016). These findings stress the influential role frames play in the field of emerging technologies and envisioned futures. Moreover, they support the argument that the German government significantly affects the public understanding, interpretation and finally its acceptance of the envisioned AI future by framing the issue in its preferred way.

This thesis is guided by the supposition that the German government promotes a closed vision of the AI future by framing the topic in a one-sided way. Furthermore, it is assumed that the German media fall short of establishing an open debate as they adopt the frames used by the German government and do not offer alternative visions of possible AI futures. The primary objective of this paper is to critically assess the political visions of AI futures diffused by the German government and the German media. Deriving from this target, the research interest has been translated into the following main research question:

*“How do the German government and the German news media envision and frame
the upcoming AI future in Germany?”*

To systematically answer the descriptive main research question, the analysis is guided by three sub-questions. The first sub-question seeks to develop a profound understanding of the future narratives conveyed to the public. It asks, *“Which frames do the German government on the one hand, and the German media on the other hand, employ, to portray their envisioned AI futures?”*. Based on the central observations and findings the second sub-question asks, *“What are the main differences between government and media frames in terms of the defined problems of and possible solutions for the envisioned AI future?”*. This focus is important due to the key assumption of this thesis that the questions posed in the public debate determine the range of possible answers and therefore the problem definition either closes or opens the discourse on AI futures. Lastly, the third sub-question deals with the meaning of the differences between frames and explores whether alternative AI future visions are integrated into the public debate. The question is *“What do the differences between government and media frames signify in terms of alternative AI future visions?”*. Briefly, this bachelor thesis aims to uncover underlying political power structures of future visions and evaluates whether the media supports or criticises the narrative dominance of specific AI futures.

For this purpose, an interpretative research approach has been developed. To provide a basis for the analysis, the next chapter outlines the theoretical framework. Firstly, the two main concepts of *envisioning AI futures* (2.1) and *framing AI futures* (2.2) are explained to understand their interconnectedness and their importance in shaping futures. Additionally, the interdependent roles of the government and the media in shaping the public’s interpretation of AI are presented (2.3) to later evaluate whether both actors fulfil their political role responsibly. The third chapter introduces the research design of this thesis (3.1). The core of this chapter is the concrete explanation of and justification for the selected cases (3.2) and data (3.3) as well as the carried-out research activities (3.4). The fourth chapter constitutes the empirical part of the thesis. It is structured along the three stages of the envisioned AI future which form the subchapters of the data analysis. These subchapters include the description and discussion of government and media frames. Thus, they generate the answer to the first sub-question. The second and third sub-questions are answered explicitly afterwards (4.4). The conclusion of this thesis provides an answer to the main research question (5.1) and considers the implication for future research (5.2) as well as practical implications for politics and media (5.3).

2 Theoretical Framework

The aim of the subsequent chapter is to develop the theoretical framework which serves as the basis for the data analysis. To begin with, the meaning of futures and the concept of envisioning are discussed to understand the role of political interests integral to future narratives (2.1). Subsequently, the importance of envisioned futures in the context of AI is specified. Based on the developed understanding, the chapter provides the connection between envisioning and framing AI futures by explicating the different elements and functions of frames (2.2). Thus, a justification for using the concept of framing to analyse dominant AI future visions is provided. Next to that, the chapter discusses the interdependent roles of the German government and media in shaping and framing AI futures (2.3). The central argument is that political elites seek to amplify their preferred frames in the news coverage to extend their influence. Lastly, this theory chapter concludes by pointing out the key insights that guide the data analysis.

2.1 Envisioning AI futures

Before clarifying what is meant by *envisioning AI futures*, one needs to discuss the term *future*. Generally, the word future is defined as “a period of time that is to come” (Cambridge Dictionary 2020) and is understood as an open space, an area not yet explored, a room full of possibilities (Sand 2019). Even if one speaks of *the future*, this does not imply that an explicit path, to one predetermined future scenario, exists. However, in today’s prevalent enlightenment perspective, the future is largely determined by scientific development (Inayatullah 2012). Economic and social progress are to be achieved through technology, and science is converted into a strategic resource for nation states (van Lente & Rip 1998). Investments in science are regarded as investments in the future and scientific advances are conceived to be far reaching in their application and revolutionary in their consequences (Williams 2006). Currently, the technologies promoted to determine the future are summed up under the umbrella term *artificial intelligence*. And to realise AI futures, resources and public support need to be mobilised (Gill 2019, Rip & Voß 2013).

This mobilisation of resources is initiated by envisioning AI futures. Several concepts have been developed to describe how stories, ideas, and visions of futures shape the present (Gill 2018, Jasianoff & Kim 2015, van Lente & Rip 1998). These concepts focus on different aspects; however, all share some specific characteristics. The futures illustrated are (1) imagined in the present and based on technology and predictions about technological development. They (2) represent widely shared expectations about the future and are (3) described as possible, attainable, and desirable. Additionally, these future images (4) help to reduce uncertainty by providing orientation and motivation and finally, they are (5) phrased in a meaningful and memorable way (Meyer 2019). Once an envisioned future has been

constructed, it is transformed from a promise into a requirement. In the end, the mere possibility of AI futures becomes an unquestioned necessity to keep up in the international race for technological development. This means AI becomes indispensable for economic and social progress, thus for the future (Gill 2018).

Simultaneously, these powerful visions enflame anxieties and controversies over the risks of new AI technologies (Lauterbach 2019, WEF 2020). Extrapolating the future from past developments is a complicated undertaking with the pitfall not to underestimate the rate of technological change (Makridakis 2017). The immense variation in AI future visions underlines the high levels of uncertainty and the great scope for interpretation (Totschnig 2019). Proponents and opponents are seeking to project their specific visions of AI futures and thereby reopen room for imagination. Whose scenario becomes the most popular one depends on the advocate's capabilities to create and spread a plausible, memorable story of the envisioned future. The topic of AI has already left the scientific arena and over the last decade various nation states have published policy programs telling their story of AI futures (Cath et al. 2017, Dafoe 2018). In doing so, they map the future and present it as given. The gap between imagined and actual futures is foreshortened and the room for alternative future scenarios is eliminated (Williams 2006). The extrapolation of the future creates an unambiguous vision which does not leave any room for change or divergence from existing power relations. In this way the future is colonised by powerful actors who make the future appear as predestined (Inayatullah 2012).

In other words, the equation of the future with AI increases international competition and governments seek to mobilise public support for research investments. By envisioning specific AI futures, alternatives are undermined, and the realisation of one exclusive AI future becomes inevitable. For these reasons, the first underlying premise of this thesis is that the German government initiates a quest for the AI future by outlining a single, unambiguous vision.

2.2 Framing Envisioned AI Futures

To become widely accepted and viable, the created AI future vision needs to be promoted and diffused. The second theoretical argument guiding this thesis is that the German government uses frames to increase support for its AI future vision.

The concept of framing traces back to Erving Goffman who defined frames as schemata of interpretation that individuals unconsciously employ to structure experiences, to interpret events and to make sense of ambiguous information (Goffman 1974). In his conception, frames are organising principles that determine how complex information is processed. Thus, frames are rather a matter of cognition than one of language. In contrast, frames in communication concentrate on the strategic use of language and are used by authors to alter problem perceptions. Entman (1993) defined four basic

functions of frames: they (1) define problems, (2) diagnose causes, (3) make moral judgements and (4) suggest solutions. Simultaneously, frames in communication direct the receiver's interpretation of information by suggesting courses of political action (Nelson 2004).

Frames are especially influential when envisioning futures. Even if scientists increasingly attempt to anticipate the future and to predict social impacts of emerging technologies, the future remains to a considerable degree uncertain (Gill 2018, Floridi 2019). The uncertainty about the future also stems from the lack of a clear interpretation of the available information (Meyer 2019). This means the concepts of envisioned futures and frames overlap as both seek to reduce ambiguity. Successful future visions are not about detailed facts but provide interpretative frames that help to grasp the meaning of the future including the meaning of AI. These frames establish bridges between the past, the present and the future to make the political decision-making appear not only consistent but imperative (Veenman et al. 2019).

The envisioned AI future is defined by abstract concepts such as data or machine learning, and frames enable a clear interpretation of new realities (Floridi 2019, Carbonell et al. 2016). The simplifying elements of frames help to quickly diffuse the envisioned AI future. By continuous confrontation with frames, they become part of the citizens' mindset, and shape their perception of reality subconsciously. Metze emphasised "that the competition between futurity framing influences public acceptance and the governance of technologies and is able to close down discursive rooms" (Metze 2018, p. 1739). This underlines that the interpretation of reality significantly shapes the future and, if one predominant interpretation silences alternative frames, one future scenario becomes increasingly hegemonic. Once an unambiguous interpretation of the future is imparted, frames provide guidance by outlining a clear plan how to best carry out the promising AI future. This means frames provide political answers by defining problems which might emerge in AI futures, and by spotlighting the problems which might be caused if the envisioned future was not realised (Berendt 2019). The result of which is that "if a problem is framed [...] in the wrong terms, then the solution will suffer from the same defects" (Jasanoff 2016, p.13). Therefore, the questions posed are as important as the questions ignored.

Expressed differently, frames guide the individual's interpretation of information by reducing ambiguity and by providing clear-cut answers. Alternative views are silenced and the outlined strategy, to realise the envisioned future, appears to be the only solution.

2.3 Diffusing Envisioned AI Futures

As explained, visions of the future are always political and organisations profit from envisioned futures in different ways (Inayatullah 2012). In this paper, the analysis focusses on the AI future envisioned by the German government and the respective news coverage of the German media as both are important institutions influencing the cognitive frames of individuals (van Wijck & Niemeijer 2016). In the following, their different interests, and interdependent roles in altering citizens' understanding and acceptance of AI futures are specified.

The government promotes its envisioned AI future to mobilise support for political action (Haynes et al. 2016). As a political elite, the government seeks to protect its privileged position by promoting a desirable AI future and by mapping a clear plan to realise this future (Sand 2019). The government uses the future strategically to enhance the probability of achieving its policy goals and thus fulfils the public's expectations to prepare for the future (Inayatullah 2012). Moreover, the political authorities are expected to communicate all their activities and to make them visible (Meyer 2019). Political elites are often the first ones to frame a public issue and they try to amplify their favoured frames in the media coverage (Haynes et al. 2016). Still, the news media may not necessarily adopt political frames but can also apply their own frames.

The use of divergent frames can be explained by different motivations. In the media debate the ease of communication plays a bigger role to increase profit (Beck 2018). Therefore, journalists frequently appeal to values and emotions when framing public issues (Callaghan & Schnell 2001). To reach a broad readership the media might seek to reduce complexity by using frames that allow a clear interpretation of AI futures (Cacciatore et al. 2016). Also, a different assessment of the desirability of AI futures can introduce new frames into the public discourse. The impact of AI technologies raises disputable ethical questions especially regarding the danger of increasing inequality, discrimination, and dependence (Makridakis 2017, Totschnig 2019). In a democratic society the media not only inform the public about the government's envisioned AI future but are equally demanded to critically question the government's strategy, including its problem definitions and suggested solutions. This means the media should seek to uncover the frames put forward by the government. If no competing frames are integrated into the public debate on AI futures, political authorities easily complete their self-fulfilling prophecy, making sure the balance of power remains the same in the future.

Previous work analysing the framing of emerging technologies showed that technological progress is often portrayed in a very positive light by political elites who strongly emphasise economic advantages (Meyer 2019, Druckman & Bölsen 2011, Cobb 2005). This portrayal was supported by the German press and researchers found indicators that "journalism is becoming a promoter of scientific progress and the economic perspective on science and technology" (Donk et al. 2012, p.24). Frames

concentrated on economic benefits and barely presented emerging technologies in a social context. Even though perceived risks and benefits play an important role in the overall evaluation of emerging technologies (Howell et al. 2019), frames depicting the ambivalence of technologies and the uncertainty surrounding their impact, were rare. Still, the evaluation of risks, benefits and ethical aspects was more frequently provided by left-wing liberal newspapers. Kohring's and Matthes' research (2002) supports these findings about differences in the news coverage of emerging technologies due to divergent political ideologies. Left-wing liberal newspapers framed biotechnology in terms of moral risks and necessary regulations, while right-wing conservative newspapers highlighted benefits and economic prospects (Kohring & Matthes 2002). Also, the analysis of the British news coverage of AI revealed that the topic was primarily positioned as a private commercial concern, not as a public issue (Brennen et al. 2018). In line with these findings a positive and benefit-oriented news coverage of possible AI futures is expected, but differences between news outlets could be noticeable.

Briefly, the government is expected to draw an unambiguous image of its desired future to prove that it is preparing for the upcoming AI future. The media's role is to critically assess the government's AI future vision by exposing the frames used. However, previous findings indicate that the media often do not fulfil their role as a watchdog responsibly. Therefore, the last theoretical argument is that the news media are highly effective in diffusing AI future visions but fall short of creating alternative ideas, opinions, and visions.

2.4 Concluding Remarks

This second chapter has delivered the theoretical framework for the analysis of the political and media discourse of the German AI future. The starting point was the recognition of actual processes of future-making and three main insights have been developed. First, it has been clarified that visions of the future are always political and established by powerful actors for strategic reasons. Secondly, the uncertainty inherent to futures is reduced by envisioning one specific AI future which is manifested by frames. The main function of frames is to create an unambiguous vision by clearly defining upcoming problems and suggesting respective solutions. Lastly, the media's role is to question the German government's envisioned AI future by exposing its frames to open the public debate on possible futures.

3 Methods

This third chapter aims to clarify and to justify the methods used for answering the research question of this thesis. First, an explanation of the overall research design is given and its linkage to the envisioning and framing of futures is provided. Subsequently, the two cases examined in this study are described and the choice to focus on the framing of envisioned AI futures in Germany is discussed. The chapter continues by explaining the selection of policy documents and newspaper articles and summarising the respective data collection. Finally, it illustrates how the selected data is analysed with the help of the theory-driven coding scheme. The chapter concludes by summing up the research activities undertaken.

3.1 Research Design

This research is an interpretative study with the aim to identify frames occurring in the political and media discourse of AI futures. The two central concepts of this study, envisioning futures and framing futures, both build up on the interpretative research paradigm.

In the interpretative dimension of future studies, the central goal is to uncover underlying narratives. The basic assumption is that language serves institutional interests, thus, discourse analysis becomes central when investigating which images of the future have become hegemonic (Inayatullah 2012). Also, Erving Goffman's basic concept of frame analysis is premised on the interpretative research paradigm. According to Goffman frames are organising principles that guide how people perceive their social realities and a basic element to understand how individuals make sense of the world (Goffman 1974). Given the research interest to investigate the frames used to envision AI futures, unpacking texts and showing the discourse that inhabit them is central. Since this study is specifically interested in the frames employed to envision AI futures, the different frame elements are the central research objects. These frame elements are operationalised in a theory-driven coding scheme, that enables to retrieve the respective frames from the policy documents and newspaper articles. This study's main target is to critically assess the public discourse of AI futures by developing an in-depth understanding of the framing by the German government and the German media. Thus, the most suitable method is a qualitative content analysis. The nature of this method goes in line with the interest of this study to "capture the meanings embedded in the internal relations within texts" (Reese 2007, p.10).

3.2 Case Selection

The two cases of this study are the envisioning and framing of AI futures by the German government on the one hand, and the German media on the other hand.

The framing of AI futures in Germany is an illustrative example to highlight the clash between economic interests and traditional values erupting with the prospect of AI futures. As strongest national economy in Europe, Germany is expected to play a leading role in the upcoming AI economy. However, it is traditionally a manufacturing nation, lagging in the process of digitalisation (PwC 2018). The German data protection standards are exceptionally high, and the public is relatively sceptical of new AI technologies (Gansser 2019). Given these peculiarities, a diverse political and media discourse on the benefits and risks of AI futures can be expected. In the case of the German government, the federal ministries for Education and Research (BMBF), Economy and Energy (BMWi) and Labour and Social Affairs (BMAS) exemplify their vision of the upcoming AI future and their strategy to realise this future. Initially the discussion of AI focused on the economic impact on Germany's industry (BMWi 2015). However, as AI turned from an economic enterprise into a public issue, the three German ministries worked out their common "National Strategy for Artificial Intelligence" published in November 2018. Since then the ministries regularly report on their progress in the realisation of the AI future, however, the time frame covered in this study is restricted to the years 2018 and 2019.

As a comparative case the framing of AI futures by the German media is analysed. Due to the importance attached to independent journalism and diversity of opinion, the discussion of AI futures by the German media is particularly interesting. The freedom of the press is guaranteed by the Basic Law, and state intervention in the press is confined to a discrimination-free media policy (Beck 2018). Thus, the media are politically independent and the news coverage on possible AI futures is expected to be framed in ways different to the government's framing. Due to the historic experience of propaganda and Gleichschaltung, political parallelism in Germany is traditionally low since 1945. However, recently claims from civil society criticising "swarm journalism" emerged indicating that the news coverage of public issues became increasingly one-sided (Röper 2016). These tendencies make the case of the framing of AI futures by the German media especially interesting as the initial expectation of a diverse public debate might be misleading.

3.3 Data Collection

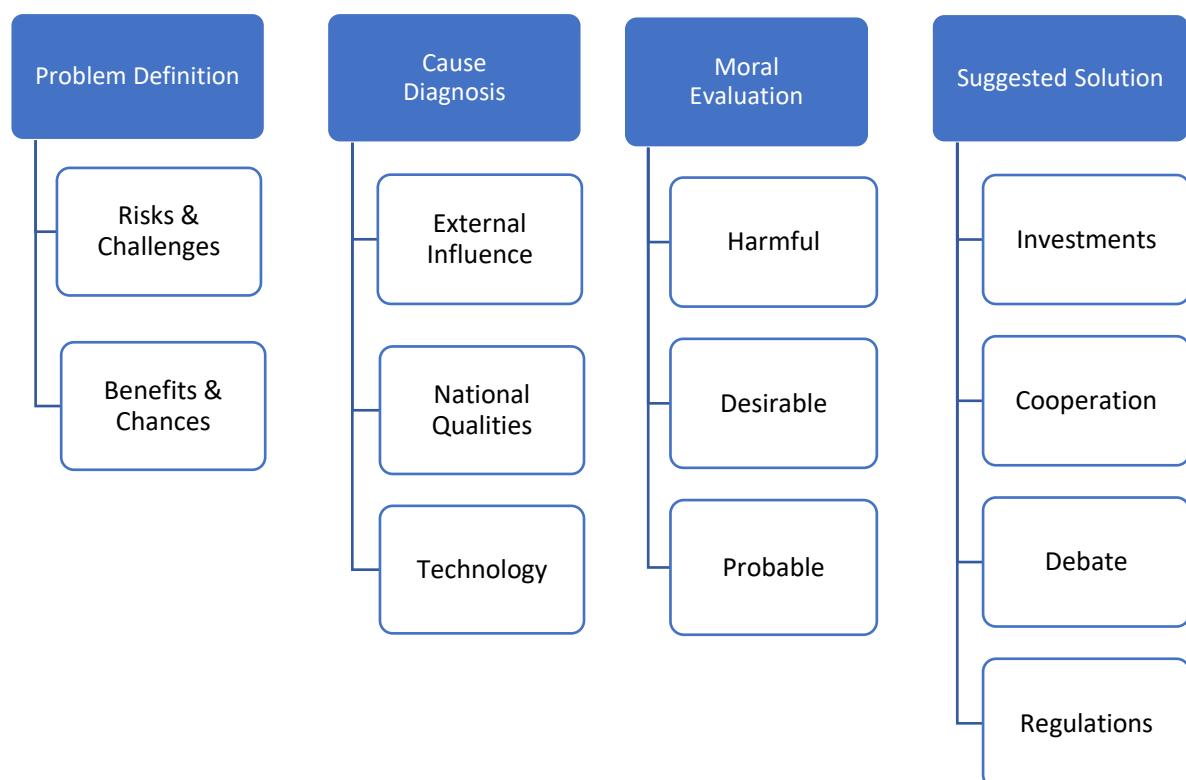
In the following content analysis, qualitative data from the German government and German newspapers is evaluated. To begin with, various types of documents have been retrieved from the official websites of the three responsible German ministries. Policy papers constitute the basis of the data collection. As decision making tools, they define policy issues, identify and evaluate policy options and recommend policy measures (Blümel 2018). This means their basic functions overlap with Entman's conceptualisation of frames. Additionally, in policy planning visions of the future are often used to increase public support (Inayatullah 2012). Therefore, they yield valuable information to examine how the German government constructs problems of AI futures and promotes its preferred solutions. Analysing evaluation reports will equally contribute to an in-depth understanding of the framing of AI futures. Furthermore, official political statements and press releases published on the ministries' websites were selected to focus not only on the construction of frames, but to also study how these frames are diffused. The complete data collection of government documents amounts to 136 pages (Appendix A).

To analyse the media frames occurring in the discourse of AI futures, newspaper articles are the chosen medium. In Germany, the periodical press still plays a major role in disseminating political background information, encouraging analysis and critique, educating, and forming opinions (Beck 2018). To reflect the diversity of the German media landscape, four different newspapers have been selected. Firstly, two national, daily German newspapers, namely *Die Welt* and *Die Tageszeitung (taz)* were chosen to avoid either conservative or liberal bias. Secondly, the high-profile quality newspapers *Frankfurter Allgemeine Zeitung (FAZ)* and *Die Zeit* were included as both are known for their in-depth investigations (Röper 2016). Additionally, they also represent contrasting political leanings, with the *FAZ* being considered as center-right, liberal-conservative and *Die Zeit* as left-liberal. As explained, it is anticipated that frames differ depending on the political leaning of the newspaper. The sample of newspaper articles was identified by searching suitable articles on the respective websites. Regarding the content check of the articles, their central topic discussed had to be the development, application or meaning of AI in Germany. In a first step articles directly commenting on the government's "National Strategy for Artificial Intelligence" were selected to analyse how the media frame the political vision of the German AI future. To develop a more profound understanding the search focus was enlarged to three key topics connected to AI futures: economy and labour, social affairs, and research. Articles with less than 100 words and interviews were excluded as they do not provide sufficient information on the dominant media frames. As all policy documents and newspaper articles are originally published in German language, excerpts have been translated into English.

The final selection includes 47 newspaper articles published between March 2018 and November 2019 (Appendix B). In the light of the research objective to uncover the underlying narratives of AI futures this limited number of articles is justifiable as it allows for a thorough study of the occurring frames, key issues and patterns. Again, this study does not aim for generalisability but seeks to gain new insight into the envisioning and framing of AI futures in Germany.

3.4 Data Operationalisation and Data Analysis

The following analysis will be guided by processes of structuring content analysis developed by Mayring (2014). Given the research interest of this thesis, the content analysis' aim is to provide an in-depth understanding of how AI futures are framed by the German government and media. Therefore, the definition of frames is central to the analysis. As frames are embedded in internal relations within texts, they involve unobservable dimensions of communication and a clear definition of specific frames is often not evident (Linström & Marais 2012). To make the definition of frames more comprehensible, the analysis follows Matthes' and Kohring's suggestion to provide operational definitions of the frame elements (Matthes & Kohring 2008). The frame components are further divided into sub-categories derived from the theoretical expectations developed in chapter 2. In the process of analysis, the collection of key words is expanded, and typical examples are provided (Appendix C).



Coding Scheme: The impact of AI futures on the German economy, society & research

A differentiation is made between the four frame elements defined by Entman (1993). To begin with, changes to the status quo are mostly perceived as gains and losses. Thus, the expectation is that the government and the media define risks and benefits of AI futures. Secondly, an explanation of the causes is provided. Here, three basic categories have been derived from theory: external influences like foreign competition, national qualities such as scientific expertise or the technological progress as an autonomous development are made responsible for threats and chances in the upcoming AI future. The third frame component refers to the evaluation of the upcoming changes, whether they are described as desirable, threatening, and/or probable. The last frame element defines the solutions suggested by the government and the media. Here, four measures were determined to be most likely: the call for increasing investments to keep up in the race for scientific progress, the demand for intensified national and international cooperation, the request to foster the public debate in the field of AI and the need of stricter legal and ethical regulations and guidelines.

3.5 Concluding Remarks

To sum up, the analysis of government and media frames in the discourse of AI futures in Germany is three-fold. First, the developed coding scheme which includes the distinction between the four frame elements is applied to the data set, to explore the frames used in policy documents and newspaper articles. Thus, an answer to the first sub-question is generated. Afterwards, the key observations regarding the problem definitions and possible solutions of the government and the media are discussed. Thereby, the second step goes more into detail in the general aim of this thesis to shed light on the different interests behind future visions and the second sub-question of this thesis is answered. Lastly, the findings are interpreted regarding their significance for alternative AI future visions to provide an answer to the third sub-question. By following these methodological steps, it is possible to generate an answer to the main research question of this thesis and to arrive at the research aim.

4 Data Analysis

The core of the subsequent chapter is the empirical analysis of the gathered data based on the concepts of envisioning and framing futures. To begin with, it is shown how the German government turns its envisioned AI future from a mere possibility into an urgent necessity by framing the future as an economic enterprise and a national mission. In the next step, it is demonstrated how the government mobilises public support and citizens' participation to carry out its supposedly infallible AI strategy. Here, AI is framed as a cure-all for upcoming problems and the AI future is only threatened by uncertainty. Lastly, it is argued that the media partly uncover the political interests behind the envisioned AI future by exposing the government's frames. The media point out the government's strategic use of the AI future vision that seeks to uphold the status quo. However, they fall short of introducing an alternative vision that broadens the public discourse.

4.1 Framing the Quest for the German AI future

To advance its political interests and to mobilise public support the German government first initiates the quest for the AI future. Its central message is that no future exists without AI and consequently AI is framed as *key to the future*. AI is presented as a strategic resource and framed as an exclusively *German mission*, that requires the cooperation of society as a whole. Every citizen is responsible for the attainment of social and economic progress, so for the fulfilment of the German AI future.

4.1.1 AI framed as key to the future

The dominant frame to create the necessity of the German AI future is the portrayal of *AI as key to the future*. The government declares that already today, new AI technologies increasingly pervade various economic sectors and people's daily lives, which means that the "age of AI" has already arrived (Bundesregierung 2018b). The various applications of the "inter-sectional technology" AI can be used to foster a noticeable social progress in the interest of all citizens (Bundesregierung 2018b). Nonetheless, the government warns that "some states already recognised the special potential of AI and produced their own strategies" and that "the race for the technology leadership is well underway" (Bundesregierung 2018a, p.4). However, the government's promise is that if all actors of society act immediately, there is still hope for winning the race for the AI future.

When examining the frame of *AI as key to the future*, two unclarities need to be pointed out and explained in more detail.

First, the meaning of the term *key technology* is used in an inconsistent way. Sometimes AI is claimed to be the key technology, sometimes specific applications such as autonomous driving or text and data mining are depicted as AI key technologies. In other cases, AI applications pose high demands on

already existing key technologies and only the combination of AI and other key technologies can leverage opportunities in the future (Bundesregierung 2018b). These diverse descriptions of AI as key technology blur its actual impact, including the problems of and solutions for the AI future. Yet, it remains clear how to interpret the information: As key to the future AI is indispensable. No further explanation to what kind of future AI is the key is provided, however, the need for AI is strongly emphasised. Thus, the frame reduces unclarity, even though it consists of an ambiguous description of *AI as key to the future*.

A second inconsistency of the frame is that AI is depicted as future and present simultaneously. AI not only governs the future, but already controls the present. This means that immediate action is essential to not lose control neither in the present, nor in the future. Crucial decisions must be made rapidly to successfully compete in the worldwide race for the promising AI technologies. As observed by Inayatullah the future is described as given and becomes an “arena of economic conquest” (Inayatullah 2012, p. 41). No more time for reflecting and debating on possible AI futures is left, but the government’s strategy is the only way to realise the future in time. Hence, “time becomes the most recent dimension to colonise, institutionalise, and domesticate.” (Inayatullah 2012, p.41). The government’s message is that thanks to its foresighted action, the German AI future can still be realised in time. This confirms that successful envisioned futures not only need to be described as desirable, but it is equally important that the future appears possible and attainable (Meyer 2019).

To sum up, the frame *AI as key to the future* justifies the urgent need for the government’s envisioned AI future by shifting the focus from the range of imaginable futures to its specific, still attainable vision. The frame’s central message is that the global competition is strong, and time is scarce, however, the quest for the indispensable AI future is not lost yet.

4.1.2 AI framed as German AI

A second prevalent frame to substantiate the necessity for the AI future is the image of *German AI* and “*AI made in Germany*”. The government suggests that not only *AI as key to the future* is exceptional, but there is something unique about *German AI*. This uniqueness of German AI is well exemplified by the following citation: “The [AI] strategy of the federal government also contributes to an “*AI made in Germany*”, a special and specific dealing with the technology for the welfare and benefit for state and society” (Bundesregierung 2018b, p.10). The dominant message is “citizens first” and the importance of “people-centered” AI which fosters citizens’ social participation, their freedom of action, and their self-determination is stressed (Bundesregierung 2018b, BMWi 2019b).

However, the development of *German AI* promises not only significant social progress but is also an economic enterprise. The following citation serves as an illustration: “We want [...] that AI-based business models are developed in Germany and become new export hits” (Bundesregierung 2018a,

p.2). Consequently, the development of *German AI as key to the future* is not only the obligation of the government, but AI is defined as a task for society as a whole. The government promotes the establishment of an “AI culture” that fosters trust and innovation and declares that the social relevance of the AI development will be ensured (Bundesregierung 2018b).

Again, the frame of *German AI* contains a range of inconsistencies on which light is thrown in the following.

The first ambiguity the frame of *German AI* masks is the role of values in the AI future. The government declares that “*AI made in Germany*” represents the German economic and social structure, particularly the German value system. Yet, it remains open how exactly the values of the German society determine the special and specific dealing with AI in Germany. Nevertheless, the frame of *German AI* fulfills its function and provides security, orientation, and motivation by reducing uncertainty (Meyer 2019). “*Made in Germany*” is a globally known, incontrovertible quality label, which implies that AI technologies that are developed, tested, and produced in Germany are, per definition, reliable and safe. Consequently, the frame of *German AI* reduces concerns, silences critical voices, and strengthens the perception of AI as a national mission.

A second key idea included in the frame of *German AI* is the economic promise of the AI future. Here, “dialectics of promise” are used to underpin the urgency and validity of the government’s policy measures. “*Dialectics of promise*” refer to the reasoning behind promises which means that every promise is bound to implicit conditions (van Lente & Rip 1998). The government’s argumentation is that AI is a strong scientific field only if investments are made right now. Only immediate financial endeavors guarantee high rates of return. Without funding, AI’s enormous economic potential will wither away. Thus, making “*meaningful investments in the future*” (Bundesregierung 2018b, p.17), is the best solution to not lose Germany’s leading economic position. Again, the aim is clearly mapped, and the uncertainty of the future is disregarded by promising a worthwhile development if the government’s AI strategy is realised.

The last central idea of the frame is that the AI future is a shared national mission. As AI has a revolutionary character and the promised social and economic progress is immense, the attainment of the German AI future needs the support of the whole nation. Federal states, local authorities and individuals are equally demanded to act straight away. However, no concrete examples of how public discourse, participatory measures, or the realisation of an “AI culture” will be organised are given. The frame’s suggested solution is participation, yet no concrete policy measures are announced. Only the frame’s central message is identifiable: The quest for the inevitable AI future is a national mission which can only be accomplished if every citizen contributes.

Briefly, the frame of *German AI* has three main functions: it moderates concerns, provides orientation, and makes a big promise that is bound to the condition of nationwide participation.

This first section showed how the German government illustrates an unambiguous image of the upcoming AI future. By framing *AI as key to the future*, the quest for AI is justified. Urgency for the fulfilment of the envisioned AI future is created by pointing at the risk of falling behind in the race for AI futures. Still, hope is maintained by praising the unique quality of German science. To truly make the quest for the AI future a national undertaking, a strong appeal to everyone's participation is made.

4.2 Framing the Fulfilment of the German AI future

The following part examines how the German government outlines its clear strategy for the fulfilment of the AI future. Even if the German AI future is an inevitability and a promising national mission, its implementation poses certain challenges. However, the government frames *AI as panacea* for potential risks and outsources the occurrence of concrete dangers to foreign countries. To shift attention further away from the downsides of AI, uncertainty itself is framed as *main menace*.

4.2.1 AI framed as panacea

To increase support for the realisation of the German AI future, the government frames changes as challenges and chances, rather than as concrete risks and benefits. According to the government, the benefits of AI lie in various scientific fields ranging from biotechnology to mobility, as well as in opportunities for the cultural, media and creative industry. In general, it is declared that AI technologies must be used for the added value of the future (Die Bundesregierung 2018a). This idea is best exemplified by the following citation of the minister for economic affairs Peter Altmaier: "AI is not any innovation – it is a basic innovation which will change and improve our economy and life profoundly" (BMAS 2018, p.1). However, the German government recognises one specific risk of AI futures: growing global inequality and the danger of discrimination in developing countries. But these threats can also be turned into potential with the help of AI. The government intends to use the local opportunities by building up AI capacities in developing countries (Die Bundesregierung 2018b).

In the following, two striking features of the frame *AI as panacea* are examined more closely.

A first considerable insight is that few direct benefits are announced, but the language used focusses on potential and chances. Again, "dialectics of promise" which bind gains to specific conditions are used to secure citizens' support for the government's actions which promise to release the potential of AI futures. Still it remains questionable what exactly is revolutionary about AI and what are the beneficial applications to change and improve economy and life profoundly. Only the economy of the AI future has already been calculated precisely and the right policy measures to achieve the promised

progress are waiting to be realised (Bundesregierung 2019). Supporting the observations of Veenman et al. (2019), “the economic story of employment and trade” is crucial in the government’s argumentation.

A further problematic issue in the frame is that the occurrence of tangible risks is outsourced to developing countries. The following citation serves as an example: “It needs to be guaranteed that AI applications from industrialised countries are not discriminatory or inappropriate for users from developing countries” (Bundesregierung 2018b, p.44). Hence, the impression is conveyed that AI technologies can only increase discrimination and inequality in developing countries, but not in developed countries such as Germany. The questions why there are great differences among countries and how exactly discrimination and inequality can be increased are not posed, let alone answered. These findings confirm Entman’s argumentation that “the omissions of potential problem definitions, explanations, evaluations, and recommendations may be as critical as the inclusions” (Entman 1993, p.54). The government’s idea that concrete dangers only occur in far-off AI futures remains, and the unique quality of *German AI* seems to exclude the possibility of a harmful use of AI in Germany.

To sum up, AI is framed as *panacea* for all difficulties in the age of AI. The threat of economic decline is to be overcome by more AI and the possibility of an adverse impact of AI is ruled out because *German AI* is, per definition, reliable and safe.

4.2.2 Uncertainty framed as main menace

The government highlights the potential and opportunities of the AI future and does not refer much to risks and dangers. However, it identifies one vital threat to the fulfilment of the German AI future: uncertainty. In the eyes of the government, future developments must be anticipated as best as possible to guarantee that AI technologies serve society and the people (Bundesregierung 2018b). For instance, Peter Altmaier states that “to develop and to control AI [...] is a key concern for Germany” (BMAS 2018, p.1). Furthermore, inaction would endanger national authority as “the use of AI-based systems is an important element of the digital sovereignty of Germany” (Bundesregierung 2018a, p.3). The government declares that “at all stages of AI, from development to use of AI systems, transparency, accountability, non-discrimination and controllability have to be guaranteed” (Bundesregierung 2018b, p.39). Thus, more between the lines than explicitly stated the government acknowledges that AI can have downsides. This admission is also reflected in the following citation: “It is necessary to use the opportunities [...] with the awareness of possible ethical limits and dangers for our free democratic society” (Bundesregierung 2018b, p.46).

The frame of *uncertainty as main menace* constitutes of three compelling elements worth examining in more detail.

Firstly, the frame portrays the AI future as calculable. The image conveyed is that if enough information is collected and analysed, the government could implement all necessary steps to realise the desirable AI future. Again, the government uses “dialectics of promise” arguing that the potential of AI could only be exhausted if its development is anticipated as precisely as possible. In line with theoretical expectations investments in science are portrayed as investments in the future (Williams 2006). Thus, attention is shifted further away from concrete risks of AI technologies by defining uncertainty itself as main menace. Conforming to Inayatullah’s findings, the underlying assumption is that “through better forecasting, the world, the future, can be more effectively controlled thus increasing profits or hegemony” (Inayatullah 2012, p.39). The policies to control the AI future are the development of measures for risk assessment and protective mechanisms (Bundesregierung 2018b). Again, the emergence of the AI future is framed as an autonomous process and the government’s political responsibility demands that it prepares for the upcoming future.

This leads to the second problematic element included in the frame: as uncertainty is the main threat that has, until now, been sufficiently reduced by the government’s alertness, then inaction poses the next severe obstacle endangering the fulfilment of the German AI future. The framing of inaction as serious threat underlines the inevitability of the AI future. As AI is the future no matter whether its development is supported or not, inaction would simply be irresponsible. The government’s message is clear: If no investments in the development of AI are made, the German welfare state will certainly diminish. As observed by Metze (2018) the projected image of a decline in competitiveness and welfare is a typical element of envisioned socio-technological futures. Also, the government’s conclusion that inaction will lead to dependence comes as no surprise. By emphasising the need of AI to protect Germany’s sovereignty and prosperity, the urgency of the AI future is further increased.

Lastly, uncertainty regarding the public’s attitudes towards AI is framed as a threat to the German AI future. The government warns that citizens’ scepticism, their ignorance and insufficient knowledge, might pose an innovation impediment. The suggested and already partly implemented solution of the government consists of educational measures. For instance, the online class “Elements of AI” is promoted with the words “AI concerns us all!” (BMWI 2019a). It seems as if citizens must be educated to understand the enormous, but obscure benefits of the AI future. As AI is also framed as a task for society as a whole, the threat of inaction would remain if citizens did not cooperate. Thus, framing uncertainty regarding public’s acceptance as harmful, prevents inaction and strengthens the sense of a shared national mission.

Expressed differently, the immanent conflict between ruling the AI future and being ruled by AI is not broached by the government, but the promise is made that the proper combination of anticipation and action can prevent all upcoming threats of and to the German AI future.

This second part of the analysis has shed light on how the German government frames the fulfilment of the AI future as promising, certain, and calculable while remaining vague in the description of benefits and risks. The potential of the AI future is highlighted by framing *AI as panacea*. Attention is shifted away from real risks by framing *uncertainty as main menace* to be overcome. This frame turns the fulfilment of the German AI future into a question of scientific calculation and political willpower, instead of one of public concerns. Nevertheless, citizens have an important role to play as uncertainty regarding their attitudes towards AI could impede the fulfilment of the AI future.

4.3 Framing the Diffusion of the German AI future

Finally, the government's vision of the German AI future would remain unknown to most citizens if it was not diffused by the media. The following section shows how the media largely takes over the frames employed by the government when describing the potential of AI for economy and research. However, regarding the framing of AI's impact on society, the media partly unveil the government's frames, and introduce divergent interpretations of the AI future broadening the public discourse. The government's AI strategy is framed as a *black box* and the media seek to uncover the myths surrounding AI futures. Furthermore, the government's idea of ethical AI is framed as a *fig leaf*, concealing the inherent conflict between economic and societal interests, and seeking to maintain the present balance of power.

4.3.1 AI framed as economic promise

In the news coverage of economic aspects of the German AI future, the same frames used by the German government occur. Also, the German media define AI as a key technology with a disruptive potential even comparable to the invention of electricity (FAZ 2, WELT 3). The AI future is framed as an inevitability that will affect all areas of life within a couple of years. The immense international competition is stressed by all newspapers and the USA and China are identified as current AI leaders and main competitors (ZEIT 5, taz 9). However, the race for the AI hegemony is not yet decided and an unequivocal appeal for *German AI* is made (FAZ 2, WELT 5). *Die Welt* warns that the "Triumphal march of Made in Germany is jeopardized" and demands a "360 degrees innovation offense" to make the German industrial location ready for the future (WELT 2). Again, more AI is the suggested solution and decreasing investments are declared to be a century error which might lead to the German economy being stuck in the present (ZEIT 2, 12). Also, in the news coverage, the role European and German values play in the AI future is inconsistent. On the one hand, ethical, human-centred AI needs to be developed by constructive openness and public discourse (ZEIT 12). On the other hand, AI must not be talked to death and, scrupulosity must not control the debate about new technologies (WELT 3).

This portrayal proves the adaptation and amplification of the government's frames by the media as observed by Haynes et al. (2016). Again, the central message is that Germany must immediately prepare for the inevitable AI future (Inayatullah 2012). The employed frames all increase the notion of an inevitable, highly competitive race for the AI future. As reported by Donk et al. (2012) journalists strongly promote scientific progress and take an economic perspective on science and technology. This proves correct both for left-wing liberal papers (*taz, Die Zeit*) as well as for right-wing conservative newspapers (*FAZ, Die Welt*). In contrast to previous findings, no significant differences among the newspapers' political leanings could be identified (Donk et al. 2012, Kohring & Matthes 2002). In line with the government all four newspapers declare immediate action to be essential to not get stuck in the present and to not miss the future.

4.3.2 AI framed as a black box

The German media's assessment of the AI future envisioned by the government does not remain completely uncritical. The media denounce the vagueness of the German government's AI strategy and frame it as a *black box*. The political interests in future narratives are exposed and the government's frames are partly displayed. To educate the public, the media uncover the myths surrounding the AI future by explicating the functioning of AI technologies.

While the media generally praise the government's political will to make Germany the worldwide leading AI location, they denounce the absence of concrete policy measures. The newspapers criticise that the sketched-out way is vague, half-baked and unsorted (FAZ 2, ZEIT 10) and address the discrepancy between the government's clear, highly ambitious goals and the vagueness of the planned measures (WELT 2, *taz* 1). The media expose the government's frames which is illustrated by the following citation: "The keyword AI serves as a placeholder for the equation: successful innovation = welfare generating future = political stability" (FAZ 7). In addition, the media scrutinise the umbrella term AI and the functioning of concrete AI applications like algorithmic decision-making and machine learning (*taz* 6, WELT 11). Also, the limits and pitfalls of algorithms are explicated, and the news media seek to unwrap digitalisation myths (ZEIT 6).

By framing the government's AI strategy as a black box the media imply that the future is indefinite and open. The image of a clear, infallible plan is blurred and the government's actions appear less strategic and self-evident. However, the general idea of a calculable future is not rejected when the media direct attention to the vagueness of the government's AI strategy. Here, the criticism concentrates on the government's incompetency to give unambiguous answers to the challenges AI poses. This means that the media display how the government's frames hide the uncertainty of possible solutions, but they do not expose the ambiguity included in the basic problem definitions.

Nonetheless, the media make clear that the future is per definition uncertain and that change should be an integral part of the future. The future is declared to be a story in the first place and the media highlight that for the attainment of one particular AI future, anxiety serves as an action engine (ZEIT 3). This means the media hint at the fact that the envisioning of futures is guided by political interests (Inayatullah 2012). According to *Die Zeit* the government's warning of Germany's economic decline is a strategic action and it is declared that the narrative of Germany falling behind in the digital development is outdated (ZEIT 3). In contrast to the findings of Callaghan and Schnell (2001) the media try to moderate anxieties and move the issue to an intellectual plane.

This objective also becomes apparent when the media educate the public about the functioning of AI applications. They attempt to demystify AI by explaining its limits and the specific ways in which AI technologies can increase discrimination (ZEIT 6, WELT 11, taz 6). These clarifications set limits to the intimidating potential of AI. By making AI futures more conceivable, citizens are enabled to sense the meaning of AI. Thereby, they are empowered to form their opinion and can integrate it into the debate.

In other words, the frame of *AI as a black box* strongly underlines the ambiguity inherent to futures. The media address the vagueness of the German government's AI strategy and the obscurity of the functioning of AI technologies. Hence, they open the public discourse and empower citizens to make sense of AI.

4.3.3 Ethical AI framed as a fig leaf

A second prevalent frame in the media coverage of the German AI future is the portrayal of *ethical AI as a fig leaf*. The media challenge the government's promise of ethical AI and frame the discussion as a diversion from a real debate about deeply rooted structural discrimination and imbalances in power structures. This portrayal is exemplified by the following quotation: "Ethical AI becomes the justification apparatus of the status quo and the diversionary tactic from more extensive political questions regarding the existing balance of power, wealth distribution, democracy, and the shaping of the future" (FAZ 7). Moreover, the media expound the problem of the strategic circumvention of binding legal regulations. The left-wing newspaper *taz* denounces that over the last decade private tech-companies made social policies worldwide, and that politics falls short of steering the development and impact of technologies (taz 5). Ethics are considered as a political instrument to create trust to overcome the threat of a sceptical public, and to foster the industry's competitiveness (FAZ 12, ZEIT 7). For instance, the centre-right newspaper FAZ declares that "the story of trustworthy AI is a marketing narrative made up by industry" and exemplifies that "Microsoft's customers don't buy products in which they don't trust" (FAZ 12). Also, *Die Zeit* raises the question "whether the monetarisation of data [...] will remain a promising business model in the future" (ZEIT 3) and

denounces the application of AI which has so far concentrated on the generation of profits by taking advantage of human weaknesses (ZEIT 9).

The media's framing of *ethical AI as a fig leaf* that hides the underlying power structures and vested interests contains two central elements worth examining in detail.

First, the media point out that political decisions are determining the future and that the development of AI is not an unalterable, autonomous process. The media highlight that change is only possible if it is wanted by political elites and industry leaders. The fundamental conflict between economic and societal interests is addressed directly which spotlights the basic question of who decides on the AI future. By criticising that the government frames the AI future as the mere adaptation to disruptive technologies and not as a possibility for design or as the result of political decisions, the media stress that an actual process of future-making exists. As pointed out in theory, the media also emphasise "power imbalances in how visions are being produced and distributed" (Sand 2019, p. 104). Likewise, the criticism of the formulation of "working through the future" underlines that futures should be dreamt up and created and not worked on with a prefabricated catalogue of measures (ZEIT 3). The media's suggested solution is a stronger participation of citizens in the AI debate to discuss the emerging technological structures in the age of AI (taz 5). Thus, the media attempt to open the debate on AI futures by demanding a democratic process of future-making.

Secondly, the frame of *ethical AI as a fig leaf* makes the government's AI future vision appear less revolutionary as the upholding of the status quo is identified as the central aim. The media reveal the underlying power structures of the AI future by referring to the invisible labour and electronic garbage that is outsourced to countries of the global South (FAZ 9). Additionally, the media clarify that algorithmic decision-making only reproduces today's underlying patterns of structural discrimination (ZEIT 11). This means the media display the government's willingness to uphold the imbalances in power structures and prove that no radical, societal vision exists, but that the government's main aim is to protect its hegemonic position.

Briefly, the frame of *ethical AI as a fig leaf* points out how the government shifts attention away from essential problems of structural discrimination and power imbalances. The media redirects the discourse to the underlying question of how society wants to live in the future. Therefore, it re-establishes the notion of a democratic process of imagining, designing, and creating AI futures.

4.4 Concluding Remarks

Lastly, the observations and findings of the data analysis are summed up to identify the most striking differences between government and media frames and to understand their significance in terms of alternative AI future visions.

In line with theoretical expectations, the German government seeks to increase public support and to mobilise resources by framing the future as given. The AI future is framed as a self-evident reality which is developing autonomously, and enormous potential is promised. However, existential political questions evolving with the development of AI are ignored, and thus profound changes in the balance of power are not considered. The government frames uncertainty as the main problem and consequently seeks to reduce it by improving forecasting technologies. Here the basic problem definition of the media most sharply contradicts with that of the government. The media pinpoints that AI technologies only reflect and reinforce today's imbalances in power structures and structural discrimination. Thus, according to the media, the government's willingness to uphold and eventually increase these inequalities is the real problem of AI futures.

The government's most prominent solution to create AI for the common good is *German AI*. This means high-quality AI technologies developed and tested by German scientists, but also includes the cooperation and participation of every citizen. Here again, the media's approach to design a desirable AI future strongly differs. The media equally demand citizens' support but highlight that only participation in creating AI futures can lead to profound changes. Participation defined by the government means adaptation to the inevitable future and not designing the future according to personal ideals and desires. However, even though the media uncover the government's short-sighted definition of participation that seeks to protect the status quo, they do not explicitly suggest solutions.

This means that the discussion of alternative AI future visions remains improbable. The government's framing of the inevitable AI future dominates the discourse, especially in the economic domain. The AI future appears as given and as time seems to run out, it is already too late to change the development. The media integrate divergent voices into the debate on AI futures, however, no shared vision that provides hope and motivation for change can be identified.

5 Conclusion

5.1 Answer to the Research Question

The German government frames the AI future and its impact on economy, society and research as the given result of an autonomous development. Thereby, the opportunity for a democratic process of future-designing and future-making is excluded. The media adopt this framing regarding economic aspects of the AI future. This implies that also in the AI future the economic rule of society is inevitable and no far-reaching, structural changes are foreseen. However, the consequences of the AI future on society are framed differently. Here, the media frame the AI future as the deliberate outcome of political decision-making, not as the result of an uncontrollable development. This means the media open room for new outlooks, thus they provide hope for change and motivation for political action.

As expected in theory, the government remains vague in its description of risks and benefits of the AI future, but still provides clear interpretative frames for its impact on economy, society and research (Meyer 2019). According to the government, the AI future is an unquestioned reality to which society must adapt. As no future exists without AI (*AI as key to the future*), there is no other option than accommodating to emerging AI technologies. The preparation for the future is the task of society as a whole (*German AI*) and participation is equated with adaptation. This signifies that citizens are demanded to adjust their positions within the framework provided by the government and are not permitted to shape their personally desired roles. AI is framed as the cure-all for present and future problems (*AI as panacea*) and the greatest danger in the AI future stems from insufficient anticipation (*Uncertainty as main menace*).

In the eyes of the media, the envisioned AI future is the political outcome desired by the government and a strategic measure to uphold underlying power structures. The media spotlight the inherent vagueness of the government's AI future vision and seek to present a clearer image of possible AI futures (*AI as a black box*). Furthermore, the media directly criticise the government's strategic use of the future (*Ethical AI as a fig leaf*). This was an unexpected finding as previous research pointed out the lack of alternative views on the capabilities, promises, and pitfalls of AI (Brennen et al. 2018). By demanding to question basic assumptions concerning the balance of power in the future, the media showed that there is no political willingness "to move out of the present to create the possibility of new futures" (Inayatullah 2012, p.40). The media denounce the government's unwillingness to change the political design of the future and clarify that participation means creating, not adjusting.

Furthermore, it was surprising that the media pointed out that “inequality – not only as access but even more of anticipation – emerges as an unresolved ethical and political barrier to the just governance of technological innovation” (Jasanoff 2016, p.256). These findings spotlight the critical role of political design in the governance of AI futures. They confirm Floridi’s argument that “the foreseeable future of AI will depend on our design abilities and ingenuity” (Floridi 2019, p.13). Supporting his argumentation, this study identified governance as the central challenge of AI futures, not technological innovation. However, it is even more the innovation of governance that is needed to design futures. This study displayed that political authorities mostly follow paths of least resistance to protect the status quo. This means that to open the future and to undermine the prolongation of the past, the innovation of governance is essential.

5.2 Suggestions for Future Research

The global development of AI and its debateable impact yields much room for discussion. This study followed an interpretative approach not aiming at making predictions about the development of AI futures but seeking to gain insights into the meaning of predominant future visions for society. The research focus was on the political and media discourse in Germany, yet the comparison of different national images of AI futures would provide relevant insights as well. As various nation-states published their political strategies discussing their predictions for AI futures, it is interesting to examine these strategy papers for universal future narratives. Additionally, critical future studies with their goal to disturb present power relations by evoking other scenarios should be integrated to initiate a more future-oriented discussion in research. By analysing how a particular discourse has become hegemonic, critical future studies seek to reconstruct how political decisions created the status quo and open up the debate for alternative scenarios (Inayatullah 2012). Also, it is advisable to consider the context and the actors involved in future-making processes even more (Meyer 2019, Veenman et al. 2019). This study already made a step towards this relevant research direction. The focus is not only on the media coverage, but frames employed in policy documents are equally considered. Further research on the discourse about socio-technological futures should integrate a greater variety of stakeholders, like business firms, research institutes or trade unions which all influence the debate on emerging technologies and future developments. Here as well, a more critical perspective concentrating on the usefulness of specific envisioned futures for different organisations would be conducive.

5.3 Practical Implications

This study highlighted how the framing of one given, unalterable AI future silences divergent voices and undermines the opportunity for change in the balance of power. Thus, there is a need to develop individual and organisational capacity to create alternative futures (Inayatullah 2012). However, it is an easy consideration that “the more futures are on the table, the smaller the probabilities for each to materialize” (Sand 2019, p. 104). Therefore, it is regarded as unlikely that the government will organise public forums for debate to design possible futures.

Yet, the media have various opportunities to broaden the debate about desirable AI futures. Various newspapers have an individual section for articles on historical events or developments. For example, *Die Zeit* has its own history podcast channel. This approach could be extended to stories of the future to foster citizens’ capacity to envision alternative futures. Here, the education of the public should not only focus on past events, but citizens should be given a sense of what might be possible in the future. To create shared narratives that are more people-centric, future-oriented and include non-linear dynamics, the inclusion of science-fiction is a promising approach (Miller & Bennet 2008). In all articles analysed, only one included science-fiction elements (WELT 9). It is often warned of the disruptive potential of emerging technologies, but concrete, revolutionary and potentially frightening scenarios are seldomly described. To broaden the debate on possible futures, journalists should not restrict their role to educate the public about the functioning of today’s AI technologies, but should equally consider future developments and their impact on and meaning for society. In this way, they could contribute to the discussion of future visions that include drastic changes and not only focus on the preparation for and adaptation to a given future. This means that each newspaper publisher is demanded to create a department specifically dedicated to articles outlining possible, utopian as well as dystopian future visions. Thereby, citizens’ curiosity for the future and their awareness of being a part of the future are strengthened which increases their motivation to design futures.

Finally, it has to be stressed that this encouragement for active participation in shaping futures is no cure-all which necessarily leads to more diverse future visions. Still, it is a personal decision to not get active in the creation of futures, but to rely on institutional arrangements. Political participation that goes beyond voting and deciding among prefabricated scenarios is often perceived as an activity of a privileged minority. However, the media could foster citizens’ willingness to design futures by initiating a more open discourse.

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7 Appendix

7.1 A: Selected policy documents of the German government

| Title | Publisher | Date | Source type | Pages | Link |
|--|------------------------------------|---------------------|----------------------|-------|---|
| Eckpunkte der Bundesregierung für eine Strategie Künstliche Intelligenz | Bundes-regierung | 18.07. 2018 (2018a) | Strategy paper | 12 | https://www.bmas.de/SharedDocs/Downloads/DE/Thema-Arbeitsmarkt/eckpunkte-strategie-ki.pdf?__blob=publicationFile&v=2 |
| Bundeskabinett hat Eckpunkte für eine Strategie Künstliche Intelligenz beschlossen | BMAS | 18.07. 2018 | Press Release | 1 | https://www.bmas.de/DE/Presse/Meldungen/2018/eckpunkte-strategie-ki.html |
| Strategie Künstliche Intelligenz der Bundesregierung | Bundes-regierung | Nov. 2018 (2018b) | Strategy paper | 47 | https://www.bmbf.de/files/Nationale_KI-Strategie.pdf |
| Zwischenbericht Ein Jahr KI-Strategie | Bundes-regierung | Nov. 2019 | Evaluation report | 9 | https://www.ki-strategie-deutschland.de/home.html?file=files/downloads/Zwischenbericht_KI-Strategie_Final.pdf |
| Ein Jahr Strategie Künstliche Intelligenz der Bundesregierung | BMWi | 15.11.2019 (2019a) | Press Release | 1 | https://www.bmwi.de/Redaktion/DE/Pressemitteilungen/2019/20191115-ein-jahr-strategie-kuenstliche-intelligenz-der-bundesregierung.html |
| KI und Robotik im Dienste der Menschen | BMWi | Sept. 2019 (2019b) | Information brochure | 36 | https://www.bmwi.de/Redaktion/DE/Publikationen/Industrie/industrie-4-0-ki-und-robotik.pdf?__blob=publicationFile&v=4 |
| KI braucht Normen und Standards | BMWi | 16.10.2019 (2019c) | Press Release | 1 | https://www.bmwi.de/Redaktion/DE/Pressemitteilungen/2019/20191016-kuenstliche-intelligenz-braucht-normen-und-standards.html |
| KI – Impulse zu einem Megatrend | Initiative Intelligente Vernetzung | 2019 | Information brochure | 29 | https://www.bmwi.de/Redaktion/DE/Publikationen/Technologie/kuenstliche-intelligenz-impulse-zu-einem-megatrend.pdf?__blob=publicationFile&v=2 |

7.2 B: Selected newspaper articles of the German media

Frankfurter Allgemeine Zeitung (FAZ)

| No. | Title | Author/Date | Link |
|----------|---|-------------------------------------|---|
| Economy | | | |
| 1 | KI ist eine Riesenchance für Deutschland | Schmidhuber/ 13.05.2018 | https://www.faz.net/aktuell/wirtschaft/kuenstliche-intelligenz/warum-kuenstliche-intelligenz-eine-riesenchance-fuer-deutschland-ist-15585232.html |
| 2 | Der deutsche KI-Weg | Armbruster/ 25.07.2018 | https://www.faz.net/aktuell/wirtschaft/digitec/kuenstliche-intelligenz-made-in-germany-kommentar-15706427.html |
| 3 | Die Schwächen der deutschen KI-Strategie | Armbruster/ 16.11.2018 | https://www.faz.net/aktuell/wirtschaft/digitec/die-schwaechen-der-deutschen-ki-strategie-15892789.html |
| 4 | Zögerliche Unternehmen – So sehr scheut die Energiebranche KI | Mihm/ 24.08.2019 | https://www.faz.net/aktuell/wirtschaft/kuenstliche-intelligenz/energiebranche-fremdelt-mit-kuenstlicher-intelligenz-16348242.html |
| 5 | „Made in Germany“ zieht immer noch | Löhr, Marx/ 25.11.2019 | https://www.faz.net/aktuell/wirtschaft/deutsche-wirtschaft-made-in-germany-zieht-immer-noch-16501822.html |
| Society | | | |
| 6 | Siri, warum bist du nicht so schlau wie wir? | Anderl/ 29.03.2018 | https://www.faz.net/aktuell/feuilleton/algorithmen-siri-warum-bist-du-nicht-so-schlau-15517279.html |
| 7 | Plötzlich reden alle über Ethik | Sloane/ 24.06.2019 | https://www.faz.net/aktuell/feuilleton/debatten/diskriminierung-durch-ki-jetzt-reden-alle-ueber-ethik-16250251/was-sehen-die-algorithmen-in-16250243.html |
| 8 | Künstliche Intelligenz – Wir Cyborgs | Siemons/ 04.08.2019 | https://www.faz.net/aktuell/feuilleton/debatten/kuenstliche-intelligenz-wir-cyborgs-16316404.html |
| 9 | KI – Wollt Ihr mit Zahlen die Menschen verstehen? | Ammicht Quinn/ 12.11.2019 | https://www.faz.net/aktuell/wissen/wollt-ihr-mit-zahlen-die-menschen-verstehen-16469033.html |
| Research | | | |
| 10 | Die zwei Gesichter der intelligenten Assistenten | Dannenberger, Herzog/ 18.03.2019 | https://www.faz.net/aktuell/wissen/medizin-ernaehrung/ki-medizin-die-zwei-gesichter-der-intelligenten-assistenten-16095381.html |
| 11 | Wenn Computer Bewerber auswählen | Bös/ 02.07.2019 | https://www.faz.net/aktuell/karriere-hochschule/buero-co/neuer-ethikbeirat-wenn-computer-bewerber-auswaehlen-16257834.html |
| 12 | Ein Gesetzbuch für Roboter | Budras/ 08.07.2019 | https://www.faz.net/aktuell/wissen/forschung-politik/kuenstliche-intelligenz-wer-reguliert-die-neue-technik-16269393.html |

Die Zeit (ZEIT)

| No. | Title | Author/Date | Link |
|----------|---|--|---|
| Economy | | | |
| 1 | Künstliche Intelligenz – Europa ist abgemeldet | Yang/ 19.09.2018 | https://www.zeit.de/2018/39/weltkonferenz-kuenstliche-intelligenz-shanghai-technologie-china-usa |
| 2 | Künstliche Intelligenz – Jetzt mal richtig | Schmidhuber/ 21.11.2018 | https://www.zeit.de/2018/48/kuenstliche-intelligenz-foerderung-geld-investition-ideen |
| 3 | Die Digitalisierung gehört zu Deutschland | Peitz/ 05.12.2018 | https://www.zeit.de/digital/2018-12/digital-gipfel-digitalisierung-bundesregierung-kuenstliche-intelligenz-5g-breitband |
| 4 | Deutschland muss lernen völlig anders zu denken | Al-Ani/ 27.01.2019 | https://www.zeit.de/digital/internet/2019-01/digitalisierung-deutschland-kuenstliche-intelligenz-bildung-digitalgipfel |
| 5 | Künstliche Intelligenz – Speeddating mit Robotern | Lasarzik/ 24.11.2019 | https://www.zeit.de/hamburg/2019-11/kuenstliche-intelligenz-standort-hamburg-speeddating-roboter |
| Society | | | |
| 6 | Nein, Ethik kann man nicht programmieren | Geuter/ 27.11.2018 | https://www.zeit.de/digital/internet/2018-11/digitalisierung-mythen-kuenstliche-intelligenz-ethik-juergen-geuter |
| 7 | Eine Frage der Ethik | Hegeman/ 08.04.2019 | https://www.zeit.de/digital/internet/2019-04/kuenstliche-intelligenz-eu-kommission-richtlinien-moral-kodex-maschinen-ethik |
| 8 | Polnische Hausfrauen | Jessen/ 07.08.2019 | https://www.zeit.de/2019/33/kuenstliche-intelligenz-amazon-alexa-algorithmus-menschen |
| 9 | Machen uns Algorithmen dümmer, als wir sind? | Herzog/ 12.09.2019 | https://www.zeit.de/arbeit/2019-09/kuenstliche-intelligenz-natuerliche-dummheit-algorithmen-vorhersagen-kapitalismus |
| Research | | | |
| 10 | Vages Wagen | Peitz/ 18.07.2018 | https://www.zeit.de/digital/2018-07/kuenstliche-intelligenz-nationale-strategie-deutschland-bundesregierung |
| 11 | Wenn Politik auf künstliche Intelligenz trifft | Hegemann/ 15.11.2018 | https://www.zeit.de/digital/internet/2018-11/digitalisierung-ki-strategie-investitionen-bundesregierung |
| 12 | Künstliche Intelligenz - Bloß nicht zerreden | Groth, Straube, Kaatz-Dubberke/ 29.05.2019 | https://www.zeit.de/digital/internet/2019-05/kuenstliche-intelligenz-strategie-bundesregierung-forschung-umsetzung |
| 13 | Die Angst des Arztes vor KI | Jan Schweitzer/ 26.06.2019 | https://www.zeit.de/2019/27/kuenstliche-intelligenz-aerzte-patienten-diagnose |

Die Tageszeitung (taz)

| No. | Title | Author/Date | Link |
|----------|---|-----------------------------|---|
| Economy | | | |
| 1 | Gehemmte Intelligenz | Mayer-Kuckuk/ 16.11.2018 | https://taz.de/Digitalstrategie-der-Bundesregierung/!5551163&s=k%C3%BCnstliche+intelligenz/ |
| 2 | Drang nach vorne | Lee/ 02.12.2018 | https://taz.de/Kuenstliche-Intelligenz-in-China/!5551309&s=k%C3%BCnstliche+intelligenz/ |
| 3 | Bei der Strategie verzettelt | Ronzheimer/ 10.09.2019 | https://taz.de/Hemmnisse-in-der-KI-Forschung/!5623727&s=k%C3%BCnstliche+intelligenz/ |
| Society | | | |
| 4 | Bund will künstlich intelligent werden | Tricarico/ 19.07.2018 | https://taz.de/Foerderung-neuer-Technologie/!5518286&s=k%C3%BCnstliche+intelligenz/ |
| 5 | Fatale Schlagseite | Ronzheimer/ 29.08.2018 | https://taz.de/Debatte-ueber-Kuenstliche-Intelligenz/!5530313&s=k%C3%BCnstliche+intelligenz/ |
| 6 | Diskriminierende Algorithmen | Hummer/ 02.11.2018 | https://taz.de/Gesichtserkennung-in-der-Kritik/!5547535&s=k%C3%BCnstliche+intelligenz/ |
| 7 | Rettet Künstliche Intelligenz die Welt? | Bergt/ 03.12.2018 | https://taz.de/Automatisierung-im-Alltag/!5553077&s=k%C3%BCnstliche+intelligenz/ |
| 8 | Zu vorsichtig und zu industrienah | Bergt/ 10.04.2019 | https://taz.de/Kommentar-Ethische-Leitlinien-zu-KI/!5584738&s=k%C3%BCnstliche+intelligenz/ |
| Research | | | |
| 9 | Computer werden immer schlauer | Ronzheimer/ 18.05.2018 | https://taz.de/Big-Data-und-Datenrevolution/!5504109&s=k%C3%BCnstliche+intelligenz/ |
| 10 | Länderranking in der KI-Forschung | Ronzheimer/ 15.12.2018 | https://taz.de/Studie-ueber-Publikationen/!5558630&s=k%C3%BCnstliche+intelligenz/ |
| 11 | Bundesregierung überwacht KI | Giessler/ 14.11.2019 | https://taz.de/Observatorium-fuer-kuenstliche-Intelligenz/!5642047&s=k%C3%BCnstliche+intelligenz/ |

Die Welt (WELT)

| No. | Title | Author/Date | Link |
|-----|---|--------------------------------------|---|
| | Economy | | |
| 1 | Diese Jobs sind besonders von Robotern bedroht | Eckert/ 16.02.2018 | https://www.welt.de/wirtschaft/article173642209/Jobverlust-Diese-Jobs-werden-als-erstes-durch-Roboter-ersetzt.html |
| 2 | Siegeszug von „Made in Germany“ gerät in Gefahr | Dierig/ 24.08.2018 | https://www.welt.de/wirtschaft/article175734240/Hannover-Messe-Siegeszug-von-Made-in-Germany-geraet-in-Gefahr.html |
| 3 | Chinas Vorteil im Kampf um die schlauen Maschinen | Gehm, Michler/ 08.11.2018 | https://www.welt.de/wirtschaft/webwelt/article183532528/Kuenstliche-Intelligenz-Chinas-Vorteil-gegenueber-Europa-und-Amerika.html |
| 4 | Dieser Milliarden-Plan soll Deutschlands Erfolg sichern | Doll, Fuest, Heuzroth/ 14.11.2018 | https://www.welt.de/wirtschaft/article183877012/Kuenstliche-Intelligenz-Deutschland-investiert-Milliarden-in-neue-Techniken.html |
| 5 | Wie Deutschland seinen digitalen Rückstand aufholen soll | Doll, Siems/ 09.01.2019 | https://www.welt.de/wirtschaft/article186831556/Welt-Wirtschaftsgipfel-Deutschland-hinkt-bei-Digitalisierung-hinterher.html |
| | Society | | |
| 6 | Roboter in der Pflege? Bisher nur eine gefährliche Illusion | Fuest/ 07.07.2018 | https://www.welt.de/wirtschaft/article178935030/Pflegenotstand-Warum-Roboter-das-Problem-vorerst-nicht-loesen-werden.html |
| 7 | Wer profitiert von Künstlicher Intelligenz? | Güdel/ 01.08.2018 | https://www.welt.de/wirtschaft/bilanz/article180295028/KI-Staatsfonds-Wer-profitiert-von-kuenstlicher-Intelligenz.html |
| 8 | Wer haftet wenn Künstliche Intelligenz Mist baut? | Schnor/ 11.09.2018 | https://www.welt.de/wirtschaft/webwelt/article181494476/Wer-haftet-wenn-eine-kuenstliche-Intelligenz-Mist-baut.html |
| | Research | | |
| 9 | Wir werden zu den Göttern, die wir einst fürchteten | Jimenéz/ 06.04.2018 | https://www.welt.de/wissenschaft/article175209359/Year-Million-KI-wird-digitale-Parallelwelt-schaffen.html |
| 10 | Unlust an Innovation gefährdet Deutschlands Wohlstand | Strohschneider/ 05.09.2018 | https://www.welt.de/debatte/kommentare/article181425958/Wissenschaft-Unlust-an-Innovation-gefaehrdet-Deutschlands-Wohlstand.html |
| 11 | Die Grenzen Künstlicher Intelligenz | Wildemann/ 11.02.2019 | https://www.welt.de/wirtschaft/bilanz/article188571271/Maschinelles-Lernen-Die-Grenzen-kuenstlicher-Intelligenz.html |

7.3 C: Coding Guidelines

Framing the impact of AI futures on economy

| Frame Element | Sub-Categories | Key words | Typical Examples |
|--|---------------------|--|---|
| Problem Definition What are the economic risks and benefits? | Economic risks | International competition Sovereignty Disruption | “The challenges for Germany lie [...] in the strongly increasing competition for talents, technologies, data and investments” (Bundesregierung 2018a, p.4) |
| | Economic potential | Leading position Progress Innovation | “AI is a key technology which that brings enormous potential for the German economy” (BMWI 2019c, p.1) |
| Cause Diagnosis Who or what is responsible? | German government | Politicians Regulations/restrictions | “Also, the survey of Boston Consulting shows great discrepancy between demands and reality.” (WELT 2) |
| | Society and values | Hesitancy Conservatism Scepticism Ignorance | “Ignorance and insufficient acceptance [...] could impede the development and distribution of the technology and become an innovation obstacle” (Bundesregierung 2018b, p. 45) “ Scrupulosity must not control the discourse about new technologies in Europe and Germany.” (WELT 3) |
| | Foreign competitors | China, India USA | “Through ambitious competitors like China even tech giants like Amazon or Google come under pressure.” (WELT 3) |
| Moral Evaluation How is the impact described? | Desirable | Potential, chances Growth | |
| | Harmful | Decline Dependence | “If this development continues, Germany will be degraded to a mere supplier of American and Chinese platforms.” (ZEIT 4) |
| Suggested Solution What is the policy response? | Investments | Venture capital Platform economy | “The improvement of the access to venture capital [...] is striven for.” (Bundesregierung 2018b, p. 24) |
| | Cooperation | France, EU Networking | “In the end, the Europeans are competing for the leading position against the USA and China. Not Germany alone.” (WELT 5) |
| | Innovation | Digital infrastructure New business models | “The federal government starts a transfer initiative with the aim to help companies to transform the results from research in products and business processes more quickly.” (Bundesregierung 2018b, p.22) |

Framing the impact of AI futures on society

| Frame Element | Sub-Categories | Keywords | Typical Examples |
|--|--|---|---|
| Problem Definition What are the social challenges and chances? | Social challenges | Legal certainty & Accountability Unemployment Discrimination, data security | "In a quarter of all jobs colleague computer could soon be in command " (WELT 1) |
| | Social chances | New jobs Increasing autonomy Improvements in health | "According to calculations [...] around 2.1 million new jobs will be created in Germany in 2025" (BMWi 2019b, p. 2) |
| Cause Diagnosis Who or what is responsible? | German government | Unwillingness Incompetence | "The debate on the emerging technological structures for the production and use of artificial intelligence [...] is considered to be secondary." (taz 5) |
| | International competition | Monopolies Tech companies | "The decisions are not primarily made in democratically legitimised contexts but by big, technological players : they make social policy worldwide" (taz 5) |
| Moral Evaluation How is the impact described? | Desirable | Self-determination Freedom of action Creativity | "We want to use the potential of AI to support citizen's social and cultural participation , freedom of action and self-determination." (Bundesregierung 2018b, p. 9) |
| | Harmful | Surveillance Dependence Uncertainty | "It is uncertain who is going to profit from the positive economic change." (WELT 7) |
| Suggested Solution Which (policy) measures are suggested? | Education & Public debate | Dialogue/discourse Trust Social participation Citizen engagement | "In order to shape the political and public discourse and to position Germany as an innovation leader [...], we are dependent on your ideas, examples and concepts " (Initiative Intelligente Vernetzung 2019, p. 28) "We need a social debate about in which areas of life we want to integrate AI – and in which areas of life not." (taz 7) |
| | Ethical guidelines & legal regulations | Legal restrictions Transparency Social vision | "The General Data Protection Regulation (GDPR) represents a reliable legal framework for innovative technologies and applications, also in the field of AI." (Bundesregierung 2018a, p. 4) |

Framing the impact of AI futures on research

| Frame Element | Sub-Categories | Key words | Typical Examples |
|---|-------------------------------|---|--|
| Problem Definition What are promising developments in R&D? What dangers exist? | Competition | Science-industry transfer Dominance | "The creation of working conditions for AI experts that create incentives against the enticement ("brain drain") and for the recruitment ("brain gain") of qualified employees" (Bundesregierung 2018a, p. 8) |
| | Inaction | Scepticism Insufficient investments | "If public resistance against AI and digitalisation would increase all research-oriented policy strategies would become wastepaper" (taz 9) |
| Cause Diagnosis Who or what is responsible for the development? | German government Industry | Research investments Quality of German research Foresight Insufficient efforts | "Thanks to public investments the German research sector became increasingly attractive, innovative and competitive." (WELT 10) "One could list numerous further examples for outstanding national contributions to AI." (FAZ 1) "Europe only put forward few alternatives to powerful foreign stakeholders and is now dominated by their IT monopolies." (FAZ 1) |
| | International competition | Superiority | "The west coast of the US and the east coast of Asia were superior regarding the commercialization and PR of AI" (FAZ 1) |
| Moral Evaluation How is the impact on research evaluated? | Positive/Promising | Advantages Potential | "The right application of AI can bring us landslide productivity advantages and new chances." (WELT 11) |
| | Negative/harmful | Lack of regulations | |
| Suggested Solution Which policy measures are foreseen to steer research? | Research budget | Qualified employees Working conditions Responsible use | "German scientists play in the Champions League of AI " (Bundesregierung 2019, p. 2) |
| | European cooperation | European Union European answer German-French innovation network | "Supporting the creation of cooperative structures in the field of AI research together with other partners of the European Union" (Bundesregierung 2018a, p. 5) |