

**The Participatory, Communicative, and Organisational
Dimensions of Public-Making: Public Engagement and
The Development of Autonomous Vehicles in the United
Kingdom**

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Declaration

I, Declan McDowell-Naylor, hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

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Abstract

This thesis examines the role of public engagement in the contemporary development of autonomous vehicles (AV) in the United Kingdom (UK). Many observers have suggested the various effects that the development of AVs may have on society, such as job losses incurred from mass automation. Much of this debate has centred on the broad actions of large companies, such as Tesla and Google. In contrast, this thesis establishes an in-depth empirical understanding of the role of public engagement in AV development, which analytically informs wider concerns about the involvement of democratic politics in the development of advanced technologies. This is explored in the context of a large UK-based AV development project, known as “GATEway” and is based on over two years of ethnographic research data, including fieldwork observations, 19 semi-structured interviews, and thousands of pages of news stories, reports, and publications.

I argue that the GATEway Project’s public engagement process served the highly managed and instrumental function of generating knowledge that could inform and facilitate an existing government-led strategy around AV development in the UK. To demonstrate this argument, the thesis provides direct evidence of numerous instances of ‘public-making practice’, which generated and articulated knowledge about the public across three distinct yet interrelated dimensions of the public engagement process. First, there is a participatory dimension, in which citizens performed public-making through various forms of digitally mediated participation provided by the project. Secondly, there is a communicative dimension, in which representations of the public in the media were articulated or influenced by members of the project. Thirdly, there is an organisational dimension, in which understandings of the public guided the strategic actions of project members. While the democratic management of technology development is not a new phenomenon, this account purposefully responds to the limited empirical evidence on the issue of AV development. My findings and analysis therefore provide a firmer basis on which to argue, conclusively, that AV policy makers and technology developers are offering inadequate forms of public engagement and that reforms should be considered. Overall, this thesis newly informs wider concerns about democratic politics and the development of advanced technologies.

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Contents

List of Tables	10
List of Figures	11
Prologue: The Nature of the Problem: Waymo’s Public Education Campaign in Phoenix, Arizona	13
Chapter One: Introduction	22
1.1 Public Engagement and the Development of Connected and Autonomous Vehicles in the United Kingdom	22
1.1.1 Public Engagement and the Success or Failure of Connected and Autonomous Vehicles	27
1.1.2 The Integration of Public-Making Practices into the GATEway Project’s Public Engagement Process.....	32
1.2 The Research Approach: Conducting Ethnographic Fieldwork Within GATEway and CCAV	38
1.2.1 The Ethnographic Research Design	39
1.2.2 Details of Methods and Data Collection	43
1.2.2.1 <i>Observational Fieldwork</i>	44
1.2.2.2 <i>Semi-Structured Interviews</i>	47
1.2.2.3 <i>Discourse Analysis</i>	49
1.2.2.4 <i>Collocated Secondary Sources</i>	50
1.3 Three Dimensions of Public-Making within the GATEway Project: Participation, Communication, and Organisation	51
1.3.1 The Participatory Dimension of Public-Making	52
1.3.2 The Communicative Dimension of Public-Making	55
1.3.3 The Organisational Dimension of Public-Making	58
1.4 Democratic Participation, Power-Relations, and Technology	62
1.4.1 Three Key Assumptions About Democracy and Power	63

1.4.2	The Study of Democratic Participation and Power-Relations in Political Communication and Science and Technology Studies	64
1.4.3	Conceptualising Technology	73
1.5	Science and Technology Studies, Political Communication, and a Combined Approach to Empirical Research	76
1.6	The Organisation of the Thesis	79
 Chapter Two: The Political Debate on The Development of Autonomous Vehicles		83
2.1	What is an Autonomous Vehicle?	84
2.2	The Trolley Problem is a Problem	87
2.3	The Public, Political Actors, and AV Development: Three Themes ...	89
2.3.1	Contesting a Utopian Future: “Evangelists” vs “Realists”	90
2.3.2	Governments and Commercial Developers as Primary Political Actors	94
2.3.3	Convincing a Sceptical Public	99
2.4	Conclusion	101
 Chapter Three: A Systematic Overview of the United Kingdom’s Connected and Autonomous Vehicle Programme		104
3.1	Connected and Autonomous Vehicle Development in The United Kingdom	104
3.1.1	A Collaborative Approach	104
3.1.2	A Government-Led Strategy	105
3.1.3	The Emergence of the CAV Programme 2013 – 2016: An Agenda-Building Process	110
3.1.4	The Institutional and Organisational Structure of the CAV Programme	114
3.2	The GATEway Project	119
3.2.1	The Aims and Purpose of the GATEway Project	119
3.2.2	The Organisational Network of The Project	123
3.2.3	The Activity of the Project	127

3.2.4	The Public Engagement Work Packages: Public, Media, and Industry Stakeholder Engagement and Live Automated Vehicle Trials .	129
3.3	The Centre for Connected and Autonomous Vehicles	131
3.3.1	A Joint Policy Unit	131
3.3.2	Day-to-Day Activity	132
3.3.3	The Official Definition of Connected and Autonomous Vehicles	133
3.4	Conclusion	134
Chapter Four:	The Participatory Dimension of Public Making	135
4.1	The Cultural and Technological Contexts of Participation: Outlining a Critical Analysis of the Participatory Dimension Public-Making	136
4.2	“Participate, Add Your Views, Take Part!”: Participatory Public-Making Practices During the Online Recruitment Phase	144
4.3	“What are your hopes and fears?”: Participatory Public-Making Practices in the Public Workshops	152
4.4	“Would you like to share your experience?”: Participatory Public-Making Practices in the Public Trials	162
4.4.1	Constructing GATEway’s Testing Environment, Shaping Participatory Public-Making	164
4.4.2	The Public Trials in Action	177
4.5	A Failure to Produce Technologies of Humility	186
4.6	Conclusion	189
Chapter Five:	The Communicative Dimension of Public-Making	191
5.1	Civic Information Styles and Democratic Citizenship	192
5.2	The GATEway Project’s Communicative Norms	198
5.2.1	Devising a Strategy: What’s the Message	199
5.2.2	Informing the Public	204
5.2.3	Targeting News Coverage: Project Members as Primary Definers	207
5.3	Examples and Project Members Reflections: Civic Information	210

5.3.1	News Coverage	211
5.3.2	Social Media	214
5.3.3	The Official Website	215
5.3.4	Targeted Emails	215
5.3.5	Local Communication with The Borough	217
5.4	The Mediated Performance of Successful Autonomy	218
5.5	Conclusion	224
 Chapter Six: The Organisational Dimension of Public-Making		226
6.1	Networks of Governance and Organisational Public-Making Practices	227
6.2	Organising Project Resources Around the Public Engagement Process	233
6.3	Boardroom Interactions Between Project Consortium Members	243
6.4	The Relationships Between Project Members and Government Officials	247
6.4.1	The Influence of Innovate UK	248
6.4.2	The Proposal Phase	249
6.4.3	Accepting the Role of Government	251
6.5	Conclusion	253
 Chapter Seven: From Public-Making to Policy-Making: Inside the Centre for Connected and Autonomous Vehicles		255
7.1	Observing CCAV Officials in Westminster	256
7.1.1	The House of Lords' Science and Technology Select Committee.....	257
7.1.2	At the Desk of a CCAV Official	260
7.1.3	Meetings, Meetings, Meetings	265
7.2	How CCAV Officials Describe Their Roles	268
7.2.1	“Pulling the Right Levers”: CCAV as an Ordered Machine	269
7.2.2	Ministerial Priorities as Key Objectives	271
7.2.3	“You Just Find More Worms”: Dealing with Complexity	273

7.2.4	Preventing the “Frankencar”: Controlling Media Coverage	275
7.3	How CCAV Officials Understand the Public	278
7.3.1	GATEway and the Importance of Public Engagement	278
7.3.2	Information Deficits	281
7.3.3	CAV Development and the Public’s “Social Decision”	282
7.4	Conclusion	284
Chapter Eight: Conclusion		285
8.1	Main Findings and Discussion	287
8.2	Democracy, Power, and Technology: Contextualising the Main Findings about GATEway’s Public Engagement Process	291
8.3	Accountability in Theory Only? Considering Future Proposals	300
8.3.1	Proliferate Public Ontologies and Expand the Frame of Authorised Knowledge	303
8.3.2	Pluralise Civic Information Styles and Spokespersons	305
8.3.3	Institute Citizen Board Members	307
8.4	A Final Word: On the Arrival of the Technology Firm	308
Bibliography		310
List of Interviews		338
Appendix A		342
Appendix B		352

List of Tables

Table 3.1	The GATEway Project’s official objectives, as presented on the project website.	120
Table 3.2	The GATEway Project’s work packages	128
Table 4.1	Sheila Jasanoff’s technologies of humility framework, listing the normative conditions for each key point	139
Table 4.2	The democratic implications of ‘technology-intensive’ politics	142
Table 5.1	Civic communication styles	194

List of Figures

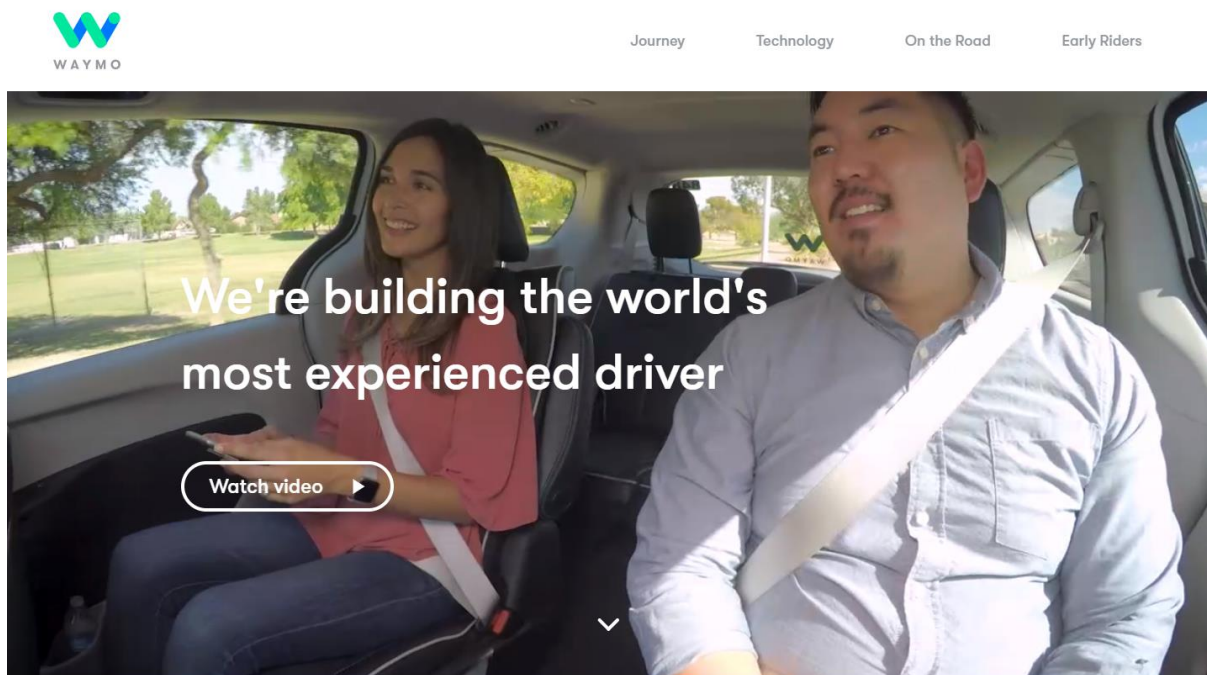
Figure i	Waymo’s online presence.....	14
Figure 1.1	An autonomous vehicle during the GATEway Project’s public trials, March 2018.	30
Figure 3.1	Organisational and Institutional Structure of the CAV Programme	116
Figure 3.2	The GATEway Project’s Consortium Members	124
Figure 3.3	The Organisational Network of the GATEway project.....	126
Figure 4.1	The GATEway Project homepage throughout early 2016	147
Figure 4.2	Participate, add your views, take part!’ The options available to ‘get involved’ that the project website offered	147
Figure 4.3	An illustration of the questions involved in the online sign-up process for the public engagement process.	148
Figure 4.4	An image from one of the public workshops.	156
Figure 4.5	A topographical representation of how social psychology influenced participatory public-making practices.	168
Figure 4.6	A portion of the route, showing the lane markings, a stopping bay, and the shuttle symbol	169
Figure 4.7	One of several information boards that was placed within the local environment	170
Figure 4.8	An illustration of the ‘journey experience’ survey	180
Figure 4.9	The ‘rate my drive’ tool.....	182
Figure 5.1	Civic information as news media coverage perceived as successful	213
Figure 5.2	Example of the project’s tweets during the live trials	223

Prologue: The Nature of the Problem: Waymo's Public Education Campaign in Phoenix, Arizona

On October 9th, 2017, Waymo CEO John Krafcik announced on Waymo's official *Medium* blog that the Alphabet Inc. subsidiary was launching the "world's first public education campaign for fully self-driving cars" (Waymo, 2017a) in the Greater Phoenix region of Arizona. Described by Waymo as the first of its kind, over several months the "Lets Talk Self-Driving" campaign deployed media advertisements on billboards and local radio news stations and provided information through a dedicated campaign website. Alongside the campaign was Waymo's already active 'early rider programme, aimed at local residents, which allowed them to experience for themselves Waymo's growing fleet of highly-advanced autonomous vehicles (AVs) (Waymo, 2017b). With its large-scale plans for widespread AV adoption, Waymo was attempting with the campaign, in its own words, to "grow this conversation into a national dialogue" (2017a).

The campaign possessed a typically slick Google-style presentation, with a clean, minimalist website featuring a simple, positive message about a safer and happy future (see figure i). Radio advertisements that played every morning on local news radio stations instructed listeners to go to this website and learn more. Videos and images of pristine white Chrysler Pacifica Hybrids, with only Waymo's green and blue 'W' symbol printed on the rear doors, circulated through Waymo's media channels and across news outlets. Yet, the campaign itself was decidedly one directional in its communication. Rather than provide the means for citizens to communicate, it focussed on providing positive information about the various reasons that suggested a *need* for AVs, with its formal association with Mothers Against Drunk Driving and the National Safety Council, as well as three local advocacy organisations, providing added authority. However, besides the early rider programme, all that the campaign

Figure i. Waymo’s online presence



Waymo is a self-driving technology company with the mission to make it safe and easy for everyone to get around—without the need for anyone in the driver’s seat. Our journey started at Google in 2009, and we became Waymo in 2016.

[Our Journey](#) >

Source: www.waymo.com

was offering to citizens in terms of public engagement was a simple request to “join the conversation” on Twitter through the almost unused #letstalkselfdriving hashtag (Waymo,2017c).

Waymo’s emergence began in 2010, when Google assembled top robotics engineers and announced that it was working on the ‘big problem’ of automobile safety (Google, 2010). Over the past decade, under Google, the technology has been technically developed, eventually reaching the point where Waymo was created. Following these events, Waymo’s decision to launch a public education campaign, as arguably the world’s leading developer of autonomous

vehicles, marked a shift in the strategic promotion of the technology and Waymo's attempts to control the message. As Krafcik's announcement made clear, Waymo had a clear set of questions it wanted to answer in its 'conversation': "“Is that a self-driving car?” “How does it know what to do?” “Are they safe?” “When can I ride in one myself?”” (Waymo, 2017a). The overwhelmingly positive steer of the campaign was clear to see, as was the transparent lack of discussions around risk or side-effects. There were, for example, no questions such as “will I lose my job?”, despite unemployment at the hands of automation being a persistent and high-end concern of American citizens in surveys (Pew Research, 2017). The limited medium and message of the campaign suggested that Waymo's idea of a conversation was based upon many purposeful assumptions and decisions about how to pursue public engagement. Nonetheless, the motivation behind the campaign was remarkably obvious: the public that Waymo was evoking was decidedly sceptical of the technology.

Various survey-based studies have shown that public trust in the vehicles is broadly lacking (Bansal et al., 2016; Kaur & Rampersad, 2018; Kyridkidis, 2015). This is for multiple reasons, such as safety, but also more contentious issues such as automation. According to one survey of 4,135 American adults conducted by the Pew Research Centre (2017) in May 2017, 81% of the respondents expected job losses because of AVs, with 72% expressing concern about automation more generally. Waymo's shift in strategy was therefore reactive. Its attempts to generate a 'conversation' suggest a political exercise in shifting and shaping public opinion towards a positive perception of AVs. It was Waymo's acknowledgment of the need to engage with *the public* in this way that suddenly made the political dimensions of their ambitions explicit.

The imperatives guiding Waymo's reactive pursuit of a 'conversation' are encapsulated by comments made by the United States (US) Transportation Secretary, Elaine Chao, a few months prior to Krafcik's announcement. In a speech on AV development, Chao stated that

“They [Silicon Valley] have a responsibility to educate the rest of the American public on the technologies they’re thinking about, technologies which are miles and miles ahead of most people’s understanding” (reported in Naughton, 2017). Chao’s comments echoed other government and advisory bodies that had put forward the need for public engagement with the development of AVs. For example, a Governors Highway Safety Association (GHSA) report, aimed at US state departments, stated that “public education on AVs will be critical. States should educate the public about the benefits that autonomous vehicles will bring and the risks that they may present” (GHSA, 2017: 18). Similarly, the National Highway Traffic Safety Administration (NHTSA), a government agency responsible for the safety and regulation of automobiles, had already issued an automated vehicles policy in the final stages of President Barack Obama’s administration. The 116-page document proposed various forms of public interaction, from workshops to collecting comments, as well as a clear statement that concerns around AV will require “longer and more thorough dialogue with government, industry, academia and, most importantly, the public” (NHTSA, 2016: 3). Crucial here, as the GHSA report clearly acknowledged, was that surveys of public opinion had consistently shown a considerable level of scepticism towards AV adoption (GHSA, 2017: 6). Waymo’s public education campaign can therefore also be seen as a limited reaction to institutional political pressure, as well as broader public opinion.

However, these were not isolated political developments. Waymo’s idea of a conversation, in Phoenix, was also set against and responsive to emerging attempts at federal level to establish national standards for governing the development of AVs, although Krafcik’s statement made no explicit mention of this wider context¹. On July 25th, earlier that year, Republican congressman Bob Latta had introduced a bill, titled the SELF DRIVE Act², to the

¹ Waymo’s safety report (2017c), however, does acknowledge the U.S Department for Transport (DOT) federal policy framework for autonomous vehicles, although this focuses primarily on safety.

² This stands for Safely Ensuring Lives Future Deployment and Research In Vehicle Evolution. The bill’s official designation is H.R 3388.

US congress. The bill's broad scope was to provide a sweeping yet basic federal framework for the regulation of AVs and their development where in its absence, at least 21 different state laws had been created (Marshall, 2017b). AV developers, including Waymo but also legacy organisations such as Ford, welcomed the bill. On September 6th, 2017, Republicans and the Democrats sitting in US House of Representatives unanimously passed the bill with a rare show of bipartisan support, amid fierce political division elsewhere. As the bill passed, Latta proclaimed, "with this legislation, innovation can flourish without the heavy hand of government" (reported in Benne, 2017) – signalling a consensus between government and large AV developers that the legislation would help cement. Issuing its own statement, the Alliance of Automobile Manufacturers (AAM), claimed that "this legislation helps address a variety of barriers that otherwise block the ability to safely test and deploy these vehicle technologies" (AAM, 2017). The bill moved swiftly onto the Senate, where a companion bill, known as the AV START Act, was introduced later that same month by Democrat and Republican US Senators, who formed another bipartisan group.

Despite these agreements, controversy still arose around the proposed legislation. Labour unions had argued in the early stages of the bill's passage that the legislative process should be slowed down until the full effects on employment conditions that widespread AV use could have were understood, and they had partial success lobbying the bill during its committee stage (Benne and Eidelson, 2017). As these labour unions continued their campaign to protect transport workers against mass-automation, groups such as the Advocates for Highway and Auto Safety voiced their concern that NHTSA was being underfunded (Benne, 2017). NHTSA funding was especially pertinent here, as among the SELF DRIVE Act's proposed legislation was the establishment of a dedicated council within the NHTSA that would have oversight over the adoption of AVs. This council was to be made up of diverse

representatives, including engineers, labour organisations, and businesses. Included among the public issues the bill designated as key duties of the council were: “labor and employment issues”; “environmental impacts”; access to “populations underserved by traditional public services”; and “educational outreach efforts” (SELF DRIVE Act, 2017). Without the right funding, the responsible management and governance of these issues would be threatened. There was therefore great concern from labour groups about the regulation and governance of the potentially wide use of AVs across the US.

The wider events in the US highlight what is at stake politically with the development of AVs. Political actors from various groups and organisations are striving to shape and control the direction that AV development will go in, as different actors realise the potential consequences of the technology and attempt to suit them to their interests. As a result, from the Capitol Building, to the streets of Phoenix, AVs have become a contested issue. Periodic accidents, such as the Tempe fatality in March 2018, in which an AV operated by Uber hit and killed a woman on the street, continually fuel this issue. What will happen over the next few years is unpredictable. Clearly, the development of AVs, in the US at least, is being driven by the powerful axis of government and technology companies. This raises questions about how their influence, guided by strong commercial logics, will shape the development of the vehicles. Already aware of this, labour unions and advocacy groups concerned about these commercial imperatives are intervening to protect themselves and those that they represent. It is possible to argue that the future direction of AV development is predicated upon this traditional conflict of interests. And so, viewed in this way this may seem like a new technology within a familiar picture. After all, in the US, there is nothing surprising about alliances between big business and government with labour unions and advocacy groups voicing their concerns in response. In many ways, the politics of autonomous vehicles can be interpreted as a new battleground in the much bigger war that is politics as usual.

However, this wider context of political events brings the specifics of Waymo's public education campaign in Phoenix into a much sharper focus. On the surface, Waymo could be seen to be meeting the duties set out by politicians such as Elaine Chao, as well as being responsible about and reactive to the registered public concerns about the development of AVs. In this sense, the public, however it is conceived, may be understood as having its own political influence on the development of AVs, shaping events according to the civic values it may hold. Yet, Waymo's 'conversation' with the public also suggests a way to mediate the contestations intertwined with the technology by attempting to shape forms of public support around their vision of AVs. The public may also therefore be seen as an instrumental construction within existing political conflicts – acting as a manufactured base of opinion that Waymo is able to wield and claim to be acting on behalf of.

Taken as an illustrative entry point for the topic of this thesis, Waymo's public education campaign and the wider political context it is set against prompts serious questioning about the role that public engagement has in the development of AVs. However, the nature of this role is little understood across the political debate and there exists only nascent academic research on the politics of AVs (see Marres, 2017b; Stilgoe, 2018a, 2017b). There is therefore a large gap in the debate that deals with the influence that public engagement *could* potentially have on the direction of AV development. But, if attention is shifted towards understanding how public engagement in the development of AVs exists and functions in practice, by taking a closer look at the activity of organisations such as Waymo, but also governments, then it becomes apparent that there are at least three significant aspects which require further explanation.

First, Waymo's Phoenix campaign, statements from leading politicians and organisations such as the NHTSA, and the wider political conflicts played in out in Congress all demonstrate the perceived importance that a supportive public has for the development of

AVs. This should be underlined. Among the widespread contestations over AV development, well-defined public support is important for who has the legitimacy and authority to develop *their* version and vision of AVs. This has significance, for as Langton Winner influentially remarked, the “ways in which specific features in a design or arrangement of a device or system could provide convenient means of establishing patterns of power and authority” (1980: 135). Given what is potentially at stake, it is crucial to scrutinise the conditions under which public support emerges and how that potentially legitimises the development of AVs.

This leads to the second important aspect. The emergence of public support highlights that the public is not objective or pre-existent, but instead the outcome of the various processes involved in public engagement (see Barry, 2013; Felt & Fochler, 2010; Marres, 2015; Stilgoe et al., 2014). The public does not simply exist – it must be formed. It is a social construction (Irwin, 2001). In the case of Waymo’s campaign, the extremely narrow forms of public engagement made available in Waymo’s ‘conversation’ with the public, contrasted with the enormous repertoire of public engagement mechanisms that democratic political institutions have deployed in recent years (see Rowe and Frewer, 2005: 257), including those which the NHTSA federal policy has suggested (NHTSA, 2016: 34-45), raises important questions about the kind of public support that Waymo wants and is able to shape. Why did Waymo pursue such narrow forms of public engagement? What would a wider range of public engagement mean for Waymo and its campaign? And what significant impacts would this have on the outcomes of Waymo’s ‘conversation’? These kinds of question have been overlooked in the political debate so far but require critical attention.

Thus, third and finally, to answer these questions attention must be turned to the ways in which the forms of public engagement that emerge are contingent upon the choices of the various actors that are involved in developing the process. This draws attention to the articulations of public engagement that are shared among the organisational interactions where

these choices take place. Who decides the parameters of any given conversation? To observe these choices qualitative, empirical research is needed. However, a significant research problem exists here in that very little is known about how the organisations responsible for developing the technology operate. Recently, democratic political institutions have acknowledged that public engagement is an important policy provision (Bucchi and Neresini, 2008: 457; Felt and Fochler, 2010: 219; Jasanoff, 2003a: 235), but there is an important difference in that AV developers like Waymo are themselves a relatively new form of organisation - the technology company (see Kreiss and McGregor, 2017). Growing evidence suggests that these organisations are increasingly interested in institutional politics (ibid.: 2), while at the same time being difficult to cohesively define (Gillespie, 2010). However, to understand and question the purpose of public engagement, it is crucial to observe how the developers and proponents (including government) of AV development pursue it in its various forms, and why.

These three aspects highlight the need for empirical research on the role of public engagement in the development of AVs. All three of these aspects can be investigated and new light shed on the politics of AV development. The US, however, is not the only nation where AVs are being developed. In chapter one, I outline how this thesis examines the role public engagement in the development of AVs in the United Kingdom (UK).

Chapter One: Introduction

1.1 Public Engagement and The Development of Connected and Autonomous Vehicles in the United Kingdom

In recent years, the dramatic growth in efforts to develop autonomous vehicles has brought with it a pressing need to understand the influences that are shaping this trend. Governments and large commercial organisations are often considered the key drivers, so to speak, forming the basis of popular debates about the prospects and potential consequences of the technology (Herrmann, Brenner, and Stadler, 2018; Lipson and Kurman, 2016; Wadhwa, 2017; Woolmar, 2018). Similarly, the opinion sections of news and technology media outlets have been filled for several years with commentary about what kind of social and political action should be taken. But missing from these debates are a set of key questions. Namely, what kind of influence do citizens exert on the development of autonomous vehicles and in what forms are citizens engaged with its development? What is the role of public engagement in the development of AVs? How does this role emerge? Crucially, is there a democratic future for the development of advanced technologies?

To answer these questions, I spent over two years, between September 2015 and March 2018, conducting ethnographic fieldwork within a jointly government-funded AV development project, based in Greenwich, London, known as GATEway. I was initially drawn to GATEway as a research object due to its ostensive aim of understanding “public acceptance of, and attitudes towards, driverless vehicles” (GATEway, 2018a), through various forms of public testing. During the time that I was ‘in’ the project, the very first project of its kind in the UK, I completed dozens of fieldwork trips to sites in Greenwich, Berkshire, and Westminster, interviewed 19 individuals closely associated with the project, including government officials,

collated and analysed the thousands of pages of news stories, project reports, and government publications that were regularly published, and otherwise became fully immersed in all things “driverless”. For the first eighteen months of the project, I barely saw an AV, as the project developed its own prototype. Instead, I observed the interactions between project members, representing fifteen different organisations, in boardroom meetings and in email exchanges as they planned and discussed how to engage citizens with the technology. In my spare time, I read news stories and industry reports, which I used to build the expertise and rapport needed to secure and carry out interviews. As I typed up fieldnotes and transcribed at my desk, the pile of government reports and internal documents shared with me grew inches and inches greater. By spring 2017, I had shadowed and interviewed government officials in Westminster, observed members of the public interacting with each other in workshops and with ‘Harry’ (a prototype AV) on the streets of Greenwich, and had even visited a British Science Museum archive in rural Wiltshire to investigate an early prototype AV from an abandoned 1960s project. As March 2018 rolled around, I finally witnessed the full public engagement process over a febrile five-week period of operation in Greenwich. By this time, I had encountered numerous claims about the ways in which AVs will, or won’t, change society. Government officials and reports, for instance, often led with bold statements about social and economic transformations, while proponents of the technology within the project that I spoke to often emphasised its life-saving nature. In contrast, what I saw from various commentators in the media was gradually becoming more sceptical. However, the purpose of my research was never to reinforce either side of this debate, despite solicitations of my opinion from various interviewees. But rather as well as the construction of a technology, what I have ultimately traced and articulated in this thesis, among the complex, pragmatic, and operational language of the project, is the construction of a public.

The primary aims and scope of this thesis is to examine the political role that GATEway's public engagement process performed and the affordances for democratic citizenship that were available to members of the public therein. My argument throughout this thesis is that this public engagement process was distinguished by a key, instrumental political function: to facilitate and inform a government-led strategy in the UK by constructing defined notions of the public in relation to the development of this technology. Regarding the affordances for democratic citizenship, I argue, through a series of analytic lenses drawn from STS (Jasanoff, 2003a), political communication (Kreiss, 2016; Wells, 2015) and public administration (Klijn and Skelcher, 2007), that the instrumental function of the public engagement process provided some discernible means for citizens to provisionally shape the development of CAVs through articulations of the public that they helped constitute, but that the process was often characterised by narrow and defined conditions in which power was exercised to maintain close control over the process. This be problematised and potentially improved upon. This is therefore a critical study, grounded in a normative concern with democratic politics. This leads to the discussion in the conclusion, in which the political implications of the key findings and analysis are considered in the vital light of democratic politics and prescriptive suggestions are provided, in relation to both the UK and comparative contexts across the world (see Schreurs & Steuwer, 2016).

What is at stake, as I discuss fully in the conclusion, is the wider fate of a democratic politics of the complex, algorithmic technologies that have become ever more pervasive in everyday life (Bucher, 2018), of which AVs are just one, albeit widely acknowledged, instance. This research is important because it scrutinises the political conditions under which public support can emerge around such technologies, how these technologies are legitimised, and how the knowledge and opinions of citizen's are subject to power relations inherent in any form of engagement. This thesis asks a series of broader questions. Are there genuine modes of

democracy that can be associated with the development of complex, algorithmic technologies? Or does public engagement simply serve the interests of the powerful proponents of these technologies? As suggested already, the findings and analyses presented here do not portray an especially positive picture in response to these questions. But it is important not to accept this situation as the way things are, and therefore to be aware of the alternatives that may well be available to citizens living within a democratic society when it comes to developing advanced technologies. This thesis provides an interpretive account of a public engagement process involved in the development of this technology in the UK. In addition to addressing the gap in the wider political debate about the role of public engagement in AV development, this research also responds to a significant gap in the social science literature for an empirical study on the politics of AV development (see Ganesh, 2017; Marres, 2017a, 2017b; Schreurs & Steuerer, 2016; Stilgoe, 2018a, 2018b, 2017a, 2017b, for previous studies) that can inform these deeper concerns about power and the democratic politics of technology. To fulfil this inquiry, this research is grounded in the fields of Science and Technology Studies (STS) and political communication. In exploring the role of GATEway's public engagement process, this thesis informs three interlinked and thematic concerns within both fields oriented around the emergence of newer technologies, the integrity of democratic politics, and power-relations. This thesis should therefore be viewed fundamentally as an empirical contribution along the line of these key conceptual themes within STS and political communication, that simultaneously develops the emerging interdisciplinary relationship between both fields at the theoretical and empirical level. Through the concerns expressed in this literature, this thesis newly informs wider concerns about democratic politics and the development of advanced technologies.

The wider importance of this research is linked to the fact that the UK is one of just dozens of global locations where AVs are currently being developed (Bloomberg

Philanthropies and the Aspen Institute, 2017). In this thesis, I start from the premise that the development of AVs in the UK is culturally distinct in many important ways. Most notably, the UK's political economy lacks organisations that can develop AVs on the scale of American technology companies such as Waymo. In terms of scale, AV development is simply not like it is in the US. Moreover, the development of the technology in the UK is also differently associated with factors such as population density, transportation infrastructure, and entrenched social issues, to name just a few factors that set the UK or any other nation apart. This means that the empirically informed analysis within this thesis is firmly rooted in the perspectives of UK politics, despite the international diffusion of this innovation. Nonetheless, exploring the role of public engagement in this setting has comparative implications for the development of AVs in other settings, including the US. The analytic task of evaluating the democratic character of GATEway's public engagement process conducted in this thesis therefore remains an important pursuit as long as the development of AVs continues to pose potentially dramatic societal consequences across the world.

As a part of growing efforts to develop AVs, the UK Government has overseen and funded the growth of a national research and development programme. The key to understanding efforts in the UK is the establishment in 2015 of the Centre for Connected and Autonomous Vehicles (CCAV), a policy centre that sits between the UK Government's Department for Transport (DfT) and the Department for Business, Energy, and Industrial Strategy (BEIS). In 2017, CCAV was responsible for the "over 50 projects with around 150 partner organisations" (CCAV, 2017) that constituted the UK's 'connected and autonomous vehicle' (CAV³) programme. Under this government-led approach, over £250 million of industry-matched funding had been allocated by 2018, which promised to "position the UK at

³ This refers to the official designation of the vehicles used across the UK's autonomous vehicle development programme. I will only refer to "CAVs" when I am specifically discussing the UK's programme, and "AVs" when making general points or claims.

the forefront of CAV research, development and use”, and, “contribute to UK. economic growth and help industry to develop safe, efficient systems” (CCAV, 2018a). Thus, whilst the development of AVs in the UK is still behind the technical scale of leading organisations like Waymo or Baidu, the UK Government is driven by a no less serious intention to develop the technology and promote its widespread use. The thesis will return to the details of the CAV programme in chapter three, which is dedicated to a systemic overview of its emergence, structure, and the government-led strategy that I have referred to here.

The following section will now set out the research context of the thesis, by demonstrating how public engagement is involved in developing the technology in the UK.

1.1.1 Public Engagement and the Success or Failure of Connected and Autonomous Vehicles

Here is Iain Forbes, the Head of CCAV, speaking before the House of Lords Science and Technology Committee’s Autonomous Vehicles Inquiry in November 2016:

[...] testing in the real world is hugely important because engaging the public in how this is taken forward is going to be one of the key ways in which you are going to succeed or fail. If people can see the benefit for them then that will speak to the ability of the technology to meet people’s needs. If they do not they will buy out and the technology will not succeed.

[...] as part of our trial programme, one thing I would stress is the importance of public engagement. I am very excited about the technology; I think it has huge potential—I am quite a techy person and I quite like technology—and if we are going to see this improving people’s lives, having people touching it, feeling it and participating in the projects is very important to allow that to happen (House of Lords, 2016).

I am sitting just a few metres from Forbes as he delivers these remarks, having accompanied a small cadre of CCAV officials on the 500-metre walk from CCAV’s offices in BEIS to the

House of Lords. In a corridor discussion prior to the evidence session the officials had primarily expected questions that would link their activity to the government's emerging Industrial Strategy (see HM Government, 2017) and a range of safety concerns that had been raised in the media. The session thus went mostly as they expected, focussing on time-frames for product delivery, the technical capacities of the vehicles being developed, and the UK's global position as an innovator. Yet Forbes' comments about public engagement revealed an important shared perspective within the UK's CAV programme: that without engagement, the public will not understand the benefits or potential of the technology and that without them, it will fail.

Clearly, widespread adoption is what is entailed in speaking of the 'success' of the technology. This would mean that the significant benefits that Forbes cites as the reasons to develop the vehicles would have been recognised and delivered. But what are the technology's "benefits" and "potential" and what is understood by "improving" people's lives and meeting their "needs"? As shown in the prologue, these are not uncontested notions that are met with agreement by all groups. They are an open question. Indeed, there were many different views about the benefits and potential of AVs that I encountered throughout this research. But what remained consistent in my encounters within the CAV programme was the perspective revealed here by Forbes – that public engagement was vital to the successful adoption of CAVs in the UK, whatever that envisaged potential may be. However, this commitment to public engagement should not be taken at face value, as public engagement can entail several different processes. This leads to the consideration of the crucial question within this thesis: what *are* the functions, boundaries, and affordances of public engagement within the CAV programme?

The three main empirical chapters of this thesis deal with this question in depth and scrutinise the particular features of the GATEway Project's public engagement process. The findings and analysis presented therein newly inform what we understand as a democratic politics of technology. At the very least, this also helps to inform the other numerous jointly

government-funded projects within the CAV programme that put the perspective voiced by Forbes into practice by providing forms of public their own forms of engagement. These projects were often aimed at providing citizens that had been designated as ‘members of the public’ with the experience of using prototype vehicles – in other words, “touching” and “feeling” the technology – as an opportunity to engage with the development of the technology. Although the number of projects has since grown, one of the flagship examples of this form of public engagement that the CAV programme provided at the time of Forbes’ comments was the aforementioned GATEway Project. As mentioned, I spent over two years conducting ethnographic research within the GATEway Project. In doing so, I observed intricate details of the planning, preparation, and execution of its public engagement process.

I provide a detailed explanation of the GATEway Project in chapter three. As a brief summary, ‘GATE’ stood for ‘Greenwich Automated Transport Environment’, in reference to the designated testing environment that the project secured on the Greenwich Peninsula, in London. GATEway was a large and complex project carried out by a consortium of fifteen different organisations, that were all based in the UK, under the guidance of CCAV. This consortium was led by the Transport Research Laboratory, an influential research centre established in 1933 with historic ties to the British Government. Whilst it was in operation, between September 2015 and March 2018, the project developed and carried out public trials of a small fleet of autonomous shuttle pods (see fig 1.1), in which project participants were able to take and observe short trips along a pedestrianised path that stretched along the north and east sides of the Greenwich peninsula, among several other forms of engagement. The distinguishing feature of the GATEway Project was not its technical contributions, but rather its primary aim to understand “public acceptance of, and attitudes towards, driverless vehicles” (GATEway, 2018a). To achieve this understanding, participants were encouraged to provide their experiences, views, and perceptions of the technology through workshops,

Figure 1.1. An autonomous vehicle during the GATEway Project's public trials, March 2018.



online surveys, and an online consultation platform known as 'Commonplace'. Collectively integrated into the public engagement process, these forms of participation generated information about the public which was used to gauge public acceptance and attitudes towards the technology. In other words, they productively defined the public as a political reality in relation to the development of CAVs through the input of these participating citizens. Alongside this, augmenting the public engagement process, was a strategic performance of public communication that the project performed. This ranged from national news coverage that the project courted, to limited but direct interaction with citizens through the project's various social media channels and email lists. Through these forms of communication, further mediated notions of the public also emerged in relation to the development of CAVs.

In light of the key themes of this research – democracy, power, and technology – why and how this particular public came to be is the concern at the centre of this thesis. Regarding the why, as Robert Goodin and John Dryzek (2006) posit, there are numerous modes of influence that publics may have, ranging from simply providing legitimation around an already specified set of ideas and policy (ibid.: 232) to the genuine empowerment of citizens in the decision-making process (ibid.: 225). As this thesis maps out the function of GATEway’s public engagement process, it argues that powerful actors in government, from ministers to senior officials such as Iain Forbes, partially rely on these publics in order to inform their expertise and strategic decision-making. As such, this poses concerns about the modes of actually existing democracy that accompany the development of new technologies. This points to the significance of the how. In its state-centric orientation, being a jointly government-funded project, GATEway’s public engagement process reflects what Ricardo Blaug has termed ‘incumbent democracy’, which “seeks to improve, though at the same time control, participatory input, by channelling, simplifying and rationalising it through institutionalised conduits” (Blaug, 2002: 105). Around the themes of power and democracy especially, this instinctively invites scepticism about the democratic quality of the project. Yet, as Graham Smith notes in direct reference to incumbent democracy, the extent to which these managed forms of participation can actually empower citizens is an “empirical question” (Smith, 2009: 3). This thesis explores this crucial question in relation to the GATEway Project, which is used here as a case study to newly inform wider concerns about democratic politics and the development of advanced technologies. As advanced technologies, such as autonomous vehicles, become ever more prevalent, it is crucially important that we provide in-depth qualitative research that can explore how the legitimacy and authority of these technologies is constructed.

Fundamentally, in directly engaging with hundreds of citizens, and communicating with many thousands more, GATEway formed an important layer of democratic politics in the development of CAVs. The two years and more of ethnographic data that forms the basis of this thesis provides a unique basis on which to understand this situation; to interpret both the political functions of the project's public engagement process and the affordances for democratic citizenship that it provided to those citizens who were involved. This required a granular approach to events. Therefore, within this thesis, I observed and interpreted politics at the level of *practice*, as the following section will now explain.

1.1.2 The Integration of Public-Making Practices into the GATEway Project's Public Engagement Process

This thesis focuses on the existence, within GATEway's public engagement process, of what STS scholar Andrew Barry (2013) has referred to as forms of 'public-making'. Public-making is defined by Barry as the numerous "ways of assembling publics and of gauging and articulating their will or opinion" (ibid.: 98). This conceptual description covers the existence of numerous practices observed across the GATEway Project's public engagement process, from citizens sharing their experiences and perceptions via digital tools, to discursive articulations deployed by project members when interacting with the media (see Ashenden, 2004; Lezaun & Soneryd, 2007; Osbourne and Rose, 1999, cited in Barry, 2013: 98, for comparative examples). 'Practices' are understood within this thesis as productive actions which bring together "different elements [...] into a specific local relationship", including material resources, experiences, knowledge, persons, and semiotic resources (Fairclough, 2010: 173). Public-making practices thus produce publics made up of an ensemble of socio-material elements (see Chilvers and Longhurst, 2016: 586; Marres 2007: 773, 2015: 61) as the

empirical findings in later chapters will demonstrate. Despite being performed through various means and in many different contexts of the project, what connects these numerous public-making practices is how they generated and circulated “empirical knowledge about publics, their opinions and concerns” (Barry, 2013: 98). Collectively, I argue, these practices were part of a concerted effort within the project to construct ‘the public’ in relation to CAV development. By being explicitly linked to the project’s aims and the facilitation of the government-led strategy, which needed a public, I argue further that these practices fundamentally defined the GATEway Project’s public engagement process.

By focussing on these practices as the unit of observation, the concept of public-making makes distinct the ways in which these practices enacted a public that was defined not by state membership, but as a set of social groups understood by their “relation to an evolving object” (ibid.: 99), which in this case was autonomous vehicles⁴. Unlike enduring notions such as the ‘British public’, the public that emerged through GATEway’s public engagement process had little or no pre-existence – underlining the very purpose of public-making practices. GATEway was thus a clear example of how publics are increasingly called upon in relation to issues (see Marres, 2007). An interpretation of these integrated practices therefore derives my overall argument about the democratic function and affordances of the GATEway Project’s public engagement process, as the primary unit of analysis, as well discussion in the conclusion of the thesis about this informs democratic politics more broadly

The concept of public-making enables this political interpretation of GATEway’s public engagement process in two key ways. Firstly, focusing on public-making practices “directs us towards the existence of a great diversity of ways in which publics are assembled and speak or are spoken for, and the need to identify and interrogate these specific means”

⁴ Barry uses the concept of public-making to analyse how oil companies understood the ‘affected communities’ involved in the construction of the Baku-Tbilisi-Ceyhan (BTC) oil pipeline across Azerbaijan, Georgia, and Turkey.

(Barry, 2013: 98). Documenting the precise ways in which the public was constructed provides the empirical perspective necessary to inform analysis of public-making practices in relation to key concerns within STS and political communication oriented around the integrity of democratic participation and power, as outlined below, in order to “consider the extent to which particular forms [of public-making] may be experienced by actors as more or less participatory or egalitarian – that is, exclusive or inclusive, in practice” (ibid.: 99). By claiming to engage the public in the issue of CAV development, the GATEway Project, and the institutions of government to which it was acting on behalf of, invite scrutiny of how and in what ways it did so. The focus on public-making practices, as definitive of the public engagement process, enables this thesis to pose several critical questions, including: to what extent was this public engagement process democratic? What factors enabled or constrained democratic affordances? And what kinds of power-relations emerged between actors involved in the project?

In drawing attention to public-making practices, it is also important to note the challenging demands that were placed upon the project’s consortium. Public-making should not be considered a simple pursuit. Project members I spoke to frequently noted the complex difficulties they encountered, not least the because of the scale of its objectives, the lack of a relevant and practical knowledge base on which to begin (GATEway, 2018c: 32) and the fact that the technology itself was not yet maturely developed. Despite claiming to have met its objectives in its final report (GATEway, 2018b: 4) the project faced numerous delays and was forced to scale down the extent of its activity.

Nonetheless, to overcome these challenges and pursue public-making, the project relied upon the diverse resources of the fifteen organisations involved in the project. This led to public-making practices being performed on the basis of different procedures, techniques, and forms of expertise. For example, as I will show in chapter four, the use of social psychology was used to foreground the value of the public’s ‘experiences’ within the public engagement

process. Connected to this, the involvement of the online, community consultation firm Commonplace led to the extensive use of digital tools to capture and record these experiences. These differences were fundamental to the performance of public making practice within GATEway, and their importance can be understood in a classic sense as what John Dewey identifies as “the conditions which promote and obstruct the organisation of the public into a social group with definite functions” (Dewey, 1954: 37). Because of these conditions, the issue-based public that emerged from GATEway was a *contingent* reality, constructed for the political purpose of informing the strategic policy of CCAV.

By taking these different procedures, techniques, and forms of expertise into account, Barry acknowledges that generic forms of public-making are subject to “re-invention and mutation in different circumstances and settings” (Barry, 2013: 98). Practices take on different functions and affordances depending on the context, producing adaptations which have important political consequences, as different public-making practices potentially articulate different publics. To provide an incisive analysis of these variations in public-making practice, I develop the concept of public-making throughout this thesis along two vectors.

The first vector is an empirical development of the concept of public-making. Whilst Barry’s original concept offers ‘genres’ as a heuristic device to differentiate empirically between enactments of public-making, in this thesis I propose that public-making practices were enacted across three distinct yet interdependent empirical dimensions of the GATEway’s public engagement process: a participatory dimension; a communicative dimension; and an organisational dimension, all of which I will describe in the next section.

The second vector involves applying a sequence of critical analytic lenses to each of these three dimensions of public-making. These lenses are crucial to the overall arguments of the thesis, as they derive a series of interlinked analytic points from the ethnographic evidence about the democratic quality of the GATEway project’s public engagement process. To the

participatory dimension I apply Sheila Jasanoff's (2003) notion of "technologies of humility" and Daniel Kreiss's (2016) notion of the "technology-intensive". The purpose of these conceptual lenses is to emphasise the cultural and technological contexts, respectively, that shaped the project's public engagement process and the participatory public-making practices found therein. Since both frameworks are grounded in normative concerns about democratic politics, both Jasanoff and Kreiss's theoretical perspectives enable a clearer and sharper look at the GATEway Project's means of participation and the forms of citizenship that were afforded within it. Importantly, it enables the derivation of analytic statements from the qualitative evidence of participatory public-making practices, since the frameworks apply the evidence to a set of political criteria. To the communicative dimension, I apply Chris Well's (2015) notion of "civic information" and "civic information styles", and to a lesser extent Andrew Chadwick's (2017) idea of power within the hybrid media system. Wells' conceptual understanding provides both an accurate conceptual description of the forms of communicative public-making practice observed, as well as a way to critically approach the democratic affordances therein. Here, the emphasis is on communicative public-making as a form of "media-related practice" (Couldry, 2012: 37), wherein the construction of the public through communication is explored through a critical perspective on how power-relations between actors shaped the construction of this information in setting of the project.

Finally, to the organisational dimension, I apply public administration scholars Erik Hans Klijn and Chris Skelcher's notion of "governance networks" (2007). The organisation of the GATEway Project was complex, involving many different commercial, research, and political organisations, in addition to government institutions. Faced with this complexity, the notion of governance networks provides a conceptualisation that understands this as a series of dispersed, flexible, and asymmetrical interdependencies between the various forms of social actor within the hybrid organisational form that GATEway consisted of. In focusing on

organisational public-making practices within these networks, it is possible to analyse how powerful actors, such as those I observed, steer policy and its implementation within organisational settings. The conceptualisation thus captures the political tension, confluence, and interdependencies between the GATEway Project's organisational elements, not least when it came to democratic norms of public engagement. Thus, as Klijn and Skeltcher point out, these networks, as rendered in the descriptions of the interactions I observed, can be analysed through the democratic criteria we would expect in a representative democracy, and thus enable conceptual analysis of organisational public making practices.

These analytic lenses attend to the contextual factors involved in each dimension as they interpret the democratic function and affordances of public-making. These analyses are explicitly linked to concerns, outlined in section 1.3 below, about democratic politics and power within the STS and political communication literature. (Section 1.4 deals with the compatibility of STS and political communication at the conceptual and empirical level). These lenses are further introduced in each of the relevant chapters in which they are applied, explaining in more detail how they analytically frame the empirical findings in each case. Finally, the validity of applying these concepts should be also considered. To what extent is it fair to hold the practitioners within the GATEway Project to the standards of democratic action that these three analytic lenses provide? In other words, is it reasonable to presume that, where shortcomings are claimed in this thesis, that actors within the project could feasibly meet these criteria? Is this just a theoretical issue? The fundamental assumption applied in this research is that as a publicly-funded project that ostensibly engaged the public around a matter of government policy, there is clear justification for applying democratic norms as a criteria. As to whether it is reasonable for practitioners to apply these norms, while the theoretical language of the conceptual lenses may seem removed from the everyday contexts observed in my fieldwork, in the conclusion I derive from their application a set of concrete proposals that

could feasibly be applied to future forms of public engagement with AV development. These proposals thus help to translate the analysis in a way that also tangibly contributes to informing the wider debate into the potential democratic politics of technology.

In section 1.3, I introduce these three dimensions of public-making through empirical evidence. In the next section, I first explain the research approach undertaken in this thesis.

1.2 The Research Approach: Conducting Ethnographic Fieldwork Within GATEway and CCAV

In his landmark study of democracy and power in the American city of New Haven, Robert Dahl (2006: 1) asks a deceptively simple question: “who actually governs?”. There is nothing inherently remarkable about this question, as Dahl suggests. The question’s relevance stemmed from the discrepancy between the unanimous belief in democracy that American citizens of the time held and what Dahl refers to as the “extensive inequalities in the resources of different citizens” (ibid.). Prior to developing the focussed research questions that I provided in chapter one, this thesis was originally guided by a new interest in Dahl’s perennial question. With such widespread activity across this government-led programme of technological innovation that I have just outlined, I wanted to understand how political power was distributed, who was making decisions, and what was being decided. In short, I wanted to know: who *actually* governs the development of CAVs in the UK?

Very little has been known about what appears to be the closed-off and bureaucratic system that exists behind the public testing of the vehicles. However, over the course of more than two years, between September 2015 and March 2018, I was able to secure access to several of the organisations and institutions operating within the CAV programme. Over time, my research questions developed around the concern with public engagement already outlined in

this thesis, as I observed and reflected upon the series of interconnect practices which are examined in this thesis through the conceptualisation of public-making. To illustrate the processes by which I arrived here, it is at this point in the thesis that I turn to and reflect upon the research methods behind this research. Prior to the sequence of empirical findings in the chapters that follow, this section provides the material and reflections needed to critically evaluate the validity of my empirical data. A short reflection on my role as an observer within this programme, including how I gained and maintained access, can be found in the appendix (see appendix A2).

1.2.1 The Ethnographic Research Design

This thesis utilises an ethnographic research design that focuses on producing rich and thick descriptions of events, presented in this thesis as episodes and quotations. The decision to pursue ethnographic research was made at the start of the research process, for which there are several justifications.

First and foremost, there is a limited amount of research providing any insights into how political organisations or institutions pursue AV development (Taeihagh and Lim, 2018: 2), creating the need in this area for the type of empirical data that ethnography provides. The value of political ethnography is captured by Charles Tilly (2006: 410, italics added), when he states that “to the extent that politics actually consists not of big structures and prescribed roles but of dynamic, contingent interaction among *persons*, households, and *small groups*, political ethnography provides privileged access to its processes, causes, and effects”. As Howard notes, many rich theory building studies of democracy have been political ethnographies in which researchers have “immersed themselves in a small, carefully selected community” (Howard, 2006: 207). In specific relation to GATEway, an ethnographic approach was also attuned to

the challenge of studying “physically decentralised social networks made up of individuals who form a community but are not members of the same formal organisation” (ibid.: 208) – this accurately describes GATEway, as outlined above. Moreover, this ethnography also provides data that was both unavailable to the political debate that I will outline in chapter two and which therefore challenges prevailing political understandings of AV development. Therefore, at its core, the research design I employed within this thesis was developed to flexibly explore a domain of technology and politics about which very little is known and from these findings to generate inductive conceptualisation about the practices found therein.

Conducting an ethnography is an inductive and emergent process (Kozinets, 2010: 190). My knowledge of the UK’s CAV programme was extremely limited at the start of the research, as was my wider knowledge of AVs. Many factors influenced the necessary selection of field sites. The timing of my research was a significant factor, as it coincided with the early stages of the official CAV programme. I began the ethnographic research process in the same month that CCAV was established in July 2015. I identified GATEway as a fieldwork site as it was a flagship CAV development project in the UK and among the first to receive government funding. Once access was secured, however, the ethnographic approach required *direction*. Although I did not systematically draw on social network analysis in the way that the approach requires, I turned here to Howard’s notion of network ethnography and the claim that the researcher should identify a “perceived community” and select “the important nodes in the social network as field sites” (Howard, 2006: 218). Social network analysis was substituted in my research design by the adoption of ANT’s ethnomethodological (see Garfinkel, 1967) dictum to “follow the actors” (Latour, 2005: 68), which was mentioned in chapter one. This approach rejects any research method that aims to translate the “expressions of their informants into” the “vocabulary of social forces” to explain social phenomenon (ibid.: 57). Instead, akin to Garfinkel, ‘following the actors’ emphasises the role of informants in

producing theories of action (ibid.). My fieldwork within the CAV programme was therefore guided by actors I encountered, producing an inductive and interpretive understanding of events.

Using this approach, based upon data saturation and open coding in the grounded theory tradition, my fieldwork encounters persistently guided me towards the relationship between public engagement and the development of AVs, until it became the focal point of my findings (again, it is important to note my initial research question was Dahlian one – “who governs?”). This first emerged in how informants would repeatedly evoke various conceptions of the public at the points in our exchanges where they were articulating their various strategies, objectives, and beliefs. Gradually, as the GATEway project took shape, it became clearer how different practices were being organised by its members into the concerted pursuit of public-making that I focus on this thesis.

Ethnography is not a perfect research approach – as no research approach is. What I argue is that the findings produced through this ethnographic research design lead me to the construction of a grounded conceptualisation of public-making at the heart of this thesis. In search of this conceptualisation, I drew support from Clifford Geertz (1973: 27), who argues that in pursuing an inductive theorisation based on ethnography, “theoretical ideas are not created wholly anew in each study”, but rather that they, “are adopted from other related studies, and, refined in the process, applied to new interpretive problems”. It was in this regard that I turned to and subsequently developed, Barry’s notion of public-making as an inductive theorisation of the empirical phenomenon that was being articulated to me by my informants. However, it is crucial to note that public-making is not a term that anyone within the CAV programme I spoke to or observed used. Yet as a theorisation, it does not solely *explain*, nor subtract, from the account my informant’s articulations of their various strategies, objectives, and beliefs (see Latour, 2005: 53). By avoiding what I deemed to be over-theorised alternatives

available from critical theory, this chosen concept is fundamentally conscious of the need to “account of the social world without assassinating the life contained within it” (Back, 2012: 21).

There are limitations to this research approach that must be acknowledged. If ethnography is understood as the generation of “thick descriptions” that are capable of “setting down the meaning particular social actions have *for actors whose actions they are*, and stating, as explicitly as we can manage, what the knowledge thus attained demonstrates about the society in which it is found and beyond that, about social life as such” (Geertz, 1973: 27, italics added), then most important of these limitations is that my findings are predominantly derived from *just* the GATEway project.

This situation was recognised during my research and I made several different attempts to gain access to a comparable project, the UK Autodrive programme in Milton Keynes and Coventry, but I was denied access. I was told upfront that nobody within the project had time to accommodate me and that I would need to sign non-disclosure agreements – a response I found frustrating given both CCAV and GATEway had granted me fieldwork and interview access. This limited my findings, as being able to compare GATEway with another of the four cities trials, triangulated with the CCAV fieldwork, would have significantly strengthened my findings by providing the opportunity for “controlled comparison” (Marcus, 1995, cited in Nielsen, 2012: 193). What variation there is between the GATEway project and a project like UK Autodrive in terms of public-making cannot be fully addressed by the findings in this thesis. However, the data from interviews, grey literature, secondary sources, and the CCAV findings that I draw upon throughout the following chapters suggest many ways in which these findings and the notion of public-making are generalisable to the CAV programme, as I explore in the conclusion. Moreover, I contend that the project provides many valuable insights that

can help establish the grounds for comparative research on this area in the future (see Schreurs & Steuer, 2016).

It should be noted that ethnographies that feature single case studies are not uncommon in either the STS or political communication literature, although I clearly acknowledge that providing comparative cases would have undoubtedly strengthened findings (as in Nielsen, 2012; Kreiss, 2016). The use of ethnography in this thesis is strongly supported within the STS literature, to which this thesis contributes, where the use ethnographic methods is intrinsic to the nature of the field in its attempts to demonstrate the social dimensions of science and technology (Latour & Woolgar, 1979; Latour, 1987). In political communication research, my selection of methods also finds support in recent contributions which have called for greater theoretical and methodological diversity (Karpf, 2012b; Karpf, et al, 2015; Nielsen, 2014) promoting a continuation of the methodological directions established in recent several key studies within the field (see Chadwick, 2017; Nielsen, 2012), which have deployed ethnographic approaches to provide new insights about the evolving nature of political communication. Regarding the communicative dimensions of public-making that I present in my findings, the ethnographic approach I deploy here further demonstrates the way that it can “highlight a range of practices that most research [...] has largely ignored” (Nielsen, 2012: 13) and eschew plain dichotomies and either/or formulations (Chadwick, 2017: 4), such as those covered in chapter two. Jessica Baldwin-Philippi’s (2015) ethnographic study of US political campaigns is particularly relevant to my analyses of public-making, due to the similar way in which she describes the construction of citizenship through the practices she observed in the backstage processes of those campaigns.

1.2.2 Details of Methods and Data Collection

I have covered the underlying principles of the research design and the selection of fieldwork sites, arguing that ethnography was necessary as a research approach to flexibly get at the inner workings and political dimensions of the CAV programme. In order to execute this approach, the ethnographic data presented in this thesis was derived from a combination of research methods, which in order of importance were:

- fieldwork observations;
- semi-structured interviews;
- discourse analysis;
- the collocation of secondary sources, mainly news articles.

These methods were combined during a period of over two years, between September 2015 and March 2018. Given that researchers interact with their field sites through their research methods, it is important to note that this period contained various interludes in which I had limited interaction with my informants. During these interludes, I maintained fieldwork presence through email, in the form of both personal communications and the fact that my email address was included in the GATEway project's board member correspondence, allowing me access to project updates and some strategic discussions.

1.2.2.1 Observational Fieldwork

Between September 2015 and March 2018, my fieldwork primarily involved visiting the main site of the GATEway project, on the Greenwich Peninsula, where I attended board meetings, shadowed GATEway project members on site during both the preparations and execution of the public trials, as well as taking part, and finally, attending public engagement workshops.

My observations of CCAV took place over four separate visits to the Department of Business, Energy, and Industrial Strategy and the Department of Transport in Westminster, with two additional visits to conduct interviews. I shadowed different government officials, sometimes changing during the same day. This involved the observation of their daily routine, access to a handful of internal meetings, and on two key occasions accompanying CCAV's senior team to both the House of Lords to give evidence at a select committee and the offices of Ofcom for a meeting about digital infrastructure.

My fieldwork also had online components. My email address was included on the consortium email list which allowed me to see internal communications and access shared project documents and I was regularly in contact with project members through email to discuss developments. I also completed three online engagement processes, now expired but presented in chapter four, producing screenshots of each stage. I also kept up to date with the project's social media activities.

I recorded these observations in several notebooks and made frequent use of what Back has referred to as "live sociology" (2012: 27) by using my smart phone to take frequent pictures of the field sites to augment my recollections. Preliminary fieldnotes were often made in the moment and then developed later that day or the following morning. In analysis, I applied the Latour's principle that "*everything is data*" and adopted four genres of notes (Latour, 2005: 133-135, italics in original). The first genre recorded my reflections of the research, noting my experience *as* a researcher. This included what would turn out to be key reflections on how my expertise as a university researcher cultivated my insider status within the CAV programme, as I reflect on in the appendix (see appendix A2). The second genre was the more typical account of events I observed, recorded chronologically, and later refined as the illustrative episodes that I provide in this thesis. Here, coordination with the interview data was crucial, as it was in my interviews that the relationship between public engagement and the development

of AVs first became apparent. This coordination was achieved in the later stages through the selective coding process. Thirdly, I kept a record of preliminary findings or arguments as and when they would occur to me. On occasions this would be in the middle of fieldwork and on other occasions it would be whilst I was translating my fieldwork observations into episodes. This was another useful exercise, as many of these interpretative snippets can be found within the thesis. Finally, I kept a small record of the effects that my findings or accounts had on my informants. This provided a limited supply of data that helped me to reflect on my findings through my informant's eyes, to see how they recognised themselves. This was often done in an informal setting and on three occasions involved sharing drafts of this thesis. The process also helped to guarantee that the accounts in this thesis were accurate in terms of how events happened. Fieldwork notes were typed up and then opened-coded (see appendix A3), applying the principles of grounded theory.

The access I was granted to conduct observations was not uninhibited or daily but comprised of frequent and selective access that I could variously attain. Difficulties emerged owing to the diversity of organisations involved and the respective procedures they had in place for outside observers, as I explain in the appendix. Moreover, the collaborative approach to developing CAVs meant interactions within the programme were often diffuse and nearly all my informants reflected upon the complexities they encountered in their roles. Whilst a methodological challenge, this also allowed me to understand the complexities of public-making from the perspectives of my informants, in a way that other research methods would have been unlikely to achieve.

Across this thesis, I have chosen to present my fieldwork observations in the form of episodes. These episodes vary in length but are all composed of fieldnotes which were typed up, open-coded, and analysed. Although it is not the standard, the presentation of fieldwork encounter episodes can be found extensively in both *Ground Wars* (Nielsen, 2012) and *The*

Body Multiple (Mol, 2002) and it is from these texts that I draw my primary inspiration. Explaining the use of episodes, Rasmus Kleis Nielsen (2012: 207) gives three primary justifications for their use, which I will link here to my intentions. First, they offer the reader a more transparent and thus impressionistic illustration of the data. Given that each of the primary empirical chapters begins with a normative conceptual framework, these episodes help to make clear the link between evidence and theory and the subsequent arguments about public-making that are derived. Secondly, Kleis Nielsen argues that episodes highlight the role of practices in a way that subsumed fieldnotes cannot render; they express the immediacy of social action. This makes sense in this research, given it equally highlights the role of practices. In many cases, such as in section 1.3 below, I provide direct accounts of what I consider to be public-making practices. Thirdly, Kleis Nielsen argues that episodes serve as a reminder that despite the attempts at ordered analyses in political research ethnographies deal with the “disjoint cacophony of social life”. Thus, the uses of episodes match my experience in the field, in which fieldwork access was often irregularly (owing to the project’s own irregularities), partial, and based upon a sole perspective. Episodes, I argue, accurately capture and portray to the reader what was fundamentally an episodic research process.

1.2.2.2 Semi-Structured Interviews

A total of 19 in-depth, semi-structured interviews were recorded. The interviews included two members of CCAV, three members of Innovate UK, a member of the Transport Systems Catapult, and thirteen members of the GATEway project. Two individuals from GATEway were interviewed twice, and one interview consisted of three individuals who worked together closely on the development of the GATEway project’s public engagement processes (see appendix for the full list). Interviews typically lasted between 40 minutes and an hour, with a

handful that ran longer, including a one hour and twenty-minute interview with “Tim”, a senior civil servant in CCAV. Most of the interviews were conducted in person in an organisational setting, typically a headquarters. Just two interviews were held over the phone.

The interview data is used to augment the fieldwork findings and extend the analysis of public-making to individuals own reflections and accounts of events. This data was open-coded manually to establish the emergent themes within thesis. This process was key in the earlier stages of the research, as it was in the interviews that articulations of the public first emerged and became the primary focus of the research. A further component of the analysis involved the organization of the transcripts by individual and mapping their relationships within the CAV programme, drawing on elements of network ethnography (Howard, 2006: 217). This process allowed me to trace and compare comments they made about similar aspects of the CAV programme, if I knew that two or more informants were involved in it. This worked the other way, too, as I was able to ascertain when somebody was discussing an aspect they were less involved in. Owing to the complexity of the CAV programme – on a practical level, individuals often changed roles and projects moved through different phases of their strategy, which meant being constantly aware of and recording people’s roles and responsibilities – it was important to integrate these organisational distances into my interpretation of the data.

Many of the informants I spoke to were extraordinarily candid about how well everything they were doing was according with their strategies. They were often highly critical of their own efforts and the efforts of others. This was obviously an advantage as a researcher looking to gain in-depth information. However, in the interests of avoiding personal and professional repercussions, not all of this makes it into the account provided here. Moreover, only informants who have both public profiles and who have agreed to have their name used are identified. To protect their anonymity, everyone else is given a pseudonym which reflects

neither their ethnicity or gender. All interviewees were sent a list of questions, a selection of which is provided in the appendix, as well as an informed consent form prior to an interview.

The fast-paced and hands on environments of CAV development often meant that I was talking to many more people than those that I officially interviewed. During these exchanges, I would take notes of what they were saying. Digital recording in these contexts would have been too disruptive and the idea of covert recording was fundamentally out of the question (especially when I was in CCAV, as this practice would of have no doubt terminated my access). I have strived to make that quotes that come from unrecorded, but on-the-record discussions held during fieldwork observation are presented as accurately and faithfully as possible.

1.2.2.3 Discourse Analysis

During the research, I collected, read, and organised large amounts of grey literature. I classify grey literature as both the publicly available information produced by both the institutional core of the CAV programme and the GATEway project that I was able to find, as well as internal documents that I was provided by my informants. As I explain in the appendix section on how I gained fieldwork access, knowledge of the grey literature was important in both cultivating an insider status and informing my interviews. In the latter, it enabled a deeper range of discussion, because a shared knowledge of the CAV programme could be quickly assumed.

Collecting, reading, and organising relevant grey literature was a time-consuming pursuit of data. Many of the documents were extremely lengthy and written in a technocratic style which required patience. I took an immersive approach in many respects, aiming to simply absorb the information. In extracting quotes as data for use in the thesis, I treated the documents as forms of social practice in the tradition of Critical Discourse Analysis (CDA) (Fairclough,

2010; Wodak, 2011), in which as texts they enact certain discourses. These texts were not coded.

Furthermore, in chapter five, I refer to both news media and a limited range social media material related to the GATEway project. Discourse analysis is applied to this material, exploring the key messages and features of the project's social media output surrounding the public trials in March 2018. Again, they were not coded. As stated in chapter two, a systemic content analysis of the news coverage surrounding AV development would offer valuable insights.

1.2.2.4 Collocated Secondary Sources

There is a large amount of secondary data that is accessible across the broader debate about AVs. As I demonstrate in chapter two, the portrayal of AVs within these sources can be explored to demonstrate the broad range of perspectives and arguments about their development.

In terms of the empirical research in this thesis, secondary sources alone provided nowhere close enough data to sufficiently inform my research questions or to build an in-depth account of the CAV programme. The role they performed in this thesis was therefore to provide a basic and factual account of events related to the development of AVs which I was unable to directly observe, relying primarily on news articles. This is partly how the events I refer to in chapter three, for example, were reconstructed. The aim here was to provide data that would contextualise the events in my fieldwork and interview data and to fill gaps in my account. I took a systematic approach to this secondary data, building a basic chronological database⁵ of

⁵ This can be found as an openly shared document here:
<https://docs.google.com/document/d/1zct2J0YcRqdaEh7DuSwFNkeo2BIRnv-6pciM1wQ3yxE/edit>

news articles going back to October 2010 that could be used to trace events and ensure the accuracy of my account.

1.3 Three Dimensions of Public-Making within the GATEway Project: Participation, Communication, and Organisation

The division of public-making into the three dimensions that I identify here is intended to break down the argument within this thesis along key empirical lines. Each of the three dimensions I discuss contain public-making practices that are fundamentally alike – to generate “empirical knowledge about publics, their opinions and concerns” (Barry, 2013: 99)-- but which vary in important ways according to the contextual factors inherent across each dimension. Each dimension of public-making I explore in this thesis is also interpreted as fulfilling the same instrumental political function: to facilitate and inform a government-led strategy by constructing defined notions of the public in relation to the development of this technology. In this light, I explore the interdependencies among the different dimensions of public-making practices that were enacted across the project – particularly in chapter six where I explore how the organisational dimensions of public-making enabled the participatory and communicative dimensions.

To illustrate these three dimensions of public-making in action, I will now provide a brief selection of episodes from my fieldwork within the GATEway Project. Presented across the following three subsections, these episodes serve as an empirical introduction to the three dimensions of public-making. This complements the theoretical introduction to public-making presented above. Each subsection provides a definition of the respective dimension of public-making, an interpretation of the episode, and a summary of the further empirical aspects related to that dimension to be explored further into the thesis. The aim here is to provide a clear idea

to the reader of what is being examined in this thesis, prior to situating the aims and scope of this thesis within STS and political communication literatures.

1.3.1 The Participatory Dimension of Public-Making

Episode 1.1

It's early March 2018 and the launch week of the GATEway Project's full public trials of its autonomous pods. I'm standing directly underneath the path of the Emirates Air Line on the Greenwich Peninsula, with two 'marshals', "Louise" and "Josh". Their job today is to be the human presence on the ground that engages with members of the public as they get on and off the pods. It's cold and windy but otherwise clear – not that the pods mind, I'm told. Louise and Josh are recent graduates and now researchers at TRL. They're here for the experience and the opportunity to work on something exciting. This is their first day. They tell me there has been lots of nervous excitement among the trial team this morning as the pods were being prepared for their first run of the day. Each run takes between 45 and 60 minutes and there are two pods running today, out of four, as the trial gains pace.

Louise and Josh are standing at the third stop on the route, dressed in bright orange jackets. Occasional chatter comes through their radios: "all clear, pod one". They are running through their brief on how to engage members of the public. Key guidelines laid out for them on a detailed four-page printed document advise them "to allow participants to form their own views and avoid overly endorsing any views they express" and to ensure they have considered answers to range of questions about the pods. Both Louise and Josh have tablets – these are to take the email addresses of members of the public as they get off the pods, so that they can later be asked about their experience through surveys. There are also interactive links on and within the pod which people can use to access online surveys and a 'sentiment-mapping' platform to provide an account of their experience and perceptions. Louise and Josh's job is to get people to use them.

Episode 1.2

The first thing I notice about my ride in the pod is how slow it is. We're on a straight section and through the glass panels I watch as the pod manoeuvres itself with painstaking care around a pedestrian, and then a moment later a cyclist. The ride is bumpy – poor suspension – and I feel slightly underwhelmed until it sinks in that the system is doing all the work. The 'steward' opposite me is simply watching a diagnostics screen and a camera feed from the front of the pod. As we're travelling, I notice a poster above our head with a QR code, asking us to share our ride experience online, with the line: "how is your ride in a driverless shuttle?". The final stretch is bendy, and the pod makes several stuttered but ultimately successful attempts to weave itself through the path. We come within centimetres of a lamppost, and I can't help but wonder if it is supposed to get that close. I get a bit nervous. Slowly and carefully, however, the pod rolls into the final stop without an incident. I'm recognised as I get off and asked how my trip was. "Strange, interesting", I say.

I activate the QR code to 'rate my ride' as prompted by the poster in the pod (*see appendix item B5*). I'm taken to a stripped-back interactive webpage which poses a selection of questions to me. The first question is: "How does/did riding the in the driverless vehicle compare to your expectation?". I'm given two options, a thumbs-down symbol ("worse than expected") and a thumbs-up symbol ("better than expected"). The second question asks me why I felt this way, giving me four paired options (e.g. "quick" or "slow, "safer" or "less safe"). The third question gives me the option to type in comments and ideas, and the fourth asks me what pod I rode in. The fifth asks me if I've been involved in any other project activity, and finally, the sixth questions asks for my email address. This simple process takes just couple of minutes to complete.

Participatory public-making practices are defined as practices which generate knowledge about the members of the public *who are enacting the practice*. That is, that citizens participating in the GATEway Project's engagement process were involved in generating knowledge about themselves, *qua* a public, in a relation to the issue of CAVs. This notion of participants acting in the capacity of the public is important, and will be examined in later chapters, as this is how

the participation of individual citizens was defined and framed by the project. The main public trials, in early 2018, were conducted over a five-week period, with every person that rode or saw a pod and subsequently targeted for a response serving to construct a defined notion of the public in relation to CAV development. Every ride was therefore extremely valuable to the project and its aims. Given the limited timeframe provided for the trials, owing to numerous procurement issues, marshals were encouraged to get as many people onboard as possible. Episodes 1.1 and 1.2. provide an indicative example of participatory public-making practices in action, as well as some of the numerous contextual factors which shaped their performance.

First, the forms of public-making practice demonstrated here are the completion of the online surveys and the act of ‘sentiment-mapping’: two digital tools. Each of these tools enabled participants to generate information based on their interactions with the pods. This can be seen in the survey, described in episode 1.2, which contained questions which focused on generating information about the *experience* of using the pod. The sentiment-mapping platform, explored in chapter four, allowed participants to pin comments about their *views* on the technology onto a digital map of the Greenwich test site. These affordances were not accidental. The project explicitly sought to generation experiential information about the public, which is could use as the basis for gauging public opinion. This points to the numerous contextual factors which shaped this process, as suggested in episode 1.1. Participatory public-making was carefully managed on the ground by a team of people, with scripts, who directed participants. But these interactions were also shaped by a series of strategic choices made earlier in the project, such the application of social psychology which led to the focus on deriving experiences, as well as the design and development of the interactive testing environment, and the development of a database used for the targeted recruitment of participants. As conditions which shape the construction of the public, these points illustrate the need to critically consider and interpret these public-making practices and their context.

As I demonstrate in chapter four, GATEway's public engagement process contained various means of participation, within which public-making practices were embedded. In addition to the public trials, there was also an interactive website with an online sign-up process and a series of public workshops, the latter of which participants were able to interact with the one another and with the development of CAVs. The website was a crucial stage of public engagement, as it enabled the project to establish a database of participants through a sign-up process. More than that, by providing demographical data, participants also provided the information the project needed to establish specific groups of the public that it could claim to be engaging with. The public workshops provided a deliberative space in which invited participants were able to discuss their views on AV development. These sessions were recorded, producing a body of data that the project could translate. It was expected that through all of this activity that the project would provide a detailed assessment of how to deliver the perceived social and economic benefits of the technology, by better understanding public attitudes towards their introduction. As with the public trials, it is important to examine this activity closely, as well as the contextual factors which shaped it, to interpret public-making in relation to the aims of this thesis.

I now turn to the communicative dimensions of public-making.

1.3.2 The Communicative Dimension of Public-Making

Episode 1.3

I've arrived early to the Intercontinental Hotel, in Greenwich, where the pods start their daily runs. I'm standing with Andy Frost, previously the project manager and now heading up the technical side of the trials. Today, they have a journalist from the *Metro* arriving, and Andy is getting ready to take them for a ride in the pods while being interviewed. Andy has given several interviews during the trials, as he knows a lot about the project.

Besides attracting broadcast and press coverage, the project's official Twitter and Facebook accounts have been posting and sharing content several times a day. I check the feed while we're waiting and see gifs of the pods in action with invitations to come and ride the pods, as well as links to the project's online participatory platform and news and commentary features about the project.

Today's assembled team are reflecting on how successful yesterday was. This week has been busy on the media front, with journalists from various technology news outlets visiting the site to profile the pods. Yesterday was a particularly big day, as Andy and another colleague had arrived before 5am to get the pods ready for a 6.20am pod run to go out live during a BBC *Breakfast* slot. Besides the BBC *Breakfast* slot, they also had the busiest day of trials, with guesses of between 50 and 75 members of the public riding the pods. The team speculates that the early morning coverage and the increase in visitors are linked.

People are tired, but Andy is relentless as he bustles around the pods and talks to the journalists before the interviews. Cameras are being set-up. More people arrive, including the project's current technical lead, who is swept into conversation with the journalists. Two members of the PR firm employed by the project, that specialises in science and technology development, arrive soon after. They too join the bustle of people, waiting on the shoulders of the journalists and running things through with Andy and the technical lead. Huddles form. Camera angles are discussed. A pod is moved for a better backdrop prior to an interview in front of it. Sunglasses? Take them off. Pod doors open or closed? Open. Can the journalists film the steward's readout display? No – sensitive information. Which pod is best? Pod three, it's the smoothest.

A few minutes later, pod three, the 'best' pod, sets off with the *Metro* journalist, Andy, a member of the team, and the camera man. It glides smoothly at 5mph onto its narrow route alongside the River Thames as another interview takes place.

Communicative public-making practices are defined as practices which articulate or influence the mediated representations of the public associated with the project. Although there are numerous actors who could be referred to here, the focus in this thesis is on the communicative public-making practices enacted by actors within the GATEway project. How the project

communicated about the public is important, as this further defined the public in relation to CAVs to a wider audience, potentially having an important effect on how CAVs were understood and perceived in a broader sense in society. Episode 1.3, also taken from the full trial phase, illustrates how project actors engaged with journalists who had come to report on the trials and the steps they took to produce positive coverage. This mattered, as the project was regularly featured in many national broadcast and print media outlets, including the BBC, *The Guardian*, and *The Telegraph* as well as technology-oriented publications such as *Wired*, *The Verge*, and *The Register*.

Gaining this coverage was a vital part of the GATEway project's public engagement process. As episode 1.3 shows, project members direct interactions with journalists afforded them the chance to influence this coverage. For example, specific project members with a depth of knowledge about the project were put forward for interviews (others, such as the marshals, were prohibited from speaking to journalists), the best working pods were used for interviews, and specific messages that needed to be put forward were agreed in advance. As the presence of the PR specialists in this episode reflects, there existed a careful concern about how the project was presented in the media. Part of this concern involved how the public was represented in relation to CAV development; due to the aims of the project, it could not risk being connected to negative publicity. Hence, why there was a perceived need for project members to engage in communicative public-making practices.

The focus on communicative public-making practices examines the many processes that lay behind the mediated representations of the public associated with the project, as well as the representations themselves. It is important to holistically understand how the project engaged in forms of communication to clearly interpret the definitive role that these public-making practices played. As I will show in chapter five, the project pursued a range of communication, providing information which had two key purposes: (1) to inform citizens

about the development of CAVs as a public concern, specifically in relation to GATEway's activity; and (2) to instruct encourage citizens to participate in the project's public engagement process. In practice, this ranged from the pursuit of news coverage seen here, to its social media output, to the information that it provided on the website, to blog posts written by individual project members. Much of this activity was events-based, meaning that communications activity would increase significantly around key project milestones, such as the launch of the trials. This is an important dynamic to consider; as for the most part the project was dormant in a communicative sense. These forms of communication were broadly supported by a media strategy and by communications personnel, as I will explore, all of which was there to help manage the communicative dimensions of public-making within the project.

I now turn to the final dimension of public-making: the organisational dimension.

1.3.3 The Organisational Dimension of Public-Making

Episode 1.4

Nick Reed is the Academy Director at TRL, and the Technical Lead on the GATEway Project, having joined TRL in 2004. We're sat in his office, at TRL HQ in suburban Berkshire. It's December 2015 – a year after funding was won from BIS, DfT and Innovate UK, and two months on from finalising the contract in October. He is explaining to me how the project is designed. He comes across as a nexus of information and is very adroit when it comes to answering my questions.

In the same breath, Nick switches between the roles of the project's many organisations, government departments, and the public, into details of procurement processes, meetings, guidelines, and then onto the advancement of the technology, public perception and change. I'm overwhelmed as I scribble down information. I'm unfamiliar with many of the groups and guidelines and have to ask him to explain who's who and what's what regularly. He assures me that the project is early days and that there is lots of time to get up to speed.

Episode 1.5

“Ed”, a senior project member in charge of key aspects of the public engagement process, is presenting to the project partners during a monthly board meeting. He is talking about an April 2017 start for the public trials, which he says gives them about a month to gather the participants that they need. He states that a press release will be sent out today and that he wants as much engagement from all the partners as possible. A media event is planned for the 3rd of March and he wants Nick Reed to be available for that to engage with the journalists. Ed stresses the need to come up with a clear message for the press and to make sure that everybody is in line with that message, so he will need to work closely with the projects comms’ lead. “We’re trying to talk about it from a social perspective”, he reminds everyone. There is agreement in the room about how to approach this.

Shortly after, the discussion around the public trials become entangled with details of the pod development. There are some issues, but there are daily updates from the engineers. One of the project members asks if they can promote some images of the pods being built, adding that it is important “the public only sees the positives”. This leads to some disagreement and a discussion about the design of the pods in relation to interests of CCAV, the testing guidelines, intellectual property, the demands of the London Metropolitan Police, and safety issues. The complexity of the request is lamented by the project member wanting to promote the images, as they just wanted something for a press release. “It doesn’t need to be war and peace”, the project member sighs.

Organisational public-making practices are defined as practices which articulated operationalizable notions of the public within the project’s organisational settings that project members relied upon to guide how they planned and managed GATEway’s public engagement process. These practices articulated predefined ideas about the public linked to the project’s expectations and assumptions about the public engagement process and the aims linked to it. Organisational actors within the GATEway Project shared, and contested, these articulations of the public among one another as they managed the project. How these interactions took place is important to understand, as it reveals the contingent backstage processes that led to the

eventual forms of participatory and communicative dimensions of public-making that took place. Moreover, this organisational dimension demonstrates how the public was understood at the strategic level of the project. These are crucial factors in relation to the overall argument of the thesis.

Episodes 1.4 and 1.5 illustrate the organisational dimensions of the project in two settings: the office of its technical lead and a boardroom meeting where the project's consortium partners had gathered. The most salient theme is complexity. As episode 1.3 shows, for the uninitiated, the project was not easy to grasp. Yet, as episode 1.4 shows, the strategic progress of the project was dependent on a series of factors and variables, including the continued support of CCAV, organising the complex range of partners within the project, the procurement of the trial technologies, the successful recruitment of members of the public to take part in the project, and, more generally, keeping the many moving parts functional in a time-efficient manner. Public-making practices were inextricably entwined with this complexity, but owing to the aims of the project, offered powerful ways to guide and direct the actions and resources of the project. For example, Ed, who attempts in this episode to guide the public engagement process into a "social" discussion. This is predicated upon assumptions about the public, as I will reveal in later chapters, that Ed is evoking to the other project members. As similar social aspect is also evoked by the project member who wants the public to see the positives of the project. The complexity was predicted on the diverse range of experience, expertise, resources, and interests that were integrated into project. This, and the wider aspects of the CAV programme, meant that public-making was often subject to the power-relations that existed between different actors. This mattered, as some viewed public engagement as more important than others in delivering the social and economic benefits of AVs. As a result, the enactment of organisational public-making practices was by no means homogenous or unified, as will be raised throughout this thesis.

Beyond the specificity of public-making itself, it is also important to understand how “organisations give rise to and structure political engagement” (Kreiss, 2016: 5) when they are in the position between government and citizens – what David Karpf (2012: 10) refers to as the “organisational layer” of politics – that GATEway occupies. I therefore trace the enactment of organisational public-making practices within the broader environment of the GATEway Project, taking into account: (1) the ways in which the project’s diverse resources were strategically arranged around the public engagement process; (2) the interactions among project members, through board meetings, email exchanges, reports, and other forms of interaction; and (3), the interactions between senior project members and government officials. This broadly reveals the hybrid/civic organisational form that I argue best describes GATEway. This poses a broader political significance and raises several questions, as I will discuss in chapter six, about the project’s instrumental pursuit of the national level aims of CCAV.

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This thesis offers an ethnographic account of the definitive role of public-making practices in their participatory, communicative, and organisational dimensions. This approach enables a set of research questions that would otherwise be left unanswered. For example, what is the demographical quality of ‘the public’ and which of its ‘problems’ were acknowledged, or ignored, by actors within GATEway? What counts this public as legitimate and credible and according to who? How do actors in the project think they should communicate with the public, and through what means? Why were certain means of participation chosen above others? What were the techniques and procedures that informed the boundaries of these means of participation? Crucially, who decides the normative understandings of the public that actors draw upon and how did it affect the kinds of public engagement they offered? Ultimately, how could this have been different? These are critical questions concerning both democracy and

power. The qualitative insights generated by this range of questioning underlines why it is important to understand the multi-dimensional empirical character of public-making within the GATEway Project.

My argument, re-stated, is that these multi-dimensional forms of public-making were definitive of the instrumental political function of the GATEway Project's public engagement process. This political function was to inform and facilitate a government-led strategy by constructing defined notions of the public in relation to the development of this technology. As suggested through the empirical findings, public-making is a contingent process, which invites critical attention. Thus, with regards to democratic citizenship, I argue that the public engagement process allowed the interests of citizens to provisionally shape the development of CAVs, but often through narrow and defined means that do not fulfil normative criteria of democracy applied in this thesis. Thus, these means can be problematised and potentially improved by exploring them through a range of critical analytic lenses drawn from STS and political communication, as I discuss in the conclusion.

Demonstrating this argument requires the establishment of key conceptual themes to help guide this account. To establish these themes, I now turn to a brief literature review which considers a range of concerns from within the political communication and STS literatures and the conceptualisations of democratic participation, power-relations, and technology that are related to those concerns. These broad themes serve as an important conduit for the argument and analysis within this thesis. As such, these themes situate this thesis as an empirical contribution to the fields of STS and political communication and in doing so connects these two fields around the empirical topic of this thesis. I evoke these themes throughout the empirical findings and analyses in this thesis, and in the discussion in the concluding chapter where I summarise the contribution of this thesis.

1.4 Democratic Participation, Power-Relations, and Technology

The ideas of democracy and power are inherent to political science. The political study of technology, however, is a concern that is more specific to certain fields, including political communication and STS. The aim here is not to rehearse the multitude of possible conceptual understandings, but instead to highlight how this thesis draws upon certain conceptualisations of democratic participation, power-relations, and technology from within political communication and STS and in doing so how it contributes to key concerns within these fields that are related to these conceptualisations. I begin by considering democracy and power, before turning to technology.

1.4.1 Three Key Assumptions About Democracy and Power

There are numerous theoretical, historical, and existing models of democracy (Held, 2006; Lijphart, 2012). As Arend Lijphart (2012: 1) states, there are many ways in which democratic society can be organised, yet examination often reveals “clear patterns and regularities”. Following Dahl (1989: 109), the participation of citizens in decision-making is often regarded as the “ideal standard” to which all forms of democratic governance are held. Based on this, the *normative importance* of citizen participation in democratic politics is my first key assumption within this thesis, as the central focus of the account in this thesis.

Power is a multidimensional concept (Lukes, 2004). Despite their differences, both the pluralist and the Foucauldian traditions have broadly maintained that power is relational, being constituted between actors (Dahl, 2006: 13; Foucault, 1981: 94), and that its analysis requires the careful and specific examination of these relations in a way that eschews any explanatory reliance on structures or forces (Dahl, 1958: 466; Foucault, 1977: 139, 1981: 95; see Latour 2005: 45). This thesis therefore proceeds on the second key assumption that power is, according

to Foucault (1981: 93), “not an institution, and not a structure; neither is it a certain strength we are endowed with; it is the name that one attributes to a complex strategical situation in a particular society”. As such, as already explained, the empirical focus in this thesis is on the performance of practices among interrelated actors.

The final key assumption in this thesis is that power is intrinsic to democratic politics (Dahl, 2006). As Chantal Mouffe has argued, if we assume the presence of power-relations in society, then a primary question for democratic politics is not how to erase power through equality, but rather how to “constitute forms of power more compatible with democratic values” (Mouffe, 2000: 100). It is on this basis that this thesis performs a set of critical analyses of the GATEway Project’s public engagement process and offers a set of prescriptive suggestions in the conclusion.

1.4.2 The Study of Democratic Participation and Power-Relations in Political Communication and Science and Technology Studies

Recent research in both political communication and STS has paid attention to a number of topical concerns about the development and use of the multiplicity of technologies that increasingly characterises society. Responding to these concerns, useful conceptualisations have emerged that seek to understand the participation of citizens in democratic politics and the constitution of power-relations.

The study of political communication has been deeply concerned with the systematic relationships between politicians, media organisations, and publics (Blumer & Coleman, 2013: 174; Blumer and Gurevitch, 1995: 12; Chadwick, 2017: 4; Stanyer, 2007: 2). In terms of democracy, this concern has been understood in particular through the lens of the Habermasian public sphere (McNair, 2011: 18-26; see Dahlgren, 2006; Downey & Fenton, 2003; Habermas,

2006; Papacharissi, 2002; Savigny, 2002), driven by the assumption that “mediated political communication has become central to politics and public life in contemporary democracies” (Bennett & Entman, 2001: 1). The democratic participation of citizens has therefore often been interpreted in its deliberative dimensions (Baldwin-Philippi, 2015: 40; Coleman and Blumer, 2009: 15) with most recent strands of research focussing on the importance of information pluralism in facilitating democratic deliberation in mediated politics (Anstead and Chadwick, 2018: 247). Several recent studies, for example, have examined inaccurate or biased representations of politicians in the press (Cammaerts, DeCillia, and Magalhães, 2017; Chadwick, Vaccari, and O’Loughlin, 2018; O’Neill, Savigny, and Cann, 2015). Traditionally, this deliberative focus has often questioned or criticised the role of the media in terms of democratic deficits (Blumer and Gurevitch, 1995; Entman, 1989; see Norris, 2011 on the term ‘democratic deficits’). However, Chadwick, Vaccari, and O’Loughlin (2018) have provided important recent evidence that citizens also engage in “democratically dysfunctional” forms of communication, helping to shift the debate. This is important, as it is one among many shifts in how democratic participation is being understood within the field, which I will elaborate on, which are relevant to the topic of this thesis.

STS research, on the other hand, has predominately focussed on the capacity for citizens to participate in shaping the development of technologies (Sclove, 1995: 26-33; Zimmerman, 1995). In recent studies, this concern has been fuelled by the recognition that democratic governments have increasingly sought public involvement in the development of science and technology (Brown, 2009: 220; Felt and Fochler, 2010: 219; Jasanoff, 2003a: 235; Marres, 2007: 760). A number of studies have therefore explored the role of public participation in the development of science and technology (for example, Durrant, 2010; Kerr, et al., 2007; Le Dantec and DiSalvo, 2013; Sleeboom-Faulkner and Hwang, 2012). Crystallising the expanse of this broad trend, Rowe and Frewer (2005: 257; see Smith, [2009] on “democratic

innovations”) identified an extensive range of over 100 “public engagement mechanisms”. In many areas of STS this has been viewed positively. For example, Callon, Lascoumes, and Barthe (2009) have advocated citizen participation in the form of “hybrid forums” of heterogeneous actors (ibid.: 18) based on their argument that contemporary democratic institutions are now unable to manage “socio-technical controversies” (ibid.: 225).

However, as Braun and Könninger (2018: 676) have observed, the course of this concern with democratic participation has gradually entailed a shift from “advocacy to analysis” (see Braun & Schultz, 2010; Felt and Fochler, 2010; Lezaun and Soneryd, 2007; Voß and Amelung, 2016) and from “normativity to nuanced views” (for a critique of this normativity, see Pestre, 2008). Voß and Amelung (2016), for example, traced the emergence of citizen panels in various contexts of scientific governance over several decades, set against critical analysis based upon questions of democracy and power. In discussing this shift, Braun and Könninger (2018: 676-677) identify eight key themes among various studies. Among these are concerns that closely inform the argument of this thesis, including the concern that limitations to participation have come to operate as forms of political control, as well as the concern that citizens views become subject to study in public engagement processes, as opposed to meaningfully participating in decision-making. Observing this trend in STS research, this thesis can be viewed as an empirical contribution that informs these concerns.

In recent years, newer conceptions of democracy have appeared in political communication research. Examples include the concepts of ‘digital citizenship’ (Mossberger, et al, 2007; Wells, 2015) and ‘networked publics’ (boyd, 2011; Varnelis, 2012; Zayani, 2015). These concepts are closely attuned to the increasingly digital character of contemporary media systems (see Chadwick, 2017), in which contemporary research has focused on the granular aspects of “the role of the citizen-user as the driver of democratic innovation through the self-actualized networking of citizens” that are using various digital tools (Loader and Mercea,

2011: 758; see Bennett and Segerberg, 2013; Coleman and Blumer, 2009⁶). For example, a key area of research here has been understanding the links between social media and democratic participation based upon the analysis of publicly-available interactions (Anstead and O’Loughlin, 2011; Ausserhofer and Maireder, 2013; Bode & Dalrymple, 2015; Jungherr, 2014; Vaccari, et al., 2015; see Boulianne [2015] for meta-analyses of this research base) which address the wider shifts towards increasingly digital media systems.

Arguably, the newer conceptions of democracy that are emerging from this concern with digital politics have been driven by two key trends. The first is the recognition of newer forms of “loosely connected political groups appearing in changing political, economic, and technological contexts” (Karpf, et al., 2015: 1901; see also Vaccari, 2013: 222). As Neuman et al. (2011: 32) note, our understandings of political participation need to become more attuned to a wider array of mediated civic engagement. The second trend is the demand for a new era of qualitative research that can study these new empirical contexts, as articulated by Karpf, Kreiss, Nielsen, and Powers (2015; see Nielsen, 2014), in agreement with Bennett and Iyengar’s (2008: 707) influential and provocative claim that there is “growing disjuncture between the prevailing research strategies and the sociotechnological context of political communication” (cf. Holbert, et al., 2010). Thus, in producing new types of empirical data, new conceptualisations of democracy have become required in the field.

An area where these trends have been particularly pronounced within political communication research has been in the study of political campaigns and advocacy organisations in the US (Baldwin-Philippi, 2015; Chadwick, 2017; Howard, 2005, 2006; Karpf, 2012a, 2016; Kreiss, 2012, 2016; Nielsen, 2012; Stromer-Galley, 2014; Wells, 2015). These

⁶ This stems from an important lineage of research which has studied the potentially democratising effect on civic culture of the internet (Chadwick, 2006; Chadwick and Howard, 2009; Dahlberg, 2001; Dahlgren 2000; Ferdinand, 2000; O’Loughlin, 2001). Much like the shifting perspective in STS around public participation, as Neuman, et al. (2011: 31) note, “expectations about the Internet’s impact on citizen engagement have run the gamut from breathless enthusiasm through cautious optimism to prophecies of digital doom”. Both fields, it appears, are in the midst of a disillusionment with democratic politics, which contextualises this thesis.

studies have focussed on how digital-technological innovations in organised politics have reshaped democratic participation, examining what Chadwick (2017: 17) has specifically identified in these studies as a concern with “the heterogeneous social and technological aspects of collective action”. Daniel Kreiss (2016), for example, has described a growing trend of “technology-intensive campaigning”, in which digital media, data, and technologies have been increasingly relied upon to organise political campaigns and facilitate democratic engagement. Moreover, a key focus within these studies has been on the *formation* of these aspects of collective action within political organisations, to better understand their influence (Howard, 2006: 33), particularly with regards to democracy (Baldwin-Philippi, 2015: 162; Nielsen, 2012: 7). Crucially, this has been facilitated by a wave of qualitative research methodologies within these studies that have advocated the use of interviews and observational fieldwork. Subsequently, constructivist interpretations of democracy, as being constituted in actor’s practices, have emerged (Baldwin-Philippi, 2015: 8-10), such as Rasmus Kleis Nielsen’s (2012) argument that the “premeditated practices” (ibid: 7), of what he has termed ‘personalised political communication’, potentially contribute towards a more inclusive form of democracy (ibid: 34). Collectively, approaches such as this have expanded the study of democracy within the field in new ways, as Jessica Baldwin-Philippi, in the context of political campaigns, clearly explains:

as campaigns develop and circulate content, they are producing visions of what it means to act as a participant in contemporary digital democracy [...] the process of constructing messages and the messages themselves highlights the forces and institutions that constrain citizens actions and illuminate those they are able and encouraged to take part [...] [which] point to new ways of understanding what it means to be a citizen and new opportunities for productive political engagement (Baldwin-Philippi, 2015: 162).

The topic of this thesis shares the core focus and concerns of these studies, but in a different and perhaps unfamiliar empirical context. Grounded in an ethnographic methodology that Baldwin-Philippi, Nielsen, Howard and others have suggest is warranted, the notion of public-making that I use in this thesis offers a conceptual approach to democratic participation based on a focus on dynamic practices (see Chadwick, 2017: 21; Couldry, 2012: 37, on the study of practices). Ultimately, there is a need, as Zizi Papacharissi has argued, to contribute a new wave of fluid conceptualisations to the field's concern with democratic participation, that are attuned to the important changes in digital politics (Papacharissi, 2010: 11). With the GATEway project offering many empirical examples of the kinds of digital politics discussed here, across all three dimensions of public-making, this thesis aims to build upon this recent research that has so far achieved this aim set out by Papacharissi and others.

Notably, these newer conceptions of democracy within political communication possess several common features with what Mark Brown has recently identified as the “democracy as collective world making” approach within STS research (Brown, 2015: 15; for further discussion on models of democracy in STS, see Durrant [2011]). In this approach, studies (for example, Barry, 2013; Chilvers & Kearnes, 2016; Irwin, 2001) have variously drawn upon Actor-Network Theory (ANT), posthumanist influences, and the pragmatist approach of John Dewey (see Dewey, 1954) to arrive at a conception of democracy which Brown loosely unifies under Noortje Marres' materialist notion of democratic participation (see Marres, 2015). As such, this entails a focus on material practices of public engagement – as in the political communication literature discussed above – that produce knowledge. In doing so, these approaches engage in critical analysis of established procedures and processes of knowledge-making (Brown, 2015: 16), itself highly relevant to the topic of this thesis. Importantly, as Brown (*ibid.*: 17) points out, these approaches challenge scientific views that enforce political hierarchy and in doing so potentially offer a way to foster greater democratic

practice, in line with the comments of Baldwin-Philippi, quoted above. Importantly, Barry's (2013) notion of public-making, that I have developed within this thesis, is derived from this 'world-making' approach, pointing further to this thesis' contribution to this range of STS research.

On the notion of public-making, there is now an explicit concern within STS with the "ways in which 'the Public' has been constructed in public engagement" (Stilgoe et al., 2014: 7). As in this thesis, this concern focuses on the specific means and settings, particularly of participation, through which the public emerges as a political reality, not only in a discursive sense, but in a material sense too. The analytic value of this constructivist approach to the public is that, as Marres (2015: 43) puts it, "it opens up for questioning our expectation that concepts of the public should already contain the theoretical solution to the public's problems". By eschewing theories such as the Habermasian public sphere (1989), this approach encourages the creation of concepts that are grounded in the problematisation of the specific ways in which the public is constructed, in line with the shift towards critique that Braun and Könninger (2018) have noted in the studies of democratic participation already mentioned above. Moreover, this can also be connected to the argument made by Papacharissi (2010: 11), described above, about the need to generate new concepts. This constructivist understanding of the public therefore directly informs the conceptual approach in this thesis. I turn now to the understandings of power-relations.

As noted, power is a perennial and vast notion within political science and in this thesis, I draw upon a relational understanding of power, based on the insights of Foucault (1977, 1981). As I will briefly demonstrate here, these insights have enduring relevance to the concerns of both political communication and STS, and to the empirical topic of this thesis, which informs those concerns.

In the field of political communication, Taina Bucher (2018) has recently proposed the concept of “algorithmic power” to examine the pervasive presence of algorithms in everyday life and the politics entailed in their immersion into social practices. Bucher directly cites the Foucauldian notion of power, described by her as “exercised, relational, and productive” (ibid.: 3), as the basis for what she also describes as an STS-informed argument (ibid.). Although not explicitly based upon Foucault’s work, a relational understanding of power as exercised is also central to how Chadwick (2017) understands the hybrid media system. As I refer to in chapter five, Chadwick proposes that power in a media system be understood as “the use of resources, of varying kinds, that in any given context of dependence and interdependence enable individuals or collectivities to pursue their values and interests, both *with* and *within* different but interrelated media” (Chadwick, 2017: 21). As in this thesis, this notion of power is also based upon practices (ibid.) – making it a useful way to understand communicative public-making.

The concern with power raised by Howard (2006) is also relevant to this study, particularly in analysing the participatory dimension of public-making. Howard has explored how what he terms “hypermedia”⁷, such as voter databases, “affect the exercise and distribution of political power” (2006: 170), with Howard’s argument being that hypermedia are used by political actors to manage and control political culture (ibid.). For instance, they provide actors in political campaigns the “power to synchronise and network issue publics” (ibid.: 169), which, as I demonstrate in chapter four, actors in GATEway also did to an extent. Moreover, Howard also refers to the assembling of detailed knowledge about individual citizens through hypermedia as an “exercise of panoptical and discursive power” (ibid.: 130), in direct reference

⁷ Defined as the “conjoined super-structure of fast, high-capacity hardware and software communication tools that let people transmit, interact with, and filter data (Howard, 2006: 2).

to Foucault (1977). This once again is relevant to the analysis of power in this thesis, in which the production of knowledge is central, as explained in previous section.

What these indicative approaches to power within political communication have in common is their proximity to STS ideas, with both Bucher (2018: 3) and Chadwick (2017: 17) being explicit about this influence. Bucher, for example, cites the “ontological politics” of Annemarie Mol (2002, cited in Bucher, 2018: 3) as a key influence on her argument, suggesting the compatibility that I have argued in this section is present. Howard has also signalled an interest in STS (Howard, 2015: xvi; Woolley & Howard, 2016).

Within STS, there are many contexts of study in which power, broadly understood for the moment, is a clear and discernible concern. For example, there have been many studies of scientific and technology controversy. Perhaps the most famous study in the field is Brian Wynne’s (1992) study of how Cumbrian sheep farmers contested scientific advice which imposed restrictions upon them following the Chernobyl disaster in 1986. As Dorothy Nelkin notes, at a fundamental level, “controversies over science and technology revolve around the question of political control” (Nelkin, 1992: x) – relevant evidence of this can be seen in the prologue, where I discussed the development of AVs in the US. Elsewhere, the concern with democratic participation in the development of technology are also presented within the field as a potential site of power and control, based on the perspective that when “technologies are developed outside of social interests, then workers, citizens and others have very few options about the use and effects of these technologies” (Wyatt, 2008:169), echoing Winner (1980). In a more specific sense, related to the critiques of democratic participation outlined above, Voß and Amelung (2016: 763) argue in their study on the use citizen panels, that as public participation methods they establish a “epistemic authority that allows for the generation of political authority”. This points to the core concerns about the relationship between power and knowledge which sets up critical questions at the heart of the field (Jasanoff, 2003b: 398), and

this thesis. Moreover, this underscores the need for a “dependable civic epistemology” (Jasanoff, 2003a: 240), understood as the culturally specific expectations that citizens have about the way that knowledge is produced and put to use in decision-making (Jasanoff, 2007).

However, across STS, the concept of power often appears to have a loose usage and application, with a meaning that lacks a clear disciplinary consensus. This can partly be attributed to what Brown notes as the ethnomethodological insistence, based on Latour’s dictum to “follow the actors” (Latour, 2005: 68), that politics is defined by the actors being observed (Brown, 2009: 186). However, in a critique of this position Brown suggest that in order to understand power, “conceptual and normative reflection” must be linked with empirical research (ibid.: 187). This refers us back to the assumptions about power that I made at the start of this section and the attempt made in this section to clearly provide a set of normative and conceptual positions to tether the empirical evidence in this thesis to.

I conclude this section by explaining two important regards in which technology is an important conceptual theme and concern within this thesis.

1.4.3 Conceptualising Technology

The topic of this thesis concerns the politics involved in the development of a certain technology, autonomous vehicles. This connects the thesis to the vast STS literature, where the study of the social and political aspects of technological development have been thoroughly established (MacKenzie and Wajcman, 1985; Williams, and Edge, 1996; Winner, 1980; Woolgar, 1991). Secondly, this thesis also considers the role that digital technologies performed in communicative and participatory dimensions of the GATEway project’s public engagement process, connecting the thesis to the prevalent trends in the political

communication literature which have examined and conceptualised the role of digital technologies in organised politics, as outlined above.

Technology as a concept has been well-explored in both the STS and political communication (see Chadwick, 2006, 17-21) literatures and this is not the place to rehearse more fundamental aspects of the debate, such as the widespread rejection of technological determinism (see Wyatt, 2008, for a counter-prevailing perspective). However, while the concern with technology in either field needs no further explanation, it is important to understand the more recent conceptual basis for these concerns, as they relate to this thesis.

Within STS, technology is fundamentally understood as being constructed under contingent circumstances, paying close attention to actors that are involved in these processes of construction (Sismondo, 2010: 11). Owing to the diverse and often fractured nature of STS (Martin et al., 2012), many different conceptual approaches to the development of technology have emerged within the field, fuelling debate (Braun and Whatmore, 2010: ix-xxxiii). I avoid the complexities of much of this debate in this thesis. In focusing on the role of public-making in CAV development, this thesis adopts the basic STS premise that technologies, such as AVs (see Stilgoe, 2018a) are not fixed or objective entities but instead co-produced by social and political processes, such as those seen in the GATEway project. A key question in this thesis, explored in chapter seven, is *the extent* to which these processes have a meaningful influence on decision-making.

A prevailing conceptualisation of technology within political communication research has been to assume a moderate perspective in which technologies have inherent political qualities while also being contextualised within political contexts (see Chadwick, 2006: 19; Howard, 2006: 209, 2010, 16-17). Recently, in *The Hybrid Media System*, Chadwick has suggested a more radical view, drawing on ANT, in which “technologies enable and constrain agency in hybrid networks” (Chadwick, 2017: 19; see also Carlson, 2018: 1761). Closely

related to this, but less radically, there has been a recent trend in which the concept of “affordances” has been more widely used to understand digital technology, particularly social media platforms (Bode and Vraga, 2018: 2). A clear explanation of the term is given by Nancy Baym, who has described how technologies have “affordances”, understood as the potential “social capabilities technological qualities enable” (Baym, 2010: 44). Kreiss et al. (2018) have provided a further definition of the concept, in which “technological practices are bounded by people’s perceptions of what technologies can do, material or digital features that literally structure what can be done with them, and behaviours that emerge and evolve in relation to technologies” (ibid. 19). To examine the participatory and communicative dimensions of the GATEway project, this thesis adopts the definition offered by Kreiss et al. In this regard, this understanding usefully informs the central concern with the democratic affordances of the project’s public engagement process, by exploring how political participation was mediated by a specific set of digital tools. Finally, in paying attention to the organisational dimension of the GATEway project, this thesis also builds upon Andreas Jungherr’s argument that political communication research needs to pay more attention to how digital tools are embedded within organisations and the practices that actors within those organisations perform (Jungherr, 2016: 374).

In summary, several connections can be drawn between the STS and political communication literatures regarding democratic participation, power-relations, and to an extent, technology. Building on this, the concept of public-making used in this thesis is intended to appeal to the conceptual sensibilities found in both fields, while also being applied to an empirical topic which presents concerns about democratic participation and power which are also relevant to both fields. As such, this thesis directly responds to Nielsen’s proposal for political communication research to explore “context-driven, problem-focused, and interdisciplinary forms of knowledge production” that adheres to an “intellectual pragmatism,

a commitment to scientific work that addresses the big issues of our day and engages with others in doing so” (Nielsen, 2018: 4).

Following Nielsen’s proposal points to the way in which this thesis differs from existing work in both STS and political communication. By converging both fields around the empirical context of GATEway, this thesis presents some new concepts, concerns, arguments, and empirical evidence to both fields. For example, media and communication technologies have not been a central topic for STS (Wajcman & Jones, 2012: 674) and are presented here through the disciplinary lens of political communication. Similarly, a project like GATEway is an unfamiliar empirical context for the study of political communication research. Similarly, it is largely presented here through the disciplinary lens of STS. As stated, the central concept of public-making helps to coalesce this thesis as a combined contribution to both fields, building on the shared concerns and conceptualisations that I have aimed to make clear in this section.

I now turn to a brief justification of STS and political communication as an approach to empirical research, before outlining the overall organisation of the remainder of the thesis.

1.5 Science and Technology Studies, Political Communication, and a Combined Approach to Empirical Research

The critical analysis of the GATEway project’s public engagement process and its democratic affordances relies upon conceptualisations and normative concerns drawn from political communication and STS, as described above. However, in taking this combined approach, the connections between STS and political communication must also be justified on an *empirical level*. That is, despite these conceptual links, as different fields of research, how can they be applied to the same empirical topic of research?

One possible justification, already suggested at the end of the previous section, is that they share technology as an empirical topic. However, beyond this ostensive point, there is a persistent bifurcation here, in that political communication tends to focus on the use of technologies *as* a means or context of engagement, whereas STS tends to focus on the means or contexts of engagement *with* technology. This broad split is one that this thesis cannot overcome. As suggested, I draw on both lines of inquiry within this thesis to holistically explore the topic, without being drawn into the totality of the conceptual debate about technology – the point is that public engagement is the focus of this thesis, not CAVs as a technology, despite the fact that they are of course inextricably linked

Where the connections between STS and political communication have already been noted or suggested by many political communication scholars (Chadwick, 2017: 16; Howard, 2015: xvi; Karpf, 2012a: 7; Kleis Nielsen, 2012: 20; Monberg, 2005; Woolley & Howard, 2016), these links have mostly been theoretical imports, as seen in Nielsen's (2012: 99), Chadwick's (2017: 75), and Anderson's (2013: 173) appropriation of the ANT-based idea of an "assemblage", for example. Similarly, ANT's conceptual import into media studies has also been further discussed by several scholars (Couldry, 2008; Boczkowski & Lievrouw, 2008; Schroeder, 2017; Wajcman & Jones, 2012). Strikingly, the conceptual imports between the fields has not equally carried the suggestion that the fields should be working on common areas of empirical inquiry. Only to the extent that Karpf et al. (2015: 1901) have suggested the potential methodological links between the fields has this been explored, with Kreiss adopting ANT's methodological dictum of 'following the actors' in his study of online electoral campaigning in the US (Kreiss, 2012: 204n; see Latour, 2005: 68). In this thesis, I argue that the common concerns *and* conceptualisations between the two fields, as discussed in the previous section, can be identified and applied, respectively, to the GATEway project's public

engagement process. As such, a combined approach is justified, as the topic can be viewed as a shared focus of empirical research.

At the conceptual level, there have been criticisms of media studies that have drawn on STS, and more specifically, ANT (see Couldry, 2008). These are particularly relevant to chapter five, where I discuss the communicative dimensions of public-making. Media scholar Ralph Schroeder, for example, has attacked studies such as *The Hybrid Media System* (Chadwick, 2017) for relying on ANT's constructivist notions, since the inherent emphasis on local social contexts makes it "impossible to generalise about the role of media" (Schroeder, 2017: 3). However, this arguably misreads the intent of these studies, which in most cases is not to create general theories of media from STS, but rather, to help guide empirically-informed analysis of localised contexts of organised politics, as in the studies of political campaigns and advocacy organisations in the US that I discussed above. Similarly, this is the intention in this thesis.

Finally, STS scholar David Moats (2017) has been critical of the dichotomous application of STS and media theories by communication scholars. As he argues, the empirical world is too often carved up into cultural domains, which are examined by media theories, and material domains, which are analysed by STS theories (ibid: 1). Thus, in many cases, studies focus on either the materiality or the content of media but are unable to study both simultaneously (ibid: 4). This is problematic, since it brackets social reality into certain domains which are too closely tied to certain conceptual foundations. He locates this problem in the theory-led connection between STS and communication studies. To overcome this, Moats argues that at the intersection between STS and media studies the focus of analysis should be shifted to instead be "grounded in the empirical rather than in high theory" (ibid.: 2). Following this proposal, the empirically driven approach in this thesis attempts to collapse the cultural/material conceptual duality into the empirically grounded idea of public-making

practices applied across the participatory, communicative, and organisational dimensions of the GATEway project and its public engagement process. In doing so, it addresses concerns about democratic participation, power-relations, and technology shared by both fields of research.

Finally, I now conclude this chapter with an overview of the organisation of this thesis.

1.6 The Organisation of the Thesis

Chapter two examines the political debate that has surrounded the development of autonomous vehicles. The chapter focuses on the political understandings of AV development, illustrated through a range of different contributions from scholars, journalists, governments, advisory bodies, and commercial organisations. To break down the debate, I suggest three key themes which I argue capture how the politics of AV development has been portrayed and understood. Based on this discussion, I argue that public engagement is overlooked as a valuable or viable form of political action in the context of AV development. Instead, the debate tends to focus on the specific capacities of government institutions and commercial organisations, such as regulation or technical advancements. The public, broadly understood, is therefore regularly seen as a passive actor that is simply affected by these events. By recognising this gap in the discussion this chapter sets up the empirical contribution of this thesis to the broader topical debate, in addition to the contributions to the academic literature discussed in chapter one.

Chapter three establishes the broad political context for this thesis: the UK's CAV programme. The chapter provides a systematic overview of how the UK government has approached the development of CAVs, how the programme has emerged since 2013, and how it is structured as a range of organisations and government institutions. The chapter also outlines the GATEway Project in more detail, as well as the role of CCAV. It is important to

provide this systematic overview to firmly establish the context of the granular descriptions of public-making practice that follows across chapters four, five and six and the descriptions of policy-making in chapter seven.

Chapters four, five, and six shift the account towards a deeper examination of the three dimensions of public-making within the GATEway project, as outlined above. In addition to demonstrating the main argument of the thesis empirically, each chapter is framed by a specific analytic lens that critically interprets the affordances for democratic citizenship across each dimension of public-making.

Chapter four examines the integration of participatory public-making practices into the public engagement process that the GATEway project facilitated. This chapter shows how members of the public were encouraged to perform public-making practices as part of the public workshops and public trials that formed the basis of the project's public engagement process. This chapter informs the main argument of the thesis by demonstrating how citizens were involved in generating knowledge about themselves *qua* a public. As per the concerns with democracy and power established in this introduction, this chapter applies political communication scholar Daniel Kriess's notion of the "technology-intensive" (2016) and STS scholar Sheila Jasanoff's notion of "technologies of humility" (2003a) to analyse the democratic affordances of these practices.

In chapter five, I explore the communicative dimensions of public-making. In this chapter, I focus on how the project engaged in communication, primarily through news coverage, to provide information which had two key purposes: (1) to inform citizens about the development of CAVs as a public concern, specifically in relation to GATEway's activity; and (2) to instruct and encourage citizens to participate in the project's public engagement process. To analyse the communicative dimensions of the GATEway project, and the public-making practices therein, I draw upon political communication scholar Chris Well's notions of "civic

information” and “civic information styles” (2015: 8). The chapter explores the media-related practices (Couldry, 2012: 37) that project members engaged in, focusing on the direct interactions with journalists, as well as the norms which guided the project’s communication strategy.

In chapter six I explore the ways in which key political actors engaged in the planning and management of the GATEway project. Relying on backstage accounts of project planning, project documents, and interviews with project members, I unfold the diverse aspects of the GATEway project and the wider CAV programme and show how they were organised around the government-led strategy. Linked to strong interests in STS and political communication about organisational forms, which I discuss, a normative framework of organisational governance provided by Klijn and Skelcher’s (2007) supports the main arguments of the thesis by illustrating both how the inner workings of the GATEway project instrumentalised the government-led strategy and in doing so considers what this means for the function of democracy. The chapter focuses on the public-making practices in the organisational context which shaped the forms of public engagement found in chapter four and five, by showing how the public was articulated and understood in a strategic sense within the project.

Chapter seven follows on from an analysis of the interactions between project members and government officials at the end of chapter six and turns to an account of the CAV programme’s nexus of operation: CCAV. This chapter is more descriptive in nature than chapters four, five, and six. Based on insightful but limited ethnographic findings, its main aim is to reveal the institutional environment of government in which these respective policy-makers operate. My argument in this chapter is that the practices associated with policy, regulation, and funding decisions are made on the basis of how government official’s expertise is informed by diverse forms of knowledge. These decisions have far reaching consequences for how projects such as GATEway operate. The chapter questions the extent to which the

knowledge generated through GATEway's public-making practices influences the expertise of these government officials. By addressing this, the chapter augments the argument demonstrated across chapters four, five, and six.

In the concluding chapter, I bring the findings and analysis in this thesis together through a discussion of the main themes. It considers the wider implications for democratic politics that the production of knowledge through public-making has, in the way it is used to govern and inform political decisions. This chapter summarised the claims made in this thesis that existent forms of public engagement within GATEway are in many ways considerably flawed. While it is unlikely that CAV development could ever be primarily conducted in the public interest, bound up as it is with so many other competing interests, moving to a more pragmatic discussion, I tentatively propose ways in which democratic practice can be further embedded within AV development and technology enterprises more generally. To achieve this, I suggest some improvements to the public engagement process based upon analysis derived from the critical frameworks used throughout the thesis. Finally, I address the limitations of this research and suggest how this study can be used as the basis for further research in political communication and STS, paving the way for future discussions and analysis.

Chapter Two: The Political Debate on the Development of Autonomous Vehicles

In the previous chapter, I explained the aims and scope of this thesis. This set out the contribution of this thesis regarding a range of concerns from across the academic literatures of both STS and political communication studies. Beyond the academic literature, however, there exists a wider political debate about the development of AVs. In analysing the role of public engagement in the development of CAVs in the UK, it is also important to explain the contribution that this thesis offers to this debate. My argument in this chapter is that the political debate has broadly overlooked the role and importance of public engagement and that it often portrays the public as being passive in the face of events. Consequently, the analysis in this thesis offers a contrasting perspective that advocates a more robust consideration of public engagement with the development of AVs than currently exists within this debate. As proposed in the previous chapter, the topic of this thesis is linked to far-reaching concerns about democracy, power, and technology, and should therefore be considered important to the political debate.

This political debate spans across contributions from researchers, journalists, governments, advisory bodies, developers, commercial organisations, and many others. This has resulted in a large pool of perspectives which has become difficult to succinctly define. Nothing better demonstrates this than the variety of adjectives used to describe the vehicles, which, to name the most common, includes: “driverless”, “self-driving”, and “autonomous”. STS scholar Jack Stilgoe (2018a: 11), who has contributed to the debate through both commentary and academic research, points out that such terms are not just a semantic or technical distinction, but terms that are often tied to a particular “rhetoric of autonomous technology” (Stilgoe, 2018a: 35), as Stilgoe identifies within his own summary of the debate.

This indicates a suitable starting point for a further exploration of the debate in relation to the aims and scope of this thesis. Therefore, in this chapter, I propose three broad themes that I argue characterise the understanding of political actors within the debate: (1) the persistent use of a realist – evangelist dichotomy to describe different actors; (2) a narrow focus on the role of governments and commercial developers as actors; (3) the notion of a currently sceptical but ultimately rational public awaiting education on the issue. The overarching point is that public engagement is understood in a very narrow sense which belies the complex dynamics demonstrated later in this thesis through the analysis of public-making.

The themes that I provide here are proposed on a hypothetical basis. While there is undeniably scope for in-depth content and discourse analysis of the debate that can ascertain the political representation of AVs in more granular and empirically rigorous detail, this is not the intention of this chapter. Rather, through discussion, the only purpose is to demonstrate that considerations of the role and importance of public engagement are largely absent from the debate. This is based on my own interpretation of a debate that I have followed closely since mid-2015. My fundamental understanding of events is based upon a chronological record, in the form of collocated news articles, spanning from 2010.

Before an exploration of the three key themes, this chapter needs to tackle two important preliminaries. The first is to provide a fundamental definition of AVs to help define the terms of discussion within this chapter (and across the thesis). The second is to dispense with the well-known ethical debate involving the ‘trolley problem’, as it is a problematic pole of attraction within the debate.

2.1 What is an Autonomous Vehicle?

There is often a mistaken assumption that there exists a shared understanding of AVs. Proponents of AV development regularly make broad claims about the socially progressive

potential of the vehicles, without necessarily defining what they are or how they work. Therefore, it is useful to grasp from the outset a fundamental understanding of what it is that is being discussed to help define the terms of discussion.

An autonomous vehicle is any vehicle that can guide itself through an environment with significantly reduced human intervention. To understand how it does this, autonomous vehicles need to be understood not as a single technology, but as a collection of various technologies. These technologies are brought together to perform the various driving tasks that humans currently carry out. To navigate the environment, AVs use a combination of technologies, including: LiDAR (this stands for Light Detection and Ranging and is a form of laser scanning); radar; high-resolution motion-sensitive cameras; odometric, infrared, and ultrasonic sensors; GPS; digitally-rendered prebuilt maps; vehicle to vehicle communication; and an internal software CPU. Not all of these technologies are always present in any given AV, nor is this list exhaustive. Many different companies have produced their own iterations of these technologies – fiercely guarding their intellectual property in a race to market a fully-working system⁸. Because of this amalgam, it is better to think of AVs not as individual objects but as advanced “automated transport systems” (Alessandrini, et al., 2015), closely connected and integrated with urban infrastructures (ibid.: 146). Similarly, Bryans has described AVs as the “Internet of Automotive Things” (Bryans, 2017: 188) which, like the Internet of Things is a “permeable network”, formed of “large, complex vehicles and infrastructure elements” (ibid.: 189). A key point is that there are many ways of applying these technologies, for example in agriculture (Brunn and Sierla, 2008), which go well beyond the narrow conception of ‘driverless cars’. The term vehicles is therefore used consistently in this thesis because it captures this wider range of applications.

⁸ In 2018, Waymo and Uber settled out of court after a protracted legal battle over trade secrets. Waymo filed a lawsuit against Uber in 2017 accusing it of stealing its LiDAR technology, focusing on the actions of Anthony Levandowski, a long time Google engineer who moved to Uber.

Nearly all forms of autonomous vehicle being developed adhere to SAE International's universal technical standard, known as J3016⁹. Produced in 2014 and revised in 2016, the standard provides a taxonomy of "the full range of levels of *driving automation* in on road *motor vehicles*" as well as "functional definitions of advanced levels of *driving automation*" (SAE International, 2016: 1, italics in original). The standard is used almost exclusively across the world, including by the NHTSA, which adopted it in October 2016. As a technical standard, it effectively defines autonomous vehicles and most importantly, their stage of development. There are six levels of automation, ranging from 0 (no automation, in which a human driver operates all aspects of the driving task) to 5 (full automation, in which an automated driving system operates all aspects of the driving task). For context, Tesla's controversial but widely publicised Autopilot is currently a level 2 system.

The range of the vehicles I encountered during my fieldwork within the GATEway project was claimed to be ranged between level 2 and level 4. J3016 is useful not only in a technical sense, but also as a way for developers to promote and publicise their vehicles to the wider world. National governments eager to portray their technological and economic credentials (Schreur and Steuwer, 2016; see also Campbell, 2017), will often seek to develop or attract the testing of vehicles towards the top of the J3016 taxonomy. To date, however, nobody has produced a level 5 AV, but it remains the ultimate goal in an apparent global race between different developers and national governments to mass market AVs. However, many commentators have recently suggested that this will likely never happen (Orlove, 2017).

This summary provides a fundamental understanding of what an AV is. I use this as the basis for understanding in this chapter and throughout the thesis. I now turn to a dismissal of

⁹ The standard's full title is *Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems*.

the use of the ‘trolley problem’ within the debate, to clear space for a more directed discussion of the three themes that I propose characterise the political debate.

2.2 The Trolley Problem is a Problem

One of the most popular areas of debate has been the ethical concerns surrounding ‘driverless cars’. This area of the debate has been popularised enormously thanks to the view that driverless cars appear to be making the trolley problem – a famous thought experiment associated with the philosopher Philippa Foot – an everyday reality (see Achenbach, 2015; Bonnefon, et al., 2016; Donde, 2017; Greenemier, 2016; Lin, 2013). The trolley problem is as follows: there is a runaway trolley heading down a track and there are five people on the track who will be killed by the trolley, but there is an option to flick a lever and divert the trolley into a different track, where there is only one person on the track. The ethical problem lies in the decision, do you do nothing and let five people die, or act and knowingly kill one person? Alarming, for commentators, in the case of autonomous vehicle the decision and the moral imperatives they encapsulated would need to be made by a software programme.

The most immediate problem with this idea is that it has buried the debate about AV development in tenuous assumptions about the technology’s as yet to be proven capabilities. Moreover, it has placed an isolated emphasis on the vehicles themselves and what *they* should do, obscuring human involvement (Ganesh, 2017). Thus, as the wider debate has progressed, many commentators have increasingly taken issue with the application of the trolley problem (see Silver, 2017; Iagnemma, 2018). Taking the 2018 Tempe incident involving an Uber vehicle¹⁰ – a perfect example of how the trolley problem has been applied in theory –

¹⁰ This incident occurred in Arizona, in March 2018. A vehicle operated by Uber failed to stop as 49-year-old Elaine Herzberg crossed the road with her bike. The vehicle collided with Herzberg and she later died of her injuries in hospital. The incident was noted for the release of dashcam footage, which was widely circulated, which showed the incident right up until the moment of impact.

philosopher of technology Ian Bogost (2018) demonstrated that none of variables involved in the crash can be addressed through the application of the trolley problem. The basic premise is that the trolley problem is far too contrived and precise to have any application to the complexities of actual vehicle use. As such, Bogost (ibid.) argues that there is a clear “problem with the trolley problem” – which, put bluntly, is that it is a terrible way of understanding the issue of AVs.

However, its continued presence is therefore a highly problematic aspect of the wider debate. The trolley problem is more than a misunderstanding or an unwanted distraction from other aspects of the debate. It is actively misconstruing the debate around AVs by making them seem “already present, reliable, and homogeneous” (ibid.) when they are still in development. This is in fact dangerous, as Tannert (2018) has argued, because these expectations of autonomy are being applied to vehicles in use, such as Tesla’s, which are not even close to being this technically capable. More concerning still is the way that the trolley problem pervades the thinking of key decision makers, such as the American judiciary, as Donde (2017) has claimed. Because of these issues, the trolley problem is rejected as a way of understanding the development of AVs within this thesis. Rather, in analysing the role of public engagement, it follows Bogost’s (2018) assertion that “citizens, governments, automakers, and technology companies must ask harder, more complex questions”.

As a final word, rejecting the trolley problem should not discount the ethical debate entirely, which is one of Bogost’s key points. In this space, ethicists such as Patrick Lin (2016) have explicitly turned away from the trolley problem and explored the more nuanced and practical ethical questions around AVs, such as impact on local neighbourhoods the navigation systems of AVs could have.

With these two important preliminaries now dealt with, this chapter has cleared the space for a concentrated discussion of the three broad themes that I argue characterise the understanding of political actors within the debate – to which I now turn.

2.3 The Public, Political Actors, and AV Development: Three Key Themes

The overarching point in this section of the chapter is that, within the political debate surrounding the development of AVs, public engagement has been overlooked or otherwise understood in a very narrow sense. This understanding is at odds with the complex dynamics demonstrated through the analysis of public-making offered later in this thesis. By proposing three key themes which illustrate this point, I suggest the gap in the broader political debate into this thesis contributes empirical findings on the role of public engagement with the development of AVs. Ultimately, I argue, the political debate must take public engagement with AV development into greater consideration.

As an issue, the development of AVs has received extraordinary attention. This is seen in the contributions from many different perspectives across the broad debate, including those of social and political scientists (Lin, 2013, 2016; Marres, 2017a; 2017b; Schreurs & Steuwer, 2016; Stilgoe, 2017a, 2017b, 2018a, 2018b) journalists of various orientation (Beckford, 2017; Felton, 2018; Hawkins, 2018a, 2018b; Marshall, 2017a, 2017b; Naughton, 2017; Woolmar, 2016, 2018a, 2018b), governments (US Department For Transportation, 2017a, 2017b; DfT, 2015a, 2015b; NHTSA, 2016), advisers and advisory bodies (Cohen, et al, 2017; GHSA, 2017; House of Lords Science and Technology Committee, 2017), commercial organisations (Google, 2010; Iagnemma, 2018; Waymo, 2017a), as well as transport (Özgüner et al., 2011; Skippon & Reed, 2017) and policy experts (Bagloee, et al, 2016; Fagnant & Kockelman, 2015; Gibson, 2017). This broad attention has set apart AV development as a technology issue,

though it is difficult to say why exactly the issue has become so prevalent and widespread. One compelling suggestion is that the complexity and multi-faceted nature of the innovation means that it is broadly relevant to many different interests. This finds support in the following chapter, where I reveal the numerous different actors involved in the UK's CAV programme.

Exploring the three themes that I propose here provides a more integrated understanding of how AV development has been viewed in a political sense and bridges some of the missing links between these various perspectives. This is of course an imperfect exercise and I make no claim to be providing an encompassing review of the entire debate. As stated, there is a broader need to produce academic research that can provide a more granular understanding of this debate, particularly where aspects of the debate can be shown to influence decision-makers. I now turn to the first of the three themes: the persistent use of a realist – evangelist dichotomy to describe different actors.

2.3.1 *Contesting a Utopian Future: “Evangelists” vs “Realists”*

We're now working on making this a commercial service available to the public. People will get to use our fleet of on-demand vehicles to do anything from commute to work, get home from a night out, or run errands. Getting access will be as easy as using an app; just tap a button and Waymo will come to you and take you where you want to go.

- John Krafcik, CEO of Waymo, November 2017¹¹

Representatives from prominent commercial developers, such as John Krafcik, regularly make broad claims about the socially progressive potential of AVs. These claims typically emphasize the public benefits of widespread AV use, from reducing road traffic accidents, to providing economic opportunities, to simply making transport more efficient and accessible for more

¹¹ Reported in Ohnsman (2017)

people. In this sense, AVs are cast as a big solution to big social problems, prompting many commentators to use the term “revolution” to describe this powerfully imagined future where AVs are widely used (Ashley, 2017; Hawkins, 2018a; Tett, 2017). In this future, human interaction with AVs is imagined as frictionless; it is a world where you just ‘tap a button’, as Krafnik envisages. These visions of the future have been a driving force in the development of AVs, fuelling both a political conviction in the technology’s potential to make society a better place and as a primary selling point for the vehicles, as illustrated with Waymo in the prologue.

These positive visions of the future are clearly built on the back of what Barbock and Cameron (1996) famously termed the “California ideology” – a belief in the emancipatory and politically progressive potential of digital-enabled technologies. Underling this is the promise of drastically reduced road deaths, providing proponents with a set of moral vindications on which to propel their innovations. This is exemplified by the persistent promises of Waymo (2017a, 2017b), as well as influential figures such as Tesla CEO Elon Musk, who claimed in 2017: “almost all cars produced will be autonomous in 10 years [...] That’s going to be a huge transformation” (reported in Boyle, 2017). This thinking has also demonstrably made its way into government transport departments, who have begun to echo claims about road safety that chime well with perennial public policy objectives (US Department of Transportation, 2017). Optimistic support can also be seen in career veterans of automobile manufacturing, such as Mary T. Barra, the experienced CEO and Chairman of General Motors (GM), who has stated that “we believe the societal benefits and business opportunities of autonomous vehicles will be significant” (reported in Symkowski, 2017) in relation to GM’s own AV development programme.

In response, many voices have contested this vision of the future. These critics often position themselves as the “realists”, who see through the illusionary promises of the “evangelist” developers (see Naughton, 2016; Woolmar, 2018b). These contestations take

many forms. For example, some have identified how the technology threatens traditional ways of living (Greenhouse, 2017; Hook, 2017) – a natural riposte to the revolutionary logic of the technology’s main advocates. More unexpected, in the context of evolving terrorist tactics, concerns have also been raised that AVs could be controlled remotely¹² and used in attacks (McCarthy, 2017). Responses have also come in the form of sensationalist and speculative stories, featured in tabloid publications, which have mirrored the optimistic rhetoric with dystopian stories such as “Revenge of the Robocars” (Beckford, 2017) which imagines a deadly scenario in which armed gangs rob a disabled vehicle’s occupants. The contestation of the utopian future vision of AVs is exemplified by Christian Wolmar, a well-known critic of AV development. Wolmar (2016), a transport journalist, has denied that the vehicles are imminent by citing the technical risks and continually delayed deadlines, arguing that “the revolution, when it comes, will not be driverless”. Raising concerns about their safety, Wolmar has characterised the vehicles as “driverless death traps” (Wolmar, 2018b) in response to episodic accidents, most notably in 2016 and 2018, in which a Tesla¹³ and Uber vehicle, respectively, were involved in fatalities. These incidents sparked widespread concerns about the validity of the central claim that AVs are safer than human drivers.

Many commentators have latched onto this criticism and proposed dichotomous understandings of the future in which either the realists or the evangelists are right (Dewson, 2015; Margolis, 2017; Plautz, 2016; Wadhwa, 2017). This is illustrated by how the commentator Wadhwa (2017: xiv) frames the development of the ‘driverless car’ within two possible futures, a “utopian *Star Trek* future in which our wants and needs are met” and a “*Mad Max* dystopia: a frightening and alienating future”, or similarly, how Margolis (2015) provides

¹² The ability to remotely hack commercially available vehicles was powerfully illustrated by two hackers, who remotely exploited a Jeep Cherokee whilst it had a *Wired* Journalist at the wheel traveling on the highway (Greenberg, 2015).

¹³ The incident in question occurred in Florida, in May 2016. The incident involved a Tesla Model S, occupied by a man named Joshua Brown, which failed to ‘see’ a white truck crossing the lane in front of it while in Autopilot mode. The vehicles collided at 74mph and Brown died at the wheel.

a variety of pros and cons which flatly divides the social consequences of AVs into two distinct groups, also suggesting an either/or future.

Consequently, a dichotomous evangelist vs realist scheme has emerged within the political debate as a way to understand the development of AVs. In this scheme, political actors are either understood as categorically and unequivocally for or against AV development. This scheme is usually applied by self-described realists to the political actors from government or commercial companies, upon whom the consequences of AV development are viewed as incumbent.

This scheme is problematic, however. For one, it does not allow for ambivalent or dynamic perspectives since it assumes that all developers or government officials are simply ideologues. In the empirical context of this thesis, this is an untenable position. Secondly, it assumes that both sides are clashing over a definitive vision of the future, when such a future can only be understood speculatively. Thirdly, what active role the public has, or could have, is rarely acknowledged within this scheme. Instead, the public is mostly cast as being subjected to the actions of others and thus not as an active participant in the direction of AV development. This either takes the form of a public that is negatively affected by the decisions of governments and corporations acting negligently or in their own interests, as in the realist vision, or a public that easily buys into and accepts the development of the vehicles, as in the evangelist vision.

In response, it is better to see the development of AVs in Stilgoe's terms, as "a technology already with us and a work-in-progress, laden with promise for what it might become" (Stilgoe, 2018a: 26) and to focus instead on the current processes by which these various promises are being pursued. As Stilgoe points out, "self-driving cars are driven by social processes of goal-selection, machine-making, governance, use and their encounters with the world around them" (ibid.: 35). The idea that the vehicles 'already exist' or 'are coming' sets up the political dimensions of AVs as predetermined, meaning society must adapt to the

vehicles, erasing from the debate the possibility that public engagement could also shape the development of AVs. Getting past this contestation of a utopian future allows the debate to step outside of evangelist/realist dichotomy which has obscured public engagement as a possible way in which the development of AVs could be shaped. This opens up a consideration of the wider variety of perspectives and political actors involved in AV development, as this thesis demonstrates.

Building on this point, I now turn to the second theme: the narrow focus on the role of governments and commercial developers as actors.

2.3.2 Governments and Commercial Developers as Primary Political Actors

Today's vehicles are so technically advanced that there is the real prospect that driverless cars could be on our roads in a relatively short amount of time. But what makes this so intriguing isn't just the technical challenge. It's the cultural challenge [...] Getting people to embrace and trust something that at first may feel alien. But if and when it is adopted, this evolution has the power to profoundly change our lives. Not just making driving safer and easier. But reducing congestion. Making people more productive. And therefore helping boost our economy, too. So, for me, driverless vehicles aren't just a challenge for engineers. They're also a challenge for us politicians. A challenge for us all to solve.

- Clair Perry MP, as U.K. Parliamentary
Secretary of State for Transport, October 2014¹⁴

Claire Perry's comments, made in the early stages of the UK's CAV programme, are indicative of the view that governments and commercial developers are the key drivers behind AV development. Within this view, AVs are often seen as a multidimensional 'challenge' by governments and commercial organisations, but one that can ultimately be 'solved', unleashing social, economic, and political benefits. This has often been couched in a narrow

¹⁴ Reported in BEIS, et al. (2014)

consequentialist perspective that emphasises the huge number of potential lives saved as a key reason to develop AVs (Lafrance, 2015; Lipson & Kurman, 2016; RAND Corporation, 2017; Samit, 2016) – a perspective at the very heart of Google’s (2010) enkindling efforts at the turn of the decade. Over the last decade, as powerful commercial organisations such as Waymo have emerged, it has of course made sense to critique their actions. Waymo has led the way in AV development, but has also recently acted as a political actor in its attempt at ‘public education’, as I illustrated in the prologue. Waymo has been joined by numerous other commercial organisations keen to develop their own version of AVs, from General Motors and Tesla, to Baidu in China. This had led to a growth in concern and interest about their actions.

For example, the role of commercial organisations and governments is especially prevalent within the policy literature. There are numerous policy papers on AV development (Bagloee, et al, 2016; Fagnant and Kockelman, 2015; Gibson, 2017; Khan, et al., 2012), with many interlinking citations that suggests a febrile and widely read range of discussion. The policy literature is strongly framed around the issue of ‘challenges’ to adoption and the implications that adoption may have for policy-makers, drawing on the same language as the policy-makers it is aimed at. The policy debate is largely aware that public scepticism towards AVs is significant, often citing it as one of the key ‘challenges’ that AV development faces. The continued referral to these challenges within this literature fits well with how governments and technology companies think but reflects a narrow conception of how AV development could be approached. Citizens are less likely to see AV development as a challenge to be solved by *them*, because they are not provided the resources needed to contribute, thus reinforcing the rhetoric of exclusion that I am suggesting exists across the political debate. Since the public is seen in these oppositional terms as a challenge for governments and commercial organisations, a paternalistic and even forceful narrative of AV development that is inherently exclusive emerges, leaving little room to consider how citizens could shape the development of AV

through engagement. Howard and Dai (2014: 18), for example, argue that understanding public opinion of AVs can “help industry tailor its product and marketing to appeal to the greatest number of people, and can help proponents of this technology frame their message”. Where the public is considered, ideas about how to engage with the public remain fixated on education, as Stilgoe (2018a: 45) notes and as was seen in the prologue. As such, developers often envisage deficits in public understanding as holding back the “unarguable potential” of AVs (ibid.: 44).

This focus on commercial organisations and governments as the primary actors involved in the development of AVs is largely replicated across the political debate. Many perspectives have focused on observing and deliberating the activity of government and commercial organisations, questioning many of these activities and the approaches to AV development ingrained in them (Cohen, et al, 2017; Financial Times, 2018; GHSA, 2017; Griffin, 2017; Hook, 2017; Lee, 2018; Scribmer, 2018; Wadhwa & Salvenker, 2017; Woolmar, 2018a, 2018b). The internal discussions within this debate have covered a complex territory, with many caveats. US-based journalists in particular have been at the forefront of this questioning, forming an investigative community. *Ars Technica* investigated what will happen if you are pulled over by law enforcement who want to retrieve the data from your vehicle (Farivar, 2018), while *The Verge* has highlighted how the pace of legislation is ahead of public acceptance of the vehicles (Hawkins, 2018b). Nonetheless, it is provided within a narrow frame that focuses on governments and commercial organisations, leaving little room to discuss other forms of activity which could shape the development of AVs, such as public engagement.

Looking to the actions of commercial developers and supporting governments, the debate has also been infused with a strong technological determinism. Commentators frequently lead their contributions with the unassessed claim that “autonomous vehicles are coming” (for instance Dewson, 2015; Frishman & Selinger, 2018; Kerrigan, 2017) or the

stronger claim that the “the technology exists” (Tovey, 2017). These claims often find supportive evidence in the growing number of alliances between technology companies and automobile manufacturers working together to combine their resources and produce AVs that can be taken to market. Here, Stilgoe (2018a: 34) has again noted the influence on these views of what he calls “the public performance of inevitability” in the form high-profile tests by these companies. This simply reinforces the narrow frame of political agency, however, as these views fail to consider the influence of the public on the arrival of these vehicles. Thus, claims that the ‘technology is coming’ reflect a timid acquiescence to the exclusive power of commercial organisations.

Commentary on the role of government has highlighted the regulation of AVs has been another focal point of debate. In the US, for example, journalists based in Washington D.C have kept a firm eye on the legislative processes in Congress – although the comparative *Automated and Electric Vehicles Bill* in the UK has largely gone unreported.

There have been different views in the commentary about what kinds of regulation and governance are needed or desirable (Lee 2018; Marshall, 2017a; Mason, 2016; Scribner, 2018; Taihagh and Lim, 2018). Given the relative lack of existent legislation many of these contributions have sought to set out forms of regulation and governance that can address the acknowledged problems that come with the development of AVs. On the issue of employment, for example, Beede, Powers, and Ingram (2017: 19) have produced findings that suggest “workers in some driving occupations might have difficulty finding alternative employment” if they lose their jobs to AVs, while political commentators such as Paul Mason (2016) argue that we need to “prepare, plan and regulate for the eradication of most driving work”, suggesting universal basic income as one option. Others have argued that the trajectory of current forms of regulation are broken (Lee, 2018), because they fail to anticipate the ride-sharing business model that companies such as Waymo and Uber are pursuing. Accidents also

prompt concern about the regulation and governance of AVs, with a coalition of safety advocates and consumer groups emerging after the Tempe accident to warn Congress that the development of the vehicles was not being regulated enough (Laris, 2018).

Within the academic debate, Stilgoe (2018a, 2017b) has explored the governance of what he terms “self-driving cars” from a “responsible innovation” perspective, in which the public interest is the main priority (see Stilgoe, et al., 2013). Using the Joshua Brown fatality as a key example, as well as the public debate on the commercial approach to AV development, Stilgoe (2018a: 26) considers the “emerging politics of machine learning and the relative problematisation of algorithmic outcomes and processes” in relation to the issue of governance, arguing that governance is a key challenge in the development of self-driving cars. Drawing on the contributions of Jasanoff (2003a), Stilgoe (2018a: 43) argues that democratising how we learn about the vehicles and encouraging constructive engagement with the processes of machine learning central to AV development, are key to governing the emergence of AVs in the public interest. In this regard, Stilgoe introduces to the debate on governance a much stronger focus on public involvement. Stilgoe’s argument about democratisation points to how to get beyond the oppositional view of governments and commercial organizations, as a form “good governance [that] will mean resisting the privatisation of learning that is happening” (ibid.: 44). However, Stilgoe does not clearly define the mechanisms that would enable this democratisation in the case of the development of AVs. What needs to be more clearly understood is how public engagement works in practice in the issue of AVs, which this thesis attempts to do.

Overall, the political debate has focused on the decisions that governments and commercial organisations, as political actors, have been making. This had led to limitations within the debate. For example, neither side of the debate considers the asymmetrical ways in which the development of AVs will be distributed across different parts of the world, for

example, or offer concrete solutions for how the issue can be shaped that goes beyond the actions of governments or commercial organisations. I argue that public engagement can be articulated far more clearly as a relevant process by which to make decisions.

I now turn to the final identified theme: the notion of a sceptical but ultimately rational public awaiting education on the issue. This theme interlinks with the previous two themes, as the implicit model of the public that I argue is embedded within both.

2.3.3 *Convincing a Sceptical Public*

One of the things that I should mention that frankly has been quite disturbing for me is the degree of media coverage of Autopilot crashes, which are basically none relative to the paucity of media coverage of the 1.2 million people that die every year in manual crashes. [...] Because, and you really need to think carefully about this, because if, in writing some article that's negative, you effectively dissuade people from using an autonomous vehicle, you're killing people.

- Elon Musk, October 2016¹⁵

Public opinion is widely discussed across the political debate surrounding AV development. Within the debate, it is commonly acknowledged that there are significant levels of public scepticism towards the development of AVs. Opinion polls have consistently shown that in the US, where the technology is most developed, and in the UK, the focus of this thesis, people are uncomfortable with the prospect of using the technology (Campbell, 2016; Lienert, 2018; Pew Research Centre, 2017). Many of these polls have focussed on the notion of *using* the vehicles. However, there have been numerous surveys and studies which have explored public opinion of AVs in greater depth, revealing levels of scepticism attached to a variety of different issues

¹⁵ Reported in Griffin (2016).

(Bansal & Kockelman, 2017; Howard & Dai, 2014; Kyriakidis et al, 2015; Schoettle & Sivak, 2014). According to a study by Kyriakidis (et al, 2015: 139) (N=5000) “public opinion appears to be diverse”, with portions accepting the technology, and others voicing concerns, finding that data sharing was a prevalent concern. More specifically, the Pew Research Centre (2017) (N=4135) found that 81% of the respondents expected job losses because of AV. Overall, most surveys demonstrate that the public is sceptical. The results of these surveys have been widely applied in political debate, with influential organisation such as the GHSA (2017: 18) and the National Highway Traffic Safety Administration (2016: 3) citing these surveys as definitive representations of public opinion and thus the basis for forms of public engagement predicated on education. As I show in the coming chapters, this notion also existed within the GATEway project.

As shown in the prologue, chapter one, and the comments made by Elon Musk, public opinion is considered extremely important to the adoption of the technology. Musk’s comments go much further than most but are attached to the same basic principle: the technology is socially beneficial, and this just needs to be demonstrated so that a sceptical public can understand what those benefits are. Many proponents therefore assume an information deficit within the public. By informing and educating the public, as in Waymo’s public education campaign, there is an implicit assumption that the public will rationally accept the facts. Moreover, this assumes that neither the function of the technology nor the potential social benefits of AVs are under question. As already noted above, AV development companies like Uber and Tesla tend to envisage deficits in public understanding as holding back the “unarguable potential” of the technology (Stilgoe, 2018a: 44). This view is often replicated within the political debate, when commentators ask what these companies can do to convince the public or to keep them on side, often without questioning what is being proposed. For example, Howard and Dai (2014: 7) argue that companies and governments need to be

proactive in shaping “public attitudes towards self-driving cars [as they] become increasingly important as the public shapes the demand and market for the cars” and the “policies that govern them”. Interlocking with the previous theme, this view firmly links the idea of public opinion to the potential actions of states or companies.

The problem with this show and tell model, however, is that it assumes public engagement need be nothing more than a transmission of the correct information from the developers to the public. As the sociologist Everett Rogers (2003: 7) has illustrated, this notion that “advantageous innovations will sell themselves”, as the potential adopters who it is aimed at realise the “obvious benefits of a new idea”, has historically been mistaken. These assumptions that the involvement of the public is based upon education and providing the correct information once again overlooks wider or more complex forms of public engagement. It assumes a linear process in which as the technology develops, so too does supportive public opinion. As this thesis will demonstrate, however, the actual processes involved in public engagement are far more complicated than this.

I have now explored three themes of the debate: (1) the persistent use of a realist – evangelist dichotomy to describe different actors; (2) a narrow focus on the role of governments and commercial developers as actors; (3) the notion of a currently sceptical but ultimately rational public awaiting education on the issue.

2.4 Conclusion

This chapter has proposed and explored three key themes within the broad political debate surrounding the development of AVs in relation to the aims and scope of this thesis’ analysis of public engagement with AV development. These themes have encompassed:

- (1) the persistent use of a realist – evangelist dichotomy to describe different actors;
- (2) a narrow focus on the role of governments and commercial developers as actors;
- (3) the notion of a currently sceptical but ultimately rational public awaiting education on the issue.

Based on this discussion, the overarching argument has been that the role of public engagement and its significance is both overlooked or understood in a very narrow sense. This belies the complex dynamics demonstrated through the analysis of public-making that follows throughout this thesis. This lack of attention comes despite the efforts of Waymo, that I explored in the prologue, and the evident importance that the UK's CAV programme has placed on public engagement. The following chapters therefore develop the understanding of public engagement, investigating its role in AV development as a series of “problems of concrete technologies, practices and institutions in specific places and circumstances with particular challenges and limitations” (Hackett, et al., 2008: 3).

Nonetheless, the wider political debate surrounding the development of autonomous vehicles contains a dynamic and insightful range of perspectives and arguments. It is not my intention to completely dismiss or criticise the entire debate. The inability to analyse or contend with public engagement as a key issue is a specific criticism. In many ways, the wider debate has achieved effective coverage and provided responsible scrutiny. As one journalist put it, the face of anti-media comments made by Elon Musk, “it’d be wholly irresponsible to avoid scrutinising whether [autonomous] technology can perform in the real world” (Byers, 2018). In this vein, there is still a large amount of potential scrutiny which can be applied to the role of public engagement in the development of AVs and a wide scope to introduce political analyses of events centred around the question of democracy and power, as I explored in chapter one (see also Wilsdon, Stilgoe, and Flanagan, 2018).

In the next chapter, I provide an overview of the UK's CAV programme, setting out a systematic overview of how the programme has approached the development of CAVs, how the programme has formed since 2013, and how it is structured as a range of organisations and government institutions. The following chapter also sets out the research strategy and methods used in this study.

Chapter Three: A Systematic Overview of the United Kingdom's Connected and Autonomous Vehicle Programme

This chapter moves from the political debate that has surrounded the development of AVs and back to the empirical focus of this thesis: the UK's CAV programme. Section 1.1 of the thesis briefly introduced the CAV programme. This chapter builds on the information provided in that section and provides a systematic overview of the CAV programme. This overview takes into the account the main approach of the CAV programme, its emergence since 2013, as well as its institutional and organisational structure. This chapter also provides a detailed description of both the GATEway project and CCAV, as the specific empirical focuses of the thesis.

It is important to provide this systematic overview of the CAV programme to firmly establish the context of the detailed descriptions of public-making practice that follows across chapters four, five and six and the descriptions of policy-making in chapter seven. The accounts in these chapters therefore function on the basis of the information provided in this chapter.

3.1 Connected and Autonomous Vehicle Development in The United Kingdom

3.1.1 A Collaborative Approach

In 2017, the UK's CAV programme consisted of “over 50 projects with around 150 partner organisations” (CCAV, 2017a: 4), increasing to more than 70 projects by 2018 (CCAV, 2018b). The organisations involved in these projects work together in consortiums under the guidance of the UK Government, in a situation described by CCAV (2017a: 4) as “collaborative”. This was a key feature of the CAV programme, and a significant factor in the organisational dimension of public-making, as I explain in chapter six.

While this description has a rhetorical element, in that it is showcasing the UK's CAV programme, it also realistically reflects the UK's wider political economy. There are a limited number of UK-based automobile or technology companies on the scale of General Motors or Google¹⁶. However, there are many small and medium enterprises (SMEs), technology start-ups, and research centres operating across the UK with specialist resources and capabilities that can be applied to the development of AVs. Oxbotica and Fusion Processing, for example, are two commercial SMEs focused on the development of AVs that have emerged in the UK in recent years. Regarding research centres, organisations such as the Transport Research Laboratory, a central organisation in the GATEway project, have a long history in British transport innovation. The key point is that by themselves, however, none of these organisations have anywhere near the capacity or resources to independently produce, test, and sell AVs in the UK on the scale of companies like Waymo or Baidu. Thus, as CCAV states in its report (ibid.), “the nature of emerging autonomous and connected vehicles requires participation from very many disparate sectors to come together to explore and develop solutions”. The adoption of a collaborative approach to CAV development in the UK was therefore seen by many within the programme as a necessity, borne out of both the technology's complexity and the UK's political economy.

3.1.2 A Government-Led Strategy

By recognising this situation and by coordinating this base of SMEs, start-ups, research centres and other organizations through legislation, regulation, and funding, the UK government subsequently emerged as a dominant political actor in the development of AVs within the UK.

¹⁶ The UK does possess significant automobile and technology sectors. They are, however, mostly owned by foreign conglomerates. Arm Holdings, for example, is a market dominant producer of smartphone processors, and is owned by the Japanese conglomerate SoftBank Group. Vauxhall motors, a highly recognisable manufacturer in the UK, is in fact owned by the French automotive giant Groupe PSA.

In this role, the UK Government, through the actions of CCAV and Innovate UK, has aimed at supporting “the research, development, and deployment of connected and autonomous vehicles” (CCAV, 2017b). This has been approached through a light-touch approach to regulation, as laid out, for example, in the publication of DfT’s regulatory review on the technology (2015a, 2015b) and its *Code of Practice* (2015c), the latter of which provided guidelines for immediate public testing. However, despite this approach to regulation, the government retained significant control over the organisations within the CAV programme through the implementation of public policy, funding, and other strategies, with the regulatory review providing a total of thirty-one actions for the government to take, with an explicit focus on the advancement of legislation (DfT, 2015a: 34-38). Therefore, as well as being collaborative, the approach in the UK also became distinctively government-led as it emerged.

The most salient of the strategies being implemented is the widely encompassing Industrial Strategy. Like many other areas of the UK economy, the development of CAVs has recently become integrated into the UK Government’s Industrial Strategy (see HM Government, 2017: 51, 201, for specific reference). According to the government’s most recent white paper, as of August 2018, the strategy is based upon five key foundations: to be “the world’s most innovative economy”; to provide “good jobs and greater earning power for all”; to conduct a “major upgrade to the UK’s infrastructure”; to be the “best place to start and grow a business”; and to cultivate the growth of “prosperous communities across the UK” (ibid.: 14). The Industrial Strategy has emerged as a key area of government policy since Theresa May became Prime Minister in 2016, as was reflected in the renaming of the Department of Business, Innovation and Skills to the Department for Business, Energy and Industrial Strategy. Deeper than this, as I suggest in chapter seven, the strategy is a day-to-day, broad framework that officials, especially those in Innovate UK, use for understanding the direction and purpose of the CAV programme.

As well as the Industrial Strategy, government reports and press releases also refer to the perceived social and economic benefit tied to the technology itself, which guide the activity of the CAV programme in a strategic sense. For example, in the executive summary of DfT's regulatory review (2015a: 14), it is stated that the "government recognises the significant benefits that driverless and automated vehicles will bring". Likewise, according to a recent press release (CCAV and Innovate UK, 2018), organisations were encouraged to apply for government funding to develop CAVs and their "potentially huge economic and social benefits". According to "Tim", a senior civil servant within CCAV, the policy centre's position between both DfT and BEIS meant that the social and economic benefits were intentionally aligned with the capacities of each department. As he explained it to me in 2016: "the economic benefits, that's BIS [BEIS], and the social benefits, that's transport, and the idea is bringing those together" (Interview 9, July 2016). In elaborating on what these social and economic benefits were, Tim identified public safety and access to mobility as key social benefits, and efficiency and productivity as key economic benefits. Importantly, Tim also placed these in relation to existing policy problems, such as the UK's persistently-low economic productivity following the 2008 financial crisis. As I will reveal in later chapters, these social and economic benefits and their importance were also recognised by the organisations involved in GATEway, demonstrating the primary argument of this thesis by providing evidence of the project's facilitative role in this regard.

It is also important to understand the discursive features of this government-led strategy. Discourse is understood in this thesis as "patterns and commonalities of knowledge" that are reified in specific texts (Wodak, 2011: 39). In terms of the analysis in later chapters, this allows this thesis to interpret how and where the government-led strategy emerged at the local-level of the GATEway project, as further evidence in support of the central argument of the thesis.

Within the government-led approach, the economic benefits of CAV development were often situated discursively as both a commercial opportunity for UK businesses and as a demonstration of the UK's international reputation as a technology hub. As Schreurs and Steuwer's (2016) comparative study of national government's approaches to AV development has shown, many governments have acted to competitively present AV development in this way, in line with their own strategic interests. In this sense, we may think of the particular discourses surrounding the economic (and social) benefits of CAVs as evidence of a "strategic narrative" (Miskimmon, et al., 2013) that is being used by the UK Government to project power on the global stage. In the context of this study, the dispersal of these discourses among GATEway highlights the UK government's strategic influence over the projects in the CAV programme.

First, regarding the commercial opportunities, the UK Government regularly refers to the development of CAVs as a source of "considerable business opportunities", as well as having "huge potential in emerging markets and new supply chain opportunities" (CCAV, 2017a: 4). Interviews with Transport System Catapult and Innovate UK officials, government reports, and calls for funded proposals, all reveal how stimulative government funding and legislation are viewed as keys ways to unlock this economic potential (CCAV and Innovate UK, 2016; Interview 3, April 2016; Interview 4, May 2016; Interview 17, March 2017; Transport System Catapult, 2017: 4). Calls for proposals, for example, have emphasised "clear commercial benefit" (CCAV and Innovate UK, 2016), while the Transport System Catapult's (2017) official market forecast implores the growth of the UK's domestic CAV industry. Government spending on CAV development has been promised to reach £200 million by 2021 (BEIS, et al. 2017) – having already allocated £100 million of state funding through a "Intelligent Mobility Fund" (BIS, et al., 2016) – by which time the UK Chancellor Philip Hammond pledged "genuine driverless vehicles" would be on the road (Topham, 2017).

Secondly, the CAV programme is also presented within a discourse that portrays the UK as having a world-leading international reputation. In various reports and media articles, this was often put explicitly. For example, Paul Gadd, the Innovation Lead for Autonomous and Connected Vehicles at Innovate UK, stated that the government was “ensuring that the UK remains a world leader in developing and testing connected and autonomous vehicles” (Gadd, 2016). This constitutes a key message about the CAV programme in relation to the UK as a state actor, with the CAV programme being portrayed as world-leading across government reports (BEIS, et al., 2017; CCAV, 2017a: 2; DfT, 2015b: 32) and, moreover, in quotes from government ministers quoted in numerous news media articles which have provided coverage of the CAV programme and its activity (see Davies, 2016; Gibbs, 2014; Perkins, 2018; Hirtenstein, 2018, Wakefield, 2015).

In chapter one, I demonstrated the importance that actors within the CAV programme placed upon public engagement, most notably through the comments of the Head of CCAV, Iain Forbes. This has further significance, as the social benefits of AV development were consistently situated within discourses of public engagement that surround the programme’s activities. In one government report, all three of the original ‘Four Cities Trials’¹⁷, for example, respectively cited public engagement as a key purpose of their projects, by claiming a need to better understand the public’s perceptions, acceptance, attitudes, and trust towards the technology (CCAV, 2017a: 6-8). In its response to the House of Lord’s Autonomous Vehicles Inquiry, the UK Government referred the fact that “a significant driver for CCAV’s involvement in research, development, trials, and demonstration is to engage the public and understand how people will use these technologies” (DfT and BEIS, 2017). This has served to

¹⁷ During the early phases of the programme, the government launched three flagship projects, known as the ‘four cities trials’, which took place in Bristol, Coventry, Greenwich, and Milton Keynes. The GATEway project was included among these.

align CAV development, and the proposed social benefits, with notions of the public interest that public engagement should derive or reveal – thus functioning as a facilitation of the government-led approach to CAV development. As I will describe later in this chapter, and in the empirical chapters, the GATEway project clearly posed public engagement in this sense, showing how the way in which it informed the UK Government’s strategy was the central purpose of the GATEway project’s public engagement process.

3.1.3 The Emergence of the CAV Programme 2013 – 2016: An Agenda-Building Process

The UK’s CAV programme came into full existence in 2015 – when CCAV was established – although important precursory activity occurred throughout 2013 and 2014. A short history of the four years leading up to the starting period of my research, from 2013 to 2016, is helpful to illustrate the constellation of conditions under which the programme emerged and how the UK Government became the dominant political actor. Given these numerous conditions, it is helpful to think of the emergence of the CAV programme as an “agenda-building process” (Cobb and Elder, 1971: 907) – in which political actors have used their available resources to leverage the issue – to distinguish these events from the media-driven process of agenda-setting. This section therefore provides a key context for the chapters ahead, particularly chapter seven.

Attempts by the UK government to produce AVs go back to at least the 1960s. A notable example is the development of a drive-by-wire system, featuring a Citroen DS19 designed by the Transport and Road Research Laboratory – a now defunct government agency that became the Transport Research Laboratory (see Reynolds, 2001). The system was technically remarkable, allowing the DS19 to lap a track in Crowthorne, Berkshire, at speeds of up to 80mph without deviation for hours at a time. Tangible history of this enterprise remains

in the form of an abandoned four-mile cable beneath the M4 between Slough and Reading and the original Citroen DS19 used in testing, which is held in a Science Museum site in Wroughton, Wiltshire. The project was killed off by the economic recession in the 1970s, when funding was withdrawn (see Latour, 1996, on the failure of ‘Arasmis’, a similar transport system innovation in France; Kirsch, 2000, on the failure of the electric vehicle in the US 20th century).

2013 was a formative year for AV development within the UK. Origins of the CAV programme can be seen in the Automotive Council’s (2013) *Intelligent Mobility Roadmap*, which identified autonomous technologies as a key area of growth for the automobile sector. In the summer, the Mobile Robotics Group at Oxford University developed and tested an AV using a modified Nissan Leaf. The Nissan Leaf was a notable choice as it was made in the UK, with one Nissan’s global assembly lines being located in Sunderland, England. Named the ‘RobotCar’, the vehicles later travelled through central Oxford between May 2014 and December 2015 and in 2016 the team released over 20TB of data for research use (Maddern, et al., 2017). Cognizant of developments, as well as developments across the world, George Osborne, the UK chancellor at the time, was important in establishing the CAV programme and the UK Government’s leading role. As Tim revealed, “the previous chancellor of the exchequer [George Osborne] was very interested in these technologies, so he was responsible for getting this off the ground, it was a very personal thing to him” (Interview 9, July 2016). Working as part of the 2010–2015 Conservative–Liberal Democracy coalition government, Osborne announced both £10 million in prize funding – a humble figure – in the 2013 Autumn statement for potential AV development projects as well as a sweeping regulatory review, in order to “ensure that UK industry and the wider public benefit from the development of driverless cars” (HM Treasury, 2013: 56). Following the 2013 Autumn Budget all subsequent budgets have included progressively increased levels of CAV funding.

In 2014, developments gained pace. In July, the £10 million competition fund announced in the Autumn budget was launched by The Business Secretary, at that time Vince Cable, during a demonstration of AV technology at the HORIBA MIRA Technology Park in Hinckley, England (HORIBA MIRA, 2014). Following the tendering, the results were announced in December 2014 and included the among its winners the GATEway project (BBC News, 2014). Later dubbed the Four Cities Trials, as described above, funding increased to £19 million based on the convincing quality of the bids. 2014 also saw the Transport Select Committee begin its *Motoring of the Future* inquiry, published in March 2015, and DfT begin work on a regulatory review of the technology. Arguably, it is during this year that a distinctive UK narrative begins to emerge, with increasing media presence around national developments and politicians beginning to articulate the UK government's role in the development of AVs more clearly.

Key decisions were made under the 2010–2015 Conservative–Liberal Democrat coalition government. Following the 2015 general election, and the emergence of a Conservative majority in Parliament, the CAV programme was firmly established. In February, DfT issued its regulatory review, the *Pathway to Driverless Cars* (2015a, 2015b), identifying that there were no regulatory barriers to testing AVs on UK roads, leading to the various projects that would emerge. The regulatory review also reveals how the UK Government drew from various international examples of AV development to help build its own approach (2015a: 20, 2015b: 131). The following month, George Osborne announced £100 million of industry matched funding, termed the “Intelligent Mobility Fund” (Tovey, 2015) clearly signaling the Government's intentions. July was a crucial month, seeing both the establishment of CCAV and the release of the UK's *Code of Practice* for testing. On its launch, CCAV received very little coverage, in contrast to the projects which it became responsible for, such as GATEway.

The strong enthusiasm for CAV development *within* the government is well-illustrated in an exchange of letters between the Prime Minister's Office, Sir Mark Walpot, the Government's Chief Scientific Adviser at the time, and Professor Dame Nancy Rothwell. This demonstrates the extent to which the emergence of the CAV programme was an agenda-building process. Writing on behalf of the Council for Science and Technology, whose role is to advise the Prime Minister on science and technology policy issues, Sir Walpot and Dame Rothwell encouraged the Government to continue its activity and included a list of five further recommendations. Included among the letters recommendation was the point that "public acceptance will be crucial to the uptake of autonomous technology and it is essential to understand public attitudes to autonomous vehicles" (Walpot and Rothwell, 2015: 3). The Prime Minister's reply, just over a week later, politely acknowledged the advice and stated that they would be integrated into the thinking of the newly-established CCAV team (Prime Minister's Office, 2015). As an emergence within the UK Government, it shows how the CAV programme became a high-level interest.

Overlapping with the time frame of the account provided in this thesis, in 2016, the outcomes of funding and planning began to materialise. The four cities trials began to get underway across the country. In May, the GATEway project opened up its public registration process, allowing members of the public to sign up to take part in trials and workshops, and to contribute to online discussions (GATEway, 2016a). 2016 also saw the CAV programme begin to expand beyond the four cities trials, as the first £20 million of the £100 million in the Intelligent Mobility Fund were allocated (see 'phase one' in fig 3.1).

As this section suggests, the role of senior government officials and key interventions from core executive ministers, notably George Osborne, has had a key influence on the emergence of the CAV programme and the formalisation of CAV development within the UK Government's "institutional agenda" (Cobb and Elder, 1971: 906). By recognising the relative

leverage that policy, regulation, and funding resources could have on AV development in the UK, various political actors in government have thus been able to secure the dominant strategic role over AV development in the UK – demonstrated, for example, in the term ‘Connected and Autonomous Vehicles’, a term devised within CCAV (see section 3.3.2). There is evidence that advisory bodies, such as the Automotive Council and the Government Office for Science have also been effective in pushing AV development onto the government’s institutional agenda (Interview 9, July 2016). Finally, however, it is clear from this account that in its earliest stages the agenda-building process was not significantly influenced by the input of citizens. Rather, it appears to have emerged from a nexus of industrial interests and technocratic decisions made within the UK government. Since then, public engagement has been added to this agenda, as shown and analysed in this thesis.

3.1.4 The Institutional and Organisational Structure of the CAV Programme

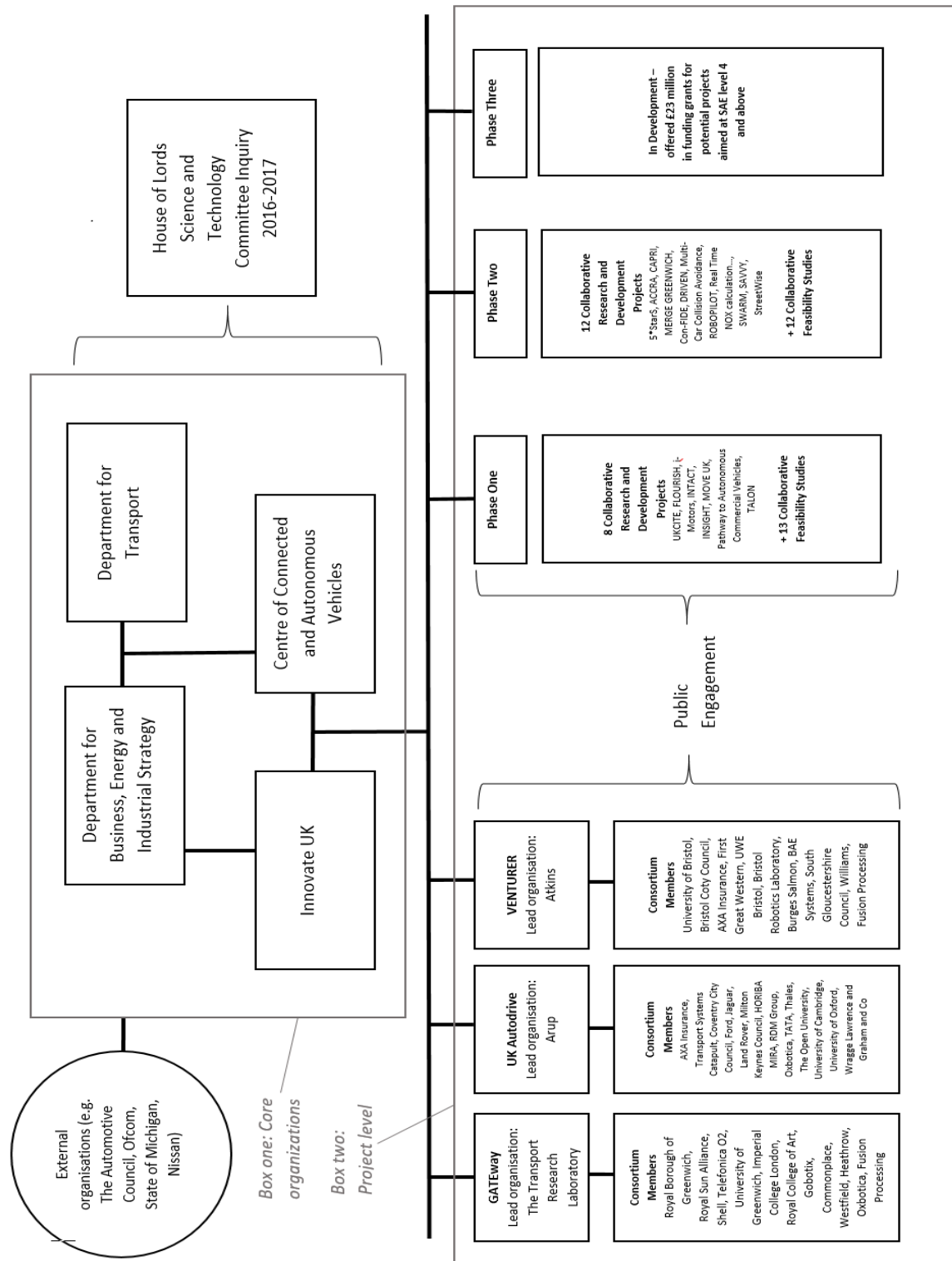
In this section, I provide a short explanation of the CAV programme’s institutional and organisational structure. This provides an important contextual understanding that situates the ethnographic accounts from within GATEway and CCAV that follows over chapters four to seven.

The institutional and organisational structure of the CAV programme is extensive, complex, and dynamic. Figure 3.1 offers a topological representation of the relationships between key institutions and organisations within the CAV programme between 2016-2017. As shown in box one, the ‘core’ of the CAV programme consists of three key types of institution within the UK Government: government departments (BEIS and DfT); a special policy unit (CCAV); and a non-executive agency (Innovate UK). Leaving aside the annual allocation of funds by the Treasury which the programme relies on, all of the key decisions

about policy, regulation, and funding allocation related to the CAV programme are made within this core by teams of ministers, advisors, and civil servants.

The position of these key institutions constitutes a typical model of governance for a specific policy issue, in which political and bureaucratic resources are concentrated into the hands of government department (see Marsh, et al, 2001: 249; Smith, et al, 2000: 163). The existence of CCAV – which I outline in section 3.3 and explore in detail in chapter seven – within this core is significant in this sense, as it demonstrates the importance that the UK Government places upon CAVs as a policy issue by applying a greater degree of departmental specialisation in which dedicated and detailed policy work can be performed. (There is, however, no dedicated minister for CAVs, with briefs and announcements tending to be allocated to junior ministers from BEIS and DfT on an ad hoc basis). Thus, within the CAV programme, CCAV is *the* primary institution and the nexus of all activity. The importance of CAVs is also demonstrated in the presence of dedicated a ‘Innovation Lead’ within Innovate UK, whose role is to “support the Centre for Connected and Autonomous Vehicles (CCAV) and the delivery of £100m over 5 years” (Innovate UK, 2016). Since its establishment in 2015, the core of the CAV programme has been organised as a stable and hierarchical structure – despite frequent personnel turnovers within the civil service (or as dramatically happened in early 2016 when Theresa May became Prime Minister, less than a year after CCAV was established). These core institutions have a close relationship, but also interact with numerous other institutions and organisations both within the programme (at the project level), and externally. For example, between 2016 and 2017, the Government’s activity received parliamentary scrutiny through the House of Lord’s Science and Technology Select Committee’s ‘Autonomous Vehicle Inquiry’. This produced a 64-page report (Science and Technology Select Committee, 2017), which the Government subsequently responded to later

Figure 3.1. The Organisational and Institutional Structure of the CAV Programme



that year. During this process, senior personnel from the core institutions, as well as certain members from the project level, gave evidence to the committee. Whilst this constituted a specific and temporary interaction, these core institutions frequently interact with a nebulous range of other external organisations, ranging from Nissan – who tested their vehicles in the UK in 2017 (Coates, 2017) – to the State of Michigan, with whom the Government initiated an information-sharing relationship (Broersma, 2018). A significant external organisation is the Automotive Council, made up of industry representatives from the automobile industry, who regularly advises CCAV and was crucial in its establishment. According to a member of CCAV's communications team (Interview 14, December 2016), potential stakeholder relationships with these external organisations are often explored through hosted events.

At the project level, shown in box two of figure 3.1, the CAV programme's structure continuously evolves as projects are completed and new projects are established. The process by which new projects are established involves consortiums of organisations working together to produce proposals for the funding competitions put together by the government, as explored in chapters six and seven. The competition criteria for funding shifts in line with the needs of the government-led strategy (Interview 9, July 2016) and with the release of new funding. Successfully-funded projects must regularly report their progress to both CCAV and Innovate UK (who hire research officers to manage this relationship), in what constitutes a hierarchical and interdependent relationship. The purpose, size, and scope of the projects varies, but it is expected that each project will be industry-led in the ways in which it carries out the project. What many of the projects have in common is a public-facing capacity through trials and demonstrations, which may be recognised as “public performance of inevitability” (Stilgoe, 2018a: 34), and in cases such as GATEway, a capacity for overt public engagement. The project level therefore constitutes the CAV programme's primary interface with the public, mediated through the demonstrations of autonomous technology.

The consortium model used by the projects constitutes the collaborative characteristics of the CAV programme. This allows the project level to be organised adaptively according to specific requirements and needs. It also means that certain organisations and individuals are more utilised within the CAV Programme than others. Oxbotica, for example, is a software developer, which provides it with certain affordances that enable it a more important role in the programme. Local councils, however, are only required when projects are based in their location. On an individual basis, some personnel are utilised more often due to their extensive knowledge, experience, or their ability to communicate with the media¹⁸. Thus, as the project level, the programme is far more dynamic and open, both in terms of personnel and resources and in terms of the capacity for public engagement.

Due to its extensive, complex, and dynamic institutional and organisational structure, an analytical categorization of the CAV programme is difficult. Drawing on the policy literature, it may be possible to point to the programme's restrictive membership and vertical interdependencies and argue that aspects of the CAV programme's organisational structure resemble a traditional policy community (Rhodes and Marsh, 1992: 13). Despite this, both the emphasis on public engagement and the scrutiny applied by the House of Lords means that to a degree the programme is not insulated from the interests or scrutiny of the public or Parliament, questioning this categorisation. Owing to the dynamics of the project level, however, actual public engagement is ephemeral, while the features of the programme which are more definitive of a policy community are both durable and institutionalised. In their communicative and participatory capacities for public engagement, the projects may therefore be viewed distinctly as a highly concentrated form of what Karpf (2012: 10) has termed an "organisational layer of politics", which, "facilitates interaction between government elites and

¹⁸ See chapter five, where I discuss this in greater detail and point to the way in which specific individuals became primary definers of events.

mass publics”. In the case of the projects, these interactions between government elites and the public take the form of the three dimensions of public-making identified in this thesis.

3.2 The GATEway Project

Chapters four, five, and six provide ethnographic accounts based on fieldwork observations and interviews from within GATEway Project. This section gives an overview of the project to help contextualise this data, expanding on the introduction to the project and its activity that was provided in chapter one.

3.2.1. *The Aims and Purpose of the GATEway Project*

As I explained in chapter one, the basic premise of the GATEway project was to provide public engagement with the development of CAVs. Managed by a consortium of 15 different organisations, demonstrating the collaborative approach within the CAV programme outline above, the project performed its public engagement process between September 2015 and March 2018. At the heart of the project was a public trial of a small fleet of autonomous shuttle pods, in which citizens were able to interact with the pods and provide feedback through various means, which I have identified as participatory public-making practices. Additionally, the project also engaged in forms of public communication about the development of CAVs, which I have claimed was shaped by communicative public-making practices that project members engaged in. As stated in the central argument of the thesis, the overall aim and purpose of the GATEway project and its public engagement process was to inform and facilitate the government-led strategy, described above, by constructing defined notions of the public in relation to the development of this emergent technology.

Table 3.1. The GATEway Project’s official objectives, as presented on the project website.

<i>Objective</i>	<i>Description</i>
<ul style="list-style-type: none"> • Demonstrate 	The safe and efficient integration of sophisticated automated transport systems into complex real world smart city environments.
<ul style="list-style-type: none"> • Understand 	The technical, cultural, societal and legal challenges and barriers to adoption surrounding automated vehicles.
<ul style="list-style-type: none"> • Inspire 	Industry, public bodies and the wider public to engage with autonomous transport technology.
<ul style="list-style-type: none"> • Generate 	Valuable, exploitable knowledge of the systems required for the effective validation, deployment, management and integration of automated transport within a smart city environment.
<ul style="list-style-type: none"> • Create 	A validated test bed in the heart of London for the evaluation of next generation automated transport systems, including the detailed testing protocols and benchmark data for independent verification of automated systems.
<ul style="list-style-type: none"> • Position 	UK PLC at the forefront of the global connected and autonomous vehicle marketplace, encouraging inward investment and job creation.

Source: GATEway (2018e)

On its website, the project listed six key objectives (see table 3.1). The discourses of economic and social benefit associated with the government-led approach can be clearly seen in these objectives. For example, the aims state the economic aim to position “UK PLC at the forefront of the global connected and autonomous vehicle marketplace, encouraging inward investment and job creation”, alongside the social aim of demonstrating “the safe and efficient integration of sophisticated automated transport systems into complex real world smart city environments” (GATEway, 2018e). Moreover, the aim of inspiring “the wider public to engage

with autonomous transport technology” (ibid.) also situates these benefits within a public engagement discourse, signalling the confluence of public interest with the development of technology. As Marres (2017b: 11) notes, GATEway appeared to openly endorse the instrumental approach to public engagement that I analyse in this thesis. These six objectives thus situate the forms of public-making practice that were aimed at fulfilling them within the government-led strategy and signal its role in the wider CAV programme.

These listed objectives show a consistency between the active project and the competition brief for government funding which the project consortium applied for in 2014. As stated in an internal project document (TRL, 2015, internal document, see appendix B), GATEway secured government funding by meeting the stipulation that the project would pursue public engagement with a “focus not on technology development but upon issues of public awareness, acceptance and the acceleration of uptake and investment”. Crucially, the need for new information is inherent in meeting these objectives, which makes it clearer as to why public-making was integrated into the project’s public engagement process. As Barry (2013: 97) notes, this draws attention to the practices which performed this type of function, as well as the settings in which they are embedded, and the specific forms of expertise, procedures, and techniques which underpin them – as chapters four, five, and six of this thesis examine. In doing so, it interprets the aims and purpose of the project.

The official objectives of the project were important but were not the only source of purpose that was attributed to the project. In interviews, the project’s members themselves often provided a set of reasons for their involvement in the project. These often echoed the official aims of the project or was linked to the interests of the organisations that the project member belonged to. As I show in later chapters, this often created tensions within the project and highlighted the power-relations that existed among its actors. However, a sentiment that was often repeated was a belief in socially progressive aspects of AVs being adopted, linked

to their personal motivations (the first question I often asked in interviews was what project members enjoyed about working on the project). For example, the initial project manager, Andy Frost, working for TRL in his initial role as project manager, gave an enthusiastic description of his involvement when asked why he was a part of the project, stating that, “the key thing is new and disruptive technology, it’s nice to be involved in something that is so ground breaking, it’s nice to be involved in something that has some real positive benefits to society and the environment” (Interview, 5 April 2016). This was based on Frost’s background in ecology and the police force, in which he had seen the negative effects of conventional driving. Ed, the project member introduced in chapter one, stated that the project was about “redefining the relationship between people and technology”, and “creating a more people-centred city and transportation system”, adding on a more withheld note, “I’m not going out being evangelical about autonomous vehicles at the moment [...] I think that all tools can be used for both negative and positive purposes” (Interview 12, October 2016). Thus, an oft-repeated sentiment in interviews with project members was that “it’s not about the technology, it is about people first”, as Vinette Taylor, Head of Internet of Things for Telefonica UK and involved heavily in the project, put it (Interview 5, May 2016). Many project members, such as Nick Reed, the project’s Technical Lead until early 2018, described the purpose of the project within a moral dimension, which is worth quoting at length:

we should design our transport systems to be as safe as is practicable. Now, at the moment, we accept on UK roads, 5/6 people will die every day. 10 times that number suffering life changing injuries, every day. I don’t think that’s acceptable. So, if there are things we can do to reduce that risk, in a cost-effective way – I appreciate you could make every car a million pounds, but nobody would buy them and we would lose other opportunities to improve safety because of that cost. So, it has to be cost effective. But people putting up barriers to automation, you have to wonder, when does it become unethical not to use an automated system that could have saved this number of lives? (Interview 1, December 2015).

These are clearly intersubjective judgements and can be interpreted in numerous ways. Andy Frost later expressed clear doubts about the ‘people-first’ notion, stating that the project was more about developing the technology in a commercial sense (Interview 19, May 2017). Moreover, it is difficult to disentangle the extent to which project members were voicing these beliefs from a personal perspective, and to what extent they were subsumed into the instrumental aims of the project. However, these comments do reflect the wider array of motivations that guided the aims of GATEway project and therefore point to a complexity that is important to consider, to avoid a stark reading of the main argument of this thesis. The explorations of public-making in the coming chapters suggest and discuss the tension and confluence between the instrumental aims and purposes of the project with a significant participatory ethos that the ethnographic fieldwork captured.

I now turn to an outline of the GATEway project’s organisational network. Chapter six focuses on the internal dynamics of this network as a political community.

3.2.2. The Organisational Network of The Project

As noted, 15 different organisations were involved in the GATEway project, making up a consortium (see table 3.2). This was symptomatic of the collaborative approach undertaken within the CAV programme, and can also be seen in the other two of the Four Cities Trials. Functioning often on an individual level, the emphasise was on project members with various types and depth of expertise, knowledge, and experience to work together across a variety of different tasks in order to facilitate the aims and purpose of the project. Typically, this would involve drawing on project member’s organisational resources to conduct specialist tasks, before communicating their progress through streams of emails, reports, monthly board meetings, and within various sub-groups. However, this meant that project work was highly

Figure 3.2 The GATEway Project's Consortium Members

The Transport Research Laboratory

Lead Organization

The Royal College of Art, The University of Greenwich, Commonplace

Public Engagement

Oxbotica, Gobotix, Heathrow, Westfield Sportcars, Fusion Processing

Prototype Vehicle Development and Procurement

Royal Borough of Greenwich Council, O2 Telefonica, Royal Sun Alliance, Shell, Imperial College London, Digital Greenwich Cities

Advisory

complicated and diverse, and extensive periods of planning and preparation were involved, as I demonstrate in chapter six. It was in these areas of the project that organisational public-making practices were located, as understandings of the public linked to the project shaped the work that project members engaged in and how they communicated with one another.

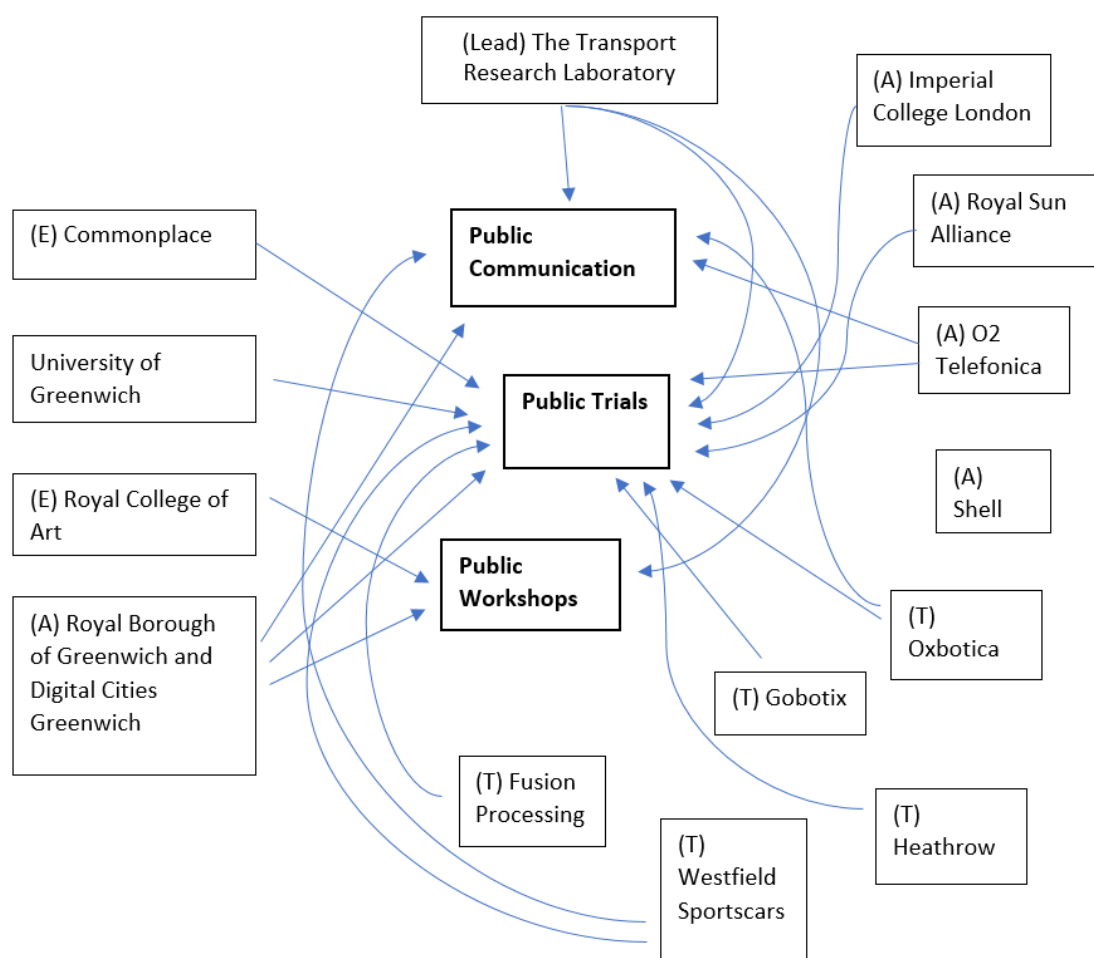
In terms of structure, the key aspect was that the GATEway project was officially led by the Transport Research Laboratory. This meant that TRL, as a research institution, had significant influence on a decision-making basis, often providing oversight and signing-off what other organisations within the project planned to do. Within the project, TRL representatives at all times occupied the formal positions of Technical Lead, Project Manager, Public Trial Lead, and Project Chairman. Moreover, most of TRL's project members were transport experts with backgrounds in psychology – the significance of which I will demonstrate in chapter four. As the lead organisation, it also meant that the oversight provided

by government officials from CCAV and Innovate UK often went through TRL, or through a consultant sent to observe the project board meetings.

Beyond this discernible hierarchal element, however, the project's structure largely functioned according to the tasks that required completion and who could provide the resources to complete them. As I outline in the next section, this was based around a series of work packages. In this sense, as laid out in figure 3.3, the project's structure resembled a network, in which action was fluid and dynamic, rather than any kind of regimented and organised structure with immutable hierarchies or lines of communication. As I will demonstrate in later chapters, organisations regularly interacted on a pragmatic basis, according to their immediate needs. For example, 02 Telephonica was initially involved to advise on the data-capacity of the Greenwich test site but became closely involved in the project's communication strategy during board room meetings. Oxbotica, the software developer, was primarily involved in developing the guidance software for the GATEway pods. However, due to the presence of its representatives on the ground during trials, it was also able secure interviews with the media to promote its guidance software. This meant that, depending on the context, actors within the project acted according to different constraints and capacities that were available to them. In chapter six, using Klijn and Skelcher's (2007) notion of a "governance network", I analyse the democratic implications of this network of actors.

This basic description of network however, does not mean that hierarchal aspects did not exist. The work packages described below were organised according to different 'leads', who provided a general oversight over that range of project activity. All of these leads were responsible to TRL. Moreover, there also existed a general two-tier hierarchy of personnel within the project. First, there was the project management, which consisted of representatives from the different organisations within the consortium. These individuals regularly attended project meetings, managed the project in the capacity of work package leads, performed media

Figure 3.3 The Organisational Network of the GATEway project. Arrows represent key input into main areas of the project. (T) = an organisation with predominately technical resources. (E) = an organisation with predominately engagement-based resources. (A) = an organisation that acted in an advisory capacity. Information based on observations, interviews, and project documents. As a sole researcher, I was unable to provide a complete purview – the role of Shell, for example, remained unclear.



interactions, and were generally responsible for making sure that the aims of the project were being met. These individuals are the focus of chapter six. The second tier of project personnel were made up of employees from the consortium organisations who were used to carry out

limited tasks. For example, in chapter one, I showed how researchers from TRL were used as marshals during the public trials. These individuals also performed other roles, such as transcribing interview data or collecting information. This second group of staff were a key resource for the project, filling in as and when they were needed and providing essential sources of manpower, particularly during the public trials. As I describe in chapter six, as a resource, they were crucial to the public-making needs of the project.

Regarding the main arguments of the thesis, a key point to make here is that I do not equate GATEway as an organisational entity with the social phenomena of public-making. In other words, I do not state that it is because GATEway was structured the way it was that public-making practices possessed their function or their democratic affordances. This is what Howard (2006: 209, italics in original) identifies as “*organisational determinism*”, in which “the explanation for a phenomenon can only be the organisation itself”. This thesis looks beyond this, empirically and analytically, looking at the both the specific practices themselves over the next three chapters, as well as the broader political context of the project, as already explored in this chapter and in chapter seven.

I now turn to an outline of the main activities that took place across the GATEway project.

3.2.3. *The Activity of the Project*

The overall activity of the project was categories within a sub-division of six ‘work packages’, each of which drew on the expertise and resources of the organisations within the project to focus on a specific area of work (see table 3.2). Work packages three and five constituted the bulk of the project and of the public engagement process, and so are the empirical focus of this thesis in terms of the both participatory and communicative dimensions of public-making. In

Table 3.2. The GATEway Project's work packages

<i>Work Package</i>	<i>Description</i>
(1) Project management	The Transport Research Laboratory led the management of the project, overseeing all other work projects and taking over responsibility for the project.
(2) Resilience, Risk management, liability, and safety	Royal Sun Alliance led this work package, which involved making sure that the trials were conducted in safe and reliable way without any risks or liabilities. This was deemed crucial.
(3) Public, media, and industry stakeholder engagement	The Royal College of Art led this work packages, which was aimed at communicating with the media, stakeholders and the wider public how CAVs could operate in cities. It involved developing an engagement plan, and the creation of various forms of public engagement that could provide insight into the “societal response” to the vehicles. This was closely aligned with work package five.
(4) Synthetic environments and teleoperation	This part of the project involved driver simulations to see how people would behave in and around autonomous vehicles. It was led by TRL and drew on their experience using simulators.
(5) Live automated vehicle trials	This was the main activity of the project and constituted the bulk of the projects funding and

resources. Eight fully automated shuttle pods were originally planned – five, including a initial ‘mule’, were eventually developed. Three distinct trials were run.

- (6) Evaluation, exploitation, dissemination Following the completion of the project, the project would be evaluated against its original aims under the scrutiny of an advisory group. Project reports were released throughout the project and published on the website.

Source: TRL (2015, internal briefing document, see appendix B)

the analysis of the organisational dimension of public-making, the empirical focus is on the range of activity that took place within work package one: project management.

These work packages remained largely consistent throughout the project, despite some organisations leaving the project and being replaced. For example, a company called Phoenix Wings was the original vehicle provider but was replaced when it was revealed it could not deliver the what was needed. Similarly, Oxbotica was replaced by Fusion Processing later in the project.

3.2.4 The Public Engagement Work Packages: Public, Media, and Industry Stakeholder Engagement and Live Automated Vehicles Trials

Work package three focused explicitly on “public, media and industry stakeholder engagement” (TRL, 2015, internal briefing paper, see appendix B). Work here was led by the Royal College of Art in partnership with an organisation called Commonplace, an “online community consultation platform” (Commonplace, 2018), as described on its website. There

was firm overall oversight provided here by TRL. As chapters four and five will demonstrate, the activity in this work package was multifaceted. For example, a website and social media strategy were devised to “build awareness and excitement around the project”, while the role of Commonplace and its sentiment mapping tool was to provide insights into the “societal response” (TRL, 2015, internal briefing paper, see appendix B). In addition, a series of public workshops were designed and hosted by the Royal College of Art, which brought citizens who had signed up to the project through its online engagement process, also developed within this work package. These workshops were a key form of public engagement for the project. They focussed on facilitating deliberative discussions between members of the public around the issue of AVs and their potential consequences. By recording these discussions and other activities, the workshops also functioned a form of participatory public-making, which I cover in chapter four. The importance of work package three is also demonstrated in chapter five, when I explore the communicative dimensions of public-making and the range of public communication that attempted to inform audiences about the technology and encourage participation in the project’s public engagement process. These actions were designed to be integrated into the fifth work package: the live trials

Regarding work package five, the project ultimately ran three interlinked trials. Trial one, which took place in March and April 2018, was the most comprehensive in terms of activities and is the primary focus of chapter four. Its purpose was to deliver “a full fleet of automated shuttles for trial by the public” (TRL, 2017, internal project document, see Appendix B), in accordance with the central objectives of the project. Trials two and trial three were more specific. Trial two deployed a single, modified Toyota Prius which operated in self-driving on a specific route along the Greenwich peninsular, with limited public participation. Trial three was much more commercial in nature and involved demonstrating the use of CAVs as delivery

vehicles, in partnership with Ocado. I do not provide empirical evidence or analysis of trials two or three, due to limited fieldwork resources.

Due to procurement delays, trial one did not run as a full operation until March 2018, by which point it had been shortened from a period of six months of operation to just four weeks – a dramatic decrease. Moreover, the original plan had been to conduct the trials before the end of 2016. Nonetheless, the participatory aspects of the trials ran largely as originally intended and it remained the case throughout that the aims and purpose of the GATEway project were focussed around a single, basic principle: to deliver trial one.

3.3 The Centre for Connected and Autonomous Vehicles

Chapter seven provides an ethnographic account that primarily derives from the fieldwork observations and interviews from within CCAV. This section gives an overview of CCAV to help contextualise this data, expanding on the brief introduction in section 1.1 of the thesis.

3.3.1 A Joint Policy Unit

The Centre for Connected and Autonomous Vehicles is an official joint policy unit that, as of September 2018, currently operates between both the Department for Business Environment, and Industrial Strategy and the Department for Transport. According to Tim, the need for CCAV within the UK government stemmed “from a realisation between the then Department of Business, Innovation and Skills and the Department for Transport that connected and autonomous vehicle technology were a growing significance”. As a policy issue, the development of CAVs cuts across many different capacities of the UK Government, meaning that, “rather than having each department [DfT and BEIS] pursuing these things in parallel, it

was big, it was complex, it was fast moving, but the best solution for that was to set up the joint policy unit” (Interview 9, July 2016). As argued above, CCAV has emerged from a period of agenda-building within government, and now belongs firmly on the government’s institutional agenda.

In this capacity, CCAV therefore acts as a nexus for the CAV programme, being central to policy development, regulation, and the coordination of the government-led strategy. In its own terms, CCAV has four key roles:

- leading innovating policy development in this sector
- delivering a programme of research, development, demonstration, and deployment activity, worth up to £200 million, through Innovate UK
- providing co-ordination across DfT, BEIS and the rest of government
- being the single contact point for stakeholder engagement (CCAV, 2018a).

3.3.2 Day-to-Day Activity

These roles are carried out from CCAV’s headquarters, which is based in the Westminster offices of DfT and BEIS. In reality, the joint policy unit’s headquarters is composed of a cluster of desks in the open plan setting of both departments. In chapter seven, I explore the day-to-day practices of these civil servants, observing them at their desks and their other engagement in and around Westminster, looking at how they fulfil the role of CCAV and enable the broad function of the CAV programme, including the GATEway project. A key theme that I focus on is how often CCAV’s officials referred to their work as a difficult process of ‘pulling the right levers’.

In my observations, CCAV's personnel were highly mobile and were often visiting project sites, holding several meetings a day, or performing other duties which require them to be away from their desks. The team I observed was composed of a mixture of senior civil servants in fixed positions, such as Tim and Iain Forbes, as well as mid-ranking civil servants and junior civil servants who are employed through the Civil Service Fast Stream. Their position in the CAV programme and the resources they hold affords these officials the ability to make decisions that have much reach and impact, from the way that they develop policy, to the funding decisions they make, to their direct access to government ministers. However, this also means that their activities shaped by highly complex working conditions, from obscure regulations to large bodies of evidence that they must incorporate into their policy-making. As already suggested in the dozens of projects within the CAV programme, there is a huge amount of ongoing activity that CCAV is required to manage. Thus, as political actors, they were often highly-constrained in how effectively they could 'pull levers' by what they saw as an inhibiting complexity and scope. Nonetheless, in chapter seven, I connect GATEway's public engagement process to the activity of CCAV, as one such 'lever' that was in place.

3.3.3 The Official Definition of Connected and Autonomous Vehicles

In the previous chapter, I provided the general and widely recognised definition of autonomous vehicles to establish a common understanding of the technology.

Since the establishment of CCAV in July 2015, the term 'autonomous and connected vehicle', and its acronym 'CAV', has been widely used as the official term for autonomous vehicles within the UK's national research and development programme. Although very little is technically differentiated by this term, given it still relies on SAE's definitions of autonomy, Tim explained to me during an interview that the term's adjectives, 'connected' and

‘autonomous’, designate the two intersecting “development paths” of the vehicles within the centre, and by extension, across the entire programme. The term was conceived during the later stages of CCAV’s establishment, with ‘autonomous’ in fact being an addition to what was originally just ‘connected vehicles’. The term is meant to suggest, and reify in the policy unit’s activity, the wider integration with other forms of transport, such as rail or cycling, and other data systems, such as the internet of things and smart cities (Interview 9, July 2016). This is why the term ‘Connected and Autonomous Vehicles’ does not appear in key documents prior to the establishment of CCAV, such as DfT’s *The Pathway to Driverless Cars* report (2015a, 2015b). The terms emergence and use thus reflects the UK government’s – and specifically CCAV’s – attempts to be purposeful and strategic with the development of AVs.

3.4 Conclusion

The UK Government, in collaboration with hundreds of industry organisations, has been actively and widely pursuing the development of CAVs in the UK. This chapter has provided a systemic overview of CAV programme. This overview has considered the main approach of the CAV programme, its emergence since 2013, as well as its institutional and organisational structure. This has built on the information provided the introduction and established an important contextual understanding for the analysis of the three dimensions of public-making that is provided across the following chapters.

In the next chapter, I move immediately to the GATEway project’s live trials and begin the analyse of the participatory dimension of public-making.

Chapter Four: The Participatory Dimension of Public-Making

This chapter deals with the participatory dimension of public-making within the GATEway project. As I explained earlier in the thesis, it was expected the project would provide a detailed understanding of public attitudes towards the introduction of CAVs. The challenge therefore facing GATEway was how to assemble this public afresh in relation to this new issue. To achieve this, the project's public engagement process contained a plurality of means for participation, which primarily involved public workshops, online platforms, and vehicle trials, into which various forms of public-making practice were integrated. To reiterate, what defines participatory public-making practices is that they generate knowledge which assembles and articulates representations of the designated members of the public *who are enacting the practice*. That is, that participating citizens are involved in generating knowledge about themselves *qua* a public as part of the engagement process.

My argument in this chapter, which later chapters will build upon, is that the participatory dimension of public-making was highly instrumentalised, primarily aimed at producing knowledge that could serve the strategic policies of the UK government. In addition, I argue that this approach meant that the democratic affordances of the public engagement process were in many ways limited, with citizens inputs being closely managed within the pre-defined boundaries of the process. Thus, despite the participatory aspects, this chapter reveals that a firm technocratic approach underlined the project's public engagement process. However, evidence from interviews and project documents suggests that many project members shared a participatory ethos based upon a firm belief on the inclusion of citizens in the issue. I argue that at times this ethos clashed with the instrumental purpose of the public engagement process and at other times was sublimated into it, suggesting more than just an either/or interpretation of the public engagement process' democratic affordances and purpose.

The structure of this chapter begins with an outline of the critical analytic framework used to interpret the democratic affordances of participatory public-making, allowing the reader to clearly follow the analysis that is developed throughout the empirical account of the project's public engagement process that follows. In this account, I first describe and analyse the public-making practices found within the online recruitment phase of the project, on the basis of which a database of potential participants was constructed. Secondly, in the same vein, I move onto a series of public workshops that the project held in which citizens deliberated CAV development, before, thirdly, moving onto the public trials of the GATEway pods. The final section of the chapter draws together the analyses into some key points.

4.1 The Cultural and Technological Contexts of Participation: Outlining a Critical Analysis of the Participatory Dimension of Public-Making

To demonstrate the central argument of this thesis, it is important to understand the specific public-making practices that were integrated into the project's public engagement process. As I will show in this chapter, various means of participation found within this process, including the online platforms, vehicle trials, and discussion workshops, focussed on capturing the experiences, perceptions, and 'hopes and fears' of CAVs that citizens held, generating findings that could be used as a basis for understanding and measuring public trust and acceptance of the technology. As already stated earlier in the thesis, the outcomes of this participation matter politically because they both define the public in relation to the issue of CAV development and do so in a way that is grounded in the authority of the project itself. However, these forms of participation must be understood within their wider social context to fully understand what Latour (1987.: 29) refers to as the "collective process" involved in the construction of facts. With respect to the argument of the thesis, as Helga Nowotny (2007: 481) puts it, "drawing out

implications [of knowledge]—and even more so policy implications—needs to be put into a larger context”. Here, I emphasise the *cultural* and *technological* contexts that shaped the project’s public engagement process and the participatory public-making practices found therein.

This focus on the contextual factors is used as the basis for a critical analysis of the democratic affordances of the project’s public engagement process. Drawing on a combination of Sheila Jasanoff’s (2003a) notion of ‘technologies of humility’ and Daniel Kreiss’s (2016) notion of the ‘technology-intensive’ – defined in this section – I analyse the complex empirical links between participatory public-making practices and the cultural and technological contextual factors that shaped the public engagement process. Grounded in normative concerns about democratic politics, Jasanoff and Kreiss’s theoretical perspectives enable an analysis of the project’s means of participation and the forms of citizenship that were afforded within it. The underlying difficulties of combining and applying concepts from across STS and political communication have already been addressed in section 1.4 of the thesis, paving the way for this analysis.

I begin by outlining the analysis of the cultural context of the project. GATEway’s public engagement process can itself be placed within the now established trend of public participation in science and technology development (Felt and Fochler, 2010: 219; Jasanoff, 2003: 235) that I discussed in the introduction. However, the democratic legitimacy of these forms of public engagement is not guaranteed, since they can have potentially managed outcomes steered towards narrow interests (Stilgoe, et al., 2014: 6). Thus, as Jasanoff argues, the civic epistemologies within which publics generate knowledge demands “systematic attention” (Jasanoff, 2014: 24) – as shown in the prologue, with Waymo, engagement can be a very narrow process. Given the ever-increasing mechanisms of participation being offered to citizens (see Rowe and Frewer, 2005) the concern is not with establishing participation *per se*,

but rather with the political culture in which this participation takes place. In this chapter, I turn Jasanoff's explicit question of how "to promote more meaningful interaction among policy-makers, scientific experts, corporate producers, and the public" (Jasanoff, 2003a: 238) to the GATEway project and the forms of participation that it offered.

To achieve this meaningful interaction, Jasanoff (2003a) proposed the adoption of what she termed "technologies of humility". These are methods of participation which elicit public opinion, with the intent of influencing public policy, in ways which confront uncertainty, ambiguity, and the uncontrollable in any given issue. In other words, they go beyond generating predictive knowledge and offer a more expansive epistemological approach (Nowotny, 2003: 153). Jasanoff sets out a four-point framework that normatively defines technologies of humility (see table 4.1). The four points of this framework concern the appropriate *framing* of an issue, the *vulnerability* of different groups, the *distribution* of an innovation's consequences, and finally, a collective process of *learning*. Subject to normative conditions, these points are basis on which "to develop the new technologies of humility" which Jasanoff argues can achieve wider and richer public participation with a greater potential for democratic decision-making (Jasanoff, 2003a: 240). For added clarity, Jasanoff contrasts technologies of humility with 'technologies of hubris', which she describes as means of participation which have three key flaws: first, they are blind to uncertainty and ambiguity and focus too much on well-defined issues; secondly, they pre-empt political discussion and perform boundary work around legitimate issues; thirdly, they are unable to internalise empirical challenges to their framing assumptions (ibid.: 239). This allows the analysis in this chapter to both positively, and negatively, interpret the ways in which GATEway's means of participation constituted technologies of humility.

Jasanoff has continuously advocated the need for technologies of humility in the face of technological developments, with this need most recently linked to digital technologies

Table 4.1. Jasanoff's technologies of humility framework, listing the normative conditions for each key point

<i>Key Point</i>	<i>Normative Conditions</i>
<ul style="list-style-type: none"> • Framing 	<p>Issues that are framed too narrowly, too broadly, or simply wrongly will produce democratically defective outcomes. For example, framing an issue as a 'regulatory' problem confines that issue to regulatory actors. Framing must therefore open the issue to appropriate actors, such as the public. Secondly, there must also be a potential to revise the framing of an issue.</p>
<ul style="list-style-type: none"> • Vulnerability 	<p>Populations affected by an issue tend to be passively classified into specific groups, which are represented in the form of statistics and through expert discourses, in ways which subordinate or erase individual experiences, internal differences within groups, and social context. Citizens must resist classification in expert discourses and actively participate in how they are classified in relation to an issue.</p>
<ul style="list-style-type: none"> • Distribution 	<p>As a technology spreads, it brings with it many distributed social consequences. These are not necessarily distributed evenly. However, the full distribution of effects may not be considered, omitting certain groups. Sustained interactions between experts and citizens at the upstream end of research and development is necessary in order to discern the broader implications of a technology and act upon them.</p>
<ul style="list-style-type: none"> • Learning 	<p>Learning is complex and contingent. The tendency for institutions to offer monocausal explanations often limits what can be learned from an issue, leading to narrow reflections. Moreover, failures are often interpreted differently depending on the perspective. Those in power should not be granted a monopoly on 'what is to be learned'. Therefore, efforts should be made to design ways in which collective</p>

reflection on experiences can be undertaken – in effect: learning should be an objective of public participation.

Source: based on Jasanoff (2003a: 240-242)

(Jasanoff, 2018). Braun et al. (2010) have also applied the concept to their cross-nation study of scientific governance. Regarding the topic of this thesis, Stilgoe has recently advocated the deployment of technologies of humility to shift existing modes of public participation with AV development away from didactic models of education and towards democracy (Stilgoe, 2018a: 45). Applied here, the framework scrutinises GATEway's means of participation in relation to key concerns within STS about democratic management and control (see Braun and Könninger 2018; Lezaun and Soneryd, 2007; Pestre, 2008). Given that means of participation "achieve their power through claims of objectivity and a disciplined approach to analysis" in ways that obscure their politically normative basis (Jasanoff, 2003a: 238), it is crucial to apply analyses that illuminate the collective process of knowledge creation. As such, the question posed here is as follows: to what extent did the participatory public-making practices observed within GATEway's public engagement process constitute technologies of humility? My response, summarised in section 4.5, is that they broadly failed.

The cultural context of participatory public-making also intersects with further contextual factors relating to the use of digital technologies. In addition to exploring the broader shifts in media systems brought about by newer digital technologies (Chadwick, 2017), political communication scholars have recently charted the growing use of digital technologies within organised politics to facilitate public engagement, as I outlined in the introduction. As discussed in the introduction, the presence of these digital technologies has important implications for how citizens can engage politically (Coleman and Blumer, 2009; Loader and Mercea, 2011). Because of this, Howard (2006: 5) has argued for the need to apply "specific

and critical treatment” to their political use. As the use of these technologies proliferates, with GATEway providing yet further evidence of this trend, I carry this critical concern into this chapter.

To analyse the technological context of GATEway, I turn to Daniel Kreiss’s (2016) recent study of ‘technology-intensive campaigning’. This term refers to the considerable use of “technology, digital media, data, and analytics” in political campaigns (ibid: 3-4), which Kreiss understands as a culturally-specific historical formation in US politics, predicated on path dependencies in electoral politics that incentivise a ‘prototype politics’, itself based upon technological innovations (ibid: 12-18, see also 206-208). Key examples of this trend include the use of digital platforms and databases. In line with other scholars, Kreiss argues that these technologies actively shape the technological context of contemporary society and in doing so “define what twenty-first century citizenship looks like” (ibid: 3-4; see Baldwin-Philippi, 2015: 10-13). I adopt Kreiss’ notion of the ‘technology-intensive’ in this chapter to explore the technological context of participation within GATEway. On an empirical level, this conceptualisation helps to identify and describe the use of digital technologies to facilitate participatory public-making, as this chapter will reveal. Assuming this empirical link, it is possible to derive from Kreiss’s study several implications for democratic citizenship entailed in a technology-intensive politics, which can be posed as two key frames of conceptual analysis useful to this chapter (see table 4.2.). The first frame concerns the “specialisation of technological work” and the “implications for what constitutes political work [...] as well as the people who perform it” (Kreiss, 2016: 4). The second frame concerns the ways in which “practitioners conceptualise citizens through various sources of data and call upon them to engage”, and in doing so how they seek to represent and profile “whole citizens” (ibid.: 4-5). By drawing attention to the technology-intensive aspects of participatory public-making, these frames augment the normative framework offered by Jasanoff above. In other words, they

Table 4.2. The democratic implications of ‘technology-intensive’ politics

<i>Frame of Analysis</i>	<i>Democratic Implications</i>
<ul style="list-style-type: none"> • The specialisation of technological work 	<p>What (contingent) technologies, organisations, staff, knowledge, and practices affect the technology-intensive resources used in organised politics? In turn, how does this affect the key points outlined in table 4.1? For example, regarding how issues are framed? Who makes these choices and why?</p>
<ul style="list-style-type: none"> • The conceptualisation of citizens through data 	<p>How are citizens understood by political actors through sources of data? What is the purpose of this data? Again, how does this effect the key points outlined in table 4.1? For example, how citizens are classified into specific groups? Who gets to control this data?</p>

Source: based on Kreiss (2016: 4-5, 205-206, 209-216)

support an understanding of the ways in which digital technologies contribute, or not, to the normative conditions that define technologies of humility.

Providing critical attention to technology-intensive forms of organised politics is important because as Howard (2006: 170) has noted, the design choices of the specialist actors affects the “exercise and distribution of political power”. Moreover, these digital technologies can act as powerful material frames that filter political content and define political culture (ibid.: 71) and strongly influence the production of social knowledge (Carlson, 2018). In the case of participatory public-making, this has specific consequences for how the public was rendered as a social reality in relation to the issue of CAV development. These analytic frames also help scrutinise GATEway’s means of participation in relation to broader concerns within political communication research about the production of the authority that forms of public

knowledge come to possess (see Carlson, 2018; Chadwick, et al., 2018, Cushion, 2018). In this regard, the use of digital technologies can potentially reinforce the obscurity surrounding the ways in which means of participation produce ‘objective’ knowledge, as mentioned above by Jasanoff.

The ethnographic data gathered in this thesis provides the opportunity to critically explore the participatory dimensions of public-making through these analytic frameworks at a granular level. These frameworks are useful because they emphasise the contextual factors – the empirical specificity of which I will demonstrate in this chapter – that shaped the means of public participation observed within GATEway, and, in addition, offers a normative basis on which to judge the democratic affordances provided to the citizens who participated in generating knowledge about the public. Additionally, the use of these framework supports this thesis as an empirical contribution by bringing it into existing debates within STS and political communication, as laid out in the introduction. Finally, the application of these frameworks also responds to the criticisms made in chapter two about the features of the broader debate and its failure to address the dynamics of public engagement. For example, the attention to vulnerability addresses the way in which the public is consistently portrayed as a passive actor in that debate.

Fore fronting this analytic framework allows the reader to clearly follow how the analysis develops throughout the empirical account that follows. The analytic points I derive are summarised in section 4.5, in which I offer my interpretation that GATEway’s means of participation broadly failed to meet the normative conditions that constitute technologies of humility. Chapter six and seven build upon the analysis in this chapter by exploring the organisational dimension of GATEway and CCAV respectively – a key point, given the behind the scenes work of infrastructure building involved in a technology-intensive approach (Kreiss, 2016: 4). Specifically, these chapters trace the organisational and institutional conduits through

which the knowledge generated in the participatory dimension of public-making travelled, demonstrating the central argument of the thesis regarding the instrumentality of the public engagement process.

Before this, however, it is important to show *how* this knowledge about the public was produced. I now move onto the empirical findings.

4.2 “Participate, Add Your Views, Take Part!”: Participatory Public-Making Practices During the Online Recruitment Phase

In the early stages of the GATEway project a dedicated website was established. As I will explore more broadly in the following chapter on communication, the website provided information related to the project which had two key purposes. Firstly, it aimed to inform its audience about the development of CAVs. Project updates, a gallery with images of the pods, and official publications could be found on the website. On the homepage, this information emphasised the potential social and economic benefits of the technology, presented in punchy quotations from senior project members. For example, a quote from “Professor Nick Reed, Director at TRL and GATEway Technical Lead” read at the time: “automated vehicles will revolutionise the way in which we move people, goods and services around urban areas, with predicted benefits to safety, efficiency, the environment and mobility”. Secondly, the website provided information that prompted citizens to become involved in the project’s public engagement process. The first thing that an earlier visitor to the website would have seen was a large, hi-resolution image of a pod prototype with “GATEway” splashed over the top and a prominent interactive button which prompted the visitor to ‘GET INVOLVED’ (see figure 4.1). Clicking the link, or one of several others clearly placed on the site, would take a site user to a page with three options (see figure 4.2), each with a verb encouraging their involvement in the

issue of AV development: “*participate* in workshops and research”; “*add* your views”; “*take part* in the trials”. By clicking on the first or third of these options, the visitor would be directed through an online process to sign them up as a project participant. Clicking on the middle option – “add your views” – would send the site user to the Commonplace platform, the function of which I describe further into this chapter.

This sign-up process was a central feature of the website and a crucial feature of the project. This is because there was no other way to get involved in the project’s public engagement process, apart from a limited opportunity during the final public trials to walk up and test the pods or to use the Commonplace platform. This sign up process was important to the project because it built a database of contactable citizens stored as potential project participants. The public workshops, vehicle trials, and smaller elements such as simulator experiments all worked on the basis of targeted recruitment, in which certain groups of the public were identified within the database from the demographical data that citizens provided during the sign-up process. This sign-up process therefore functioned as the first step in participatory public-making, establishing a pool of digital data through which the public was initially understood. This provides an early indication of the technology-intensive approach that characterised the project’s means of participation. Demonstrating how this sign-up process functioned as participatory public-making allows a consideration of the extent to which it constituted a technology of humility. Episode 4.1 describes the process, supported by the illustrations in figure 4.3.

Episode 4.1

May 2016. I’m on the GATEway website signing up to participate in the project. The website has been launched recently and was publicised through the project’s social media channels and in several news articles. The site is professional-looking, with clean fonts and a branded colour green and white colour scheme – the same

colour as the shuttle pod designs. The homepage has several links, the most prominent is a large “GET INVOLVED” button on the homepage just above the project description. I click it which takes me to a page which gives me three options. Each option starts with a verb: “*participate* in workshops and research”; “*add* your views” or “*take* part in the trials”. I click on the third option, which takes me to a page where I confirm I am willing to share my information and that I am not guaranteed a place in the trials. I continue through a series of thirteen questions, asking for simple demographic information such as my age, gender, employment status, and whether I am disabled, but also my connection to the local area and the forms of transport I most often use. The first question asks what my interest in driverless vehicles is, giving me two options or ‘other’. The process is quick and simple as most of the questions are multiple choice, yes/no, or asking me to rate on a scale of 1 to 5. Having provided my email address, I am told I will now receive regular updates about the project, as well as how I can take part if I am selected to be a part of the trials or the workshops.

Completing this simple process provided the project with the basic personal profile of an individual citizen, based upon age, and employment, as well as several issue-specific details about them, such as transport preferences, connection to the local area, a disability, and so on. In total, 5,631 citizens completed this process (GATEway, 2018d). In doing so, they engaged in participatory public-making, with every one of the thirteen question that they answered contributing data points that would be used to discern what kind of group the potential participant belonged to. It also placed these citizens ‘in reserve’, as a ‘public-in-waiting’.

The public engagement discourses drawn upon by the project called upon those who engaged in this process *as* members of the public. This is seen not just in the language on the website, but also in the press material related to its launch, which proclaimed: “members of the public can now register to take part in the UK’s first public driverless vehicle trials” (GATEway, 2016a). To this extent it was made clear to citizens that they were engaging in the

Figure 4.1 The GATEway Project homepage throughout early 2016. Note the extensive use of prompts that encouraged visitors to sign up to the public-engagement process.

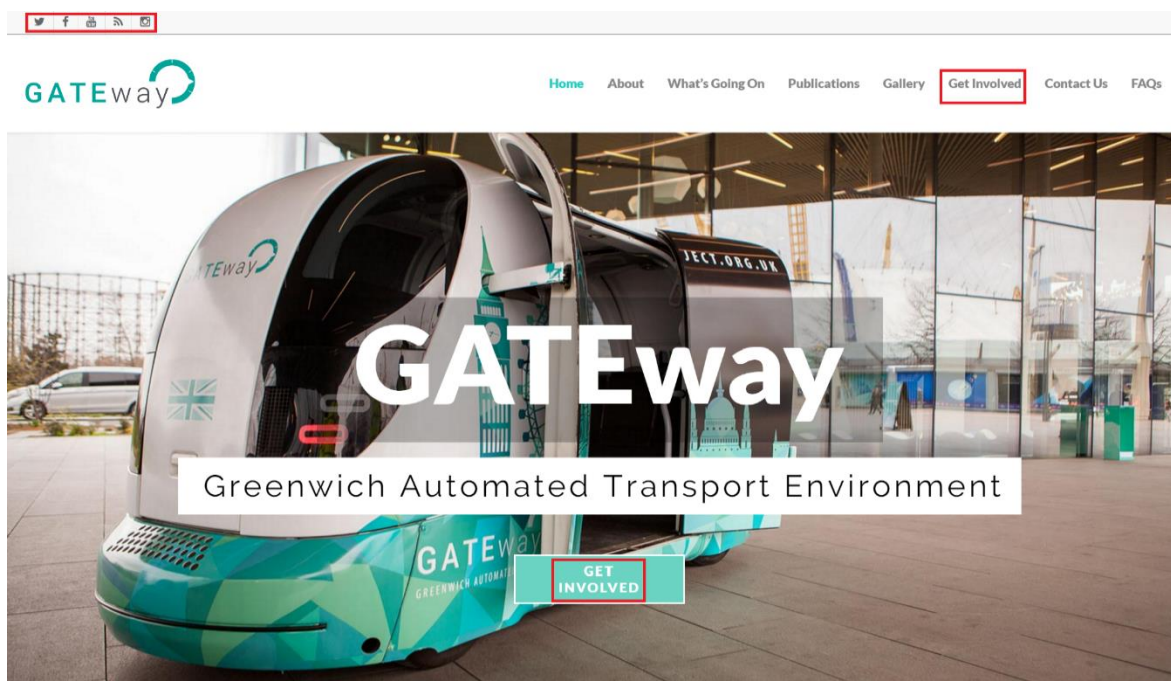


Figure 4.2 ‘Participate, add your views, take part!’. The options available to ‘get involved’ that the project website offered.

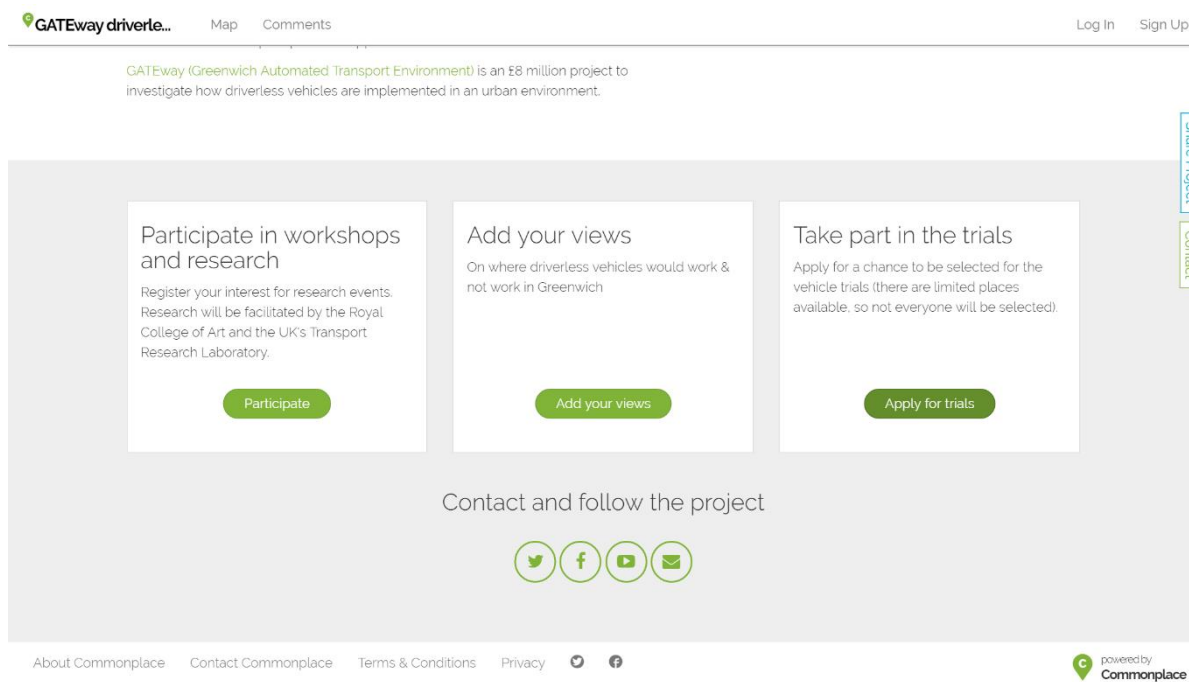


Figure 4.3 An illustration of the questions involved in the online sign-up process for the public engagement process. Note the limited number of multiple choice responses.

GATEway driverle... Map Comments [+ Add Your Views](#) [Log In](#) [Sign Up](#)

[Research interviews & workshops](#) ✓

3 → What is your interest in driverless vehicles?

A It's mainly personal (they might affect how I get around)

B It's mainly professional (I work in a related sector) ✓

C Other

4 → What is your age?

A 16 or under

B 17-24 ✓

C 25-34

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GATEway driverle... Map Comments [+ Add Your Views](#) [Log In](#) [Sign Up](#)

6 → What's your relationship to Greenwich?

A I live in Greenwich

B I work/study in Greenwich

C I commute through Greenwich

D I'm a visitor/tourist

E None, I'm just interested in the trials ✓

F Other

7 → What's your employment status?

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process as ‘members of the public’. However, they were provided with limited means to define what that meant. As can be seen in episode 4.1 and figure 4.3, the amount of input available to citizens was constrained by the digital architecture of the sign-up process, which consisted almost entirely of box ticking from a set of limited options. Despite the fact it explicitly led to further participation, the participatory public-making practices embedded in the online sign-up process are important to consider because they performed the ontological task of reifying the public within the project. In fact, it is because it led to further participation that these participatory public-making practices have significance, because as this chapter will show, the resultant database of potential participants was used consistently for targeted recruitment.

This process was crucial to fulfilling the aims of the project. As Nick Reed explained, the idea was to engage with “numerous different user groups”, which better enabled the project’s general purpose of understanding “their perspective on things” (Interview 1, December 2015). Because these groups cannot already be known or engaged with, the project needed to systemically discern them in order to “cover the interests and views of other road users, younger and older groups, disabled travellers, technophiles/-phobes”, among others (TRL, 2015, internal briefing paper, see appendix B1). In these early project documents and interviews, these groups were clearly predefined, so the participatory public-making practices contained in the online sign-up process simply identified which group of the public a potential participant was a part of by matching up the data with the categories. Importantly, this enabled the project to define the representative groups of the public that it was engaging with and articulate whose experiences and perceptions it was claiming to understand. Moreover, these groups were necessarily defined on the basis of certain assumptions about those groups and how the development of CAVs may potentially affect them, such as “offering independent mobility to disabled and older travellers” (Interview 1, December 2015). Anticipating potential outcomes such as this enabled the project to articulate the social and economic benefits of

CAVs more efficiently by being selective about its participants; project documents clearly state the application of “recruitment criteria” around the trials, which, for example, sought “members of the public who are likely to use these services to move around London” (GATEway, 2017: 2). In this sense, the online sign-up process and the construction of a database reflected the instrumental purpose of the public engagement process itself, in its targeted pursuit of knowledge about the public.

For the project members, building the project’s capacity to engage with these different group was perceived as enabling a more inclusive public engagement process. As Ed, the senior project member introduced in episode 1.4, stated: “we’re making sure we don’t just bring along the usual suspects, we’re looking to reach a broader audience” (Interview 12, October 2016). This was reiterated by “Eric”, a senior project board member from TRL, who saw the project as a way to open up engagement to the wider public and go beyond expert audiences, such as journalists (Interview 11, September 2016). In this sense, the project members sought to portray the activity of the project as ‘more than usual’, often while referencing the collaborative nature of the project and the fact that it was at the forefront of technological development. Andy Frost contrasted the project’s public engagement with the standard notion of public consultancy, stating the project was “doing something of high value and is not just the usual consultancy of rinse and repeat” (Interview 2, April 2016). Linked to the perspectives of these project members, the availability of this information about the many different groups the project could claim to be engaging with enabled what they understood as a richer and more legitimate basis for public engagement.

This technology-intensive use of a database fits with findings in the political communication literature. For example, Howard has observed the use of “unique relational databases” in political campaigns to generalise individual data into larger social groupings (Howard, 2006: 93); the use appears functionally similar here, but for different political

purposes. Interestingly, Howard also describes the perspectives of consultants who believed that this data facilitates a more open relationship between citizens and politicians (ibid.: 94). This is not unlike the views of project members who expressed the inclusivity view, with one project member expressing the relationship within the public engagement process as one in which “we want to learn from the public and the public want to learn from us” (Interview 5, May 2016). Moreover, Kreiss has discussed the collection of wide-ranging data, from psychological attitudes to geographical location, to build knowledge of “whole citizens” that can guide campaign strategy and communication (Kreiss, 2016: 213-214). The more modest capacities of GATEway meant that the data only partially revealed citizens through the public-making practices involved in the sign-up process. They did, however, clearly inform the strategic purposes of the project.

What initial analysis can be drawn out here by applying the framework set out above? First, regarding vulnerability, the evidence shows that participants were able to define themselves through these practices, but only within the established boundaries of pre-defined groups that the sign-up process offered. In this regard, the online setting directed and framed their agency through a narrow range of possible inputs. Moreover, the process did not afford opportunities for participants to define those groups in terms of how they were affected by CAV development. For example, one question asked: “do you have a disability or special needs which affect your ability to travel?”, in which the response was simply “yes” or “no”. Finally, at the initial stage, there was no means for participants to engage in the framing of CAV development as an issue. Although participation was promised on the basis that citizens, as members of the public, would be able to have their say, the sign-up process did not enable citizens to contribute to what made this *an* issue. In effect, their participation was predicated on the terms of the issue that the GATEway project set out. Therefore, given the ontology of those groups of the public framed the further stages of the engagement process and the forms

of participatory public-making practice therein, as I will show, to have constituted technologies of humility citizens would have needed to have been afforded the capacity to shape these group formations and the issue itself.

This section has explored the participatory public-making practices embedded within the online recruitment process. This has focussed on the technology-intensive means that the project used to assemble a database of potential participants and in doing so create discernible categories of the public. It has brought into discussion the shared notions of inclusivity behind this process, but also pointed to the highly-managed aspects of the process, in which its democratic affordances for those citizens that participated in these online public-making practice should be regarded as limited. Most notable, citizens were immediately interpellated as a public, by had very little say in what it meant to *be* a public. In the following section, I examine the participatory public-making practices found within the public workshops.

4.3 “What are your hopes and fears?”: Participatory Public-Making Practices in the Public Workshops

Prior to the vehicle trials, project members from the RCA designed and conducted a series of public workshops over July and August in 2016. In line with the aims of the project, the purpose of the workshops was to “generate more insight into how autonomous vehicles could positively impact people’s lives with real social value, but also influence the future development of this technology and design possibilities” (RCA, 2016). These workshops were intended to be closely associated with the vehicle trials and ensure that the project captured insights from participants taking part in both the workshops and the public trials (TRL, 2015, internal briefing paper, see appendix B1). To “ensure a range of views” (GATEway, 2016b: 5) the organisers used the project’s database of potential participants to recruit a total of 109 people to take part

in eight workshops, with individual workshops focusing on six different groups: “technology enthusiasts, people with additional needs, drivers, non-drivers, the general public and professional stakeholders” (ibid). Workshops took place in the evenings, in Greenwich, which meant participants were predominately local people with a connection to the area.

While the public trials focused on capturing interactions between people and technology, the workshops focussed on capturing interpersonal interactions between participants in a deliberative setting. Participants were expected to debate autonomous vehicles as an issue, in small groups on tables within the workshops and as a room, using their existing knowledge, views, and possible experiences. This was conducted through a series of exercises placed within the frames of discussion set out by the structure of the workshops. This entailed: deliberating ‘hopes’ and ‘fears’ around a set of predefined issues, which included “safety, cost, ownership, environment and their social and cultural issues” (ibid.: 8), using prompts, such as large whiteboards and post it notes (see fig 4.4); designing a journey through London in which CAVs could solve existing transport challenges that they faced (ibid.: 11); and finally, designing a model of a CAV from Lego, plasticine, paper and pens (ibid.: 12). Audio recording devices and photography were used to ‘capture’ these deliberations, with several ‘facilitators’ (comprised of RCA graduates) present to help guide and encourage discussions. Episodes 4.2 and 4.3 provide my observations of the workshops in action.

Episode 4.2

As I enter the room, the first thing I notice is The Chordette’s Mr Sandman being played over a looped video clip of a busy four-way intersection where people cross without looking as vehicles flash past without touching them, on a screen at the front of the room. It’s the same brightly lit office space used for GATEway’s board meetings. Four tables are filling with approximately fifteen people. They look like they’ve come directly from work. None of these participants know each other, having just met for the first time in the foyer whilst they signed informed consent

forms. We're surrounded by a variety of materials, including white boards, post it notes, writing pads, Play Doh, and Lego. Waiting on each table is a 'facilitator', one of whom has just informed me that tonight's workshop is one of three 'general public' groups, meaning the people in the room were from all of the categories.

"We've come here today to understand your attitudes towards driverless vehicles in the city" announces the RCA designer leading this evening's workshop. He introduces the workshop, informing everyone that they would like to "capture hopes and fears" around the technology through a series of activities. He plays a video clip from the film *Minority Report*, in which a driverless vehicle is remotely controlled by a malicious agent. He then provides a still image of a 1950s post-war family enjoying a picnic in a retro-futuristic driverless vehicle. A classic technology dystopia/utopia frame. This is used to prompt an activity. Written on the whiteboards next to the tables are a series of issues, such as "infrastructure", "safety", and "environment". Working with the facilitators, the participants write their thoughts on different coloured post it notes – with one colour symbolising a hope and another a fear – and attach them to the issue. Plenty of eager discussion breaks out around the task, with participants often prefacing their contributions with comments such as "the problem is" and "what people think is". On the table nearest to me, I hear somebody mention the recent Tesla crash. The facilitators make sure to keep the recording devices among the huddled discussions, whilst another designer goes around and takes regular photographs of the whiteboards.

Episode 4.3

After a break, each table is now mapping out a route of a typical journey in London with challenges that they might face along the way. These mostly included issues based around personal mobility, such as getting stuck in traffic or parking. It's all fairly mundane. The workshops leader tells them to imagine that they are the one taking the journey and then asks them to imagine how driverless vehicles might help to solve or alleviate the challenges. A lot of the focus is on imagination – notably, the project has so far been unable to provide a prototype vehicle so that people can go on experience. As in the previous exercise, there is a lot of discussion between the participants and at times the facilitators become heavily involved. In the middle of each table, the recorders are still switched on to capture everything

that is being said. The facilitators listen in, prompting if the discussion stalls. I sense that the discussions are deliberative and taking place from a personal point of view, with a range of issue-based and identity-based discussions going on, with people making statements like “as a cyclist” or “from my perspective”. The conversation moves fast in this way, interlocking sentiments, issues, and reference points. On the latter, people appear keen to present themselves as in-the-know, often distancing themselves from “what people think”, by mentioning things that they have seen in the news. There is, however, very little sense from the discussions I am listening to that the participants understand themselves as a public, and especially not in the sense that the project defined.

Participatory public-making practices were evident in the workshop exercises. Through discussion and other exercises, participants were engaged in generating information about themselves – having been previously interpellated as a public during the online recruitment phase and by the project’s broader public engagement discourses. From these workshop exercises, the project captured around 1400 ‘hopes’ and ‘fears’ (ibid.: 23), produced dozens of lengthy transcripts from the audio recordings, as well as film clips, photography, vox pops, and interpretative drawings. This eclectic data was interpreted by the RCA using thematic content analysis software and turned into a series of results which were publicly published in a report published on the GATEway website (see GATEway 2016). The extent to which the citizens present understood themselves as a public during the workshops, however, is uncertain. I was unable to directly engage with project participants, yet neither my observations nor the small sample of workshop transcripts I received suggested any reflexive understanding by the participants. There is limited evidence to suggest that the project participants ignored the groups defined by the project, and instead engaged in a more fluid identity-based set of discussions, in which they switched between groups they considered themselves to belong to (for example, “as a cyclist”). Despite this, they nonetheless engaged in practices that the project

Figure 4.4 An image from one of the public workshops. Note the post-it notes on the board in the background.



Source: GATEway (2016b: 3)

clearly understood as being formative of its definition of the public, its views and opinions, and more specifically, their ‘hopes’ and ‘fears’. identity-based set of discussions, in which they switched between groups they considered themselves to belong to (for example, “as a cyclist”). Despite this, they nonetheless engaged in practices that the project clearly understood as being formative of its definition of the public, its views and opinions, and more specifically, their ‘hopes’ and ‘fears’.

In interviews with the workshop organisers, a public-making intent was clearly described. As Ed, who led on the workshops put it, “the question we have at the RCA is to see how design can support or influence people’s attitudes towards adoption and acceptance [...] to understand the general public’s attitudes towards driverless vehicles” (Interview 12, October 2016). This was reiterated by the graduate designers who were involved in developing the

workshops and who acted as facilitators. As they put it, “the aim of the workshops is to understand people’s attitudes and perspectives to driverless cars – and also looking at how they can be designed to meeting people’s needs, and also the adoption of driverless cars [sic]” (Interview 8, July 2016). Placed within the stated aims of the project, both these comments and the statements at the beginning of this section indicate the instrumental approach taken towards the public workshops. The intent was to understand the *what*, that is the public, in order to understand the *how* of adoption, acceptance, and social benefits. This is reflected in the assemblage of recording devices and workshop exercises which in practice produced clear, measurable forms of outputs, such as the sticky-notes and transcripts, from which abstractions such as ‘hopes’ and ‘fears’ were produced.

As a form of public participation, the workshops were viewed by the organisers as an effective means of generating dynamic and in-depth information from participants. As “Rebecca”, a project lead for work package three, explained, workshops are effective at creating dynamic information because, “in a workshop you get debate between people who have different views – you get discussion and how that progresses – and you can see if people’s opinions are likely to change having heard the opinions of other people”. In terms of depth, the workshops were seen as a way to collect information that might otherwise be inaccessible or difficult to solicit, with Rebecca adding that, “you also might find that people are more reluctant to say what they really think or that the conversation is led in a certain direction [...] you have to design in ways to make them comfortable about speaking up”. This need to structure the workshops to draw out participants views was underlined by Rebecca: “it’s all about the depth of the information” (Interview 7, July 2016).

When asked about how they put the workshops together, the organisers provided plenty of detail. There were three key points.

First, it is important to note that all of the workshops and other activities that the RCA conducted were checked and approved by TRL, as the lead organisation, to make sure they were congruent with the aims of the project (Interview 6, June 2016). This entailed a clear acknowledgment of the aims of the project by the workshop organisers – ultimately linking their activity to the instrumental purpose of informing government strategy.

Secondly, to come up with the framing of the workshop, the organisers drew upon the representations of AVs in the news media. As Rebecca explained, “one of the first pieces of work we did was to collect a lot of newspaper articles and then analysed the issues and ideas that the journalists raised, and that people raised in the comments – so we already had this huge map [...] we identified 18 different areas that would be of interest to public engagement” (Interview 7, July 2016). (This process is where the categories in the whiteboard exercise seen in the episodes above were derived from). The hopes and fears frame, also described above, was viewed as a way to “pose more of a question to the public” (Interview 8, July 2016). Ed elaborated on this and explained that “we’re presenting both the opportunities and challenges to the general public and we’d like them to come up with the answers to those issues [...] it’s not quite black and white but it is useful to draw a separation between those things” (Interview 12, October 2016).

Finally, the organisers used the project’s database to perform a targeted recruitment of participants, reflecting further the technology-intensive aspects of the public engagement process. In practice, according to the graduate designers, this meant that they “put together a list of the type of participants we’re looking for” (Interview 8, July 2016). As Rebecca explained, in using the database, “there’s a process of going through that list and seeing which sort of vague categories of people we’ve got subscribed and which need more targeted recruitment” (Interview 7, July 2016).

These key points suggest high degrees of control, in terms of both the framing of the workshops and in terms of who attended the workshops. Moreover, attendees were also grouped together *by* the project. This is a continuation of the public-making performed during the online recruitment phase, enabled by the use of digital technology, in which these very groups were established. Even so, the organisers claimed that they remained unsure about what would be discussed during the workshops, stating that “when we do actually hear back from these people it’s the unknown [...] we have no idea what they’re going to say which for me is great because we can get into the nitty gritty” (Interview July 8, 2016). Here, the organisers showed a strong enthusiasm towards the deliberative discussions in the workshops, supported by a belief in social justice and a view that the social benefits of AVs were there to be found among the views of the public – they just needed to be included.

Much like the initial recruitment process, this was reflected in a participatory ethos that also surrounded the workshops. This stemmed from the explicit application of ‘inclusive design’ by the organisers. Inclusive design is a design philosophy institutionalised within the RCA that aims to involve people in the design process to break down traditional, and problematic, barriers between designers and users. Inclusive design was described by Rebecca as a “methodology we always use [...] if you speak to people who may have more extreme needs or atypical lifestyle, people that are maybe forgotten about in the design process” (Interview 7, July 2016). It is also a principled approach, that as Ed stated, means “no exclusion by design” (Interview 12, October 2016), or as one of the graduate designers put it: “I think it is just about involving everyone that we can” (Interview 8, July 2016). Ed reflected on its application to the workshops, stating the importance of involving different groups of the public and “trying to create an environment that’s open and supportive and not too directed and trying to understand people – not tell people what they should understand” (Interview 12, October 2016). This was reiterated by the designers involved in developing the workshops, who stated

that “we want to help people by encouraging them to come up with ideas, but we also don’t want to influence too much what they say” adding that there is a difficulty in “trying to find that balance” (Interview 8, July 2016). Here, the organisers give a reflexive voice to the difficulties they encountered in trying to create a participatory environment that also produced the right kind of information about the development of CAVs as an issue – fulfilling the aims of the project.

This notion of balance is important as it reflects the way in which the stated desire for inclusive participation both clashed with and was sublimated by the instrumental purpose of the broader engagement process. This tension can be seen in the genuinely effusive attitude towards the ideals of public engagement that organiser such as Ed continually showed throughout the project – with further evidence in chapter six – while at the same time adopting the pragmatic notion, for example, that the “specific workshops” with different groups of people “gives us a different sort of perspective on the challenge” (Interview 12, October 2016). This is a direct reference to the aims of the project, and is explicitly laid out within the final report, which listed the objectives of the workshops as investigating how linking perceptions to vehicle design could help “to make acceptance and adoption more likely” (GATEway, 2016b: 4) – these being the ultimate strategic policy objectives of the UK government.

In terms of the analysis in this chapter, the framing of the workshops would appear to be the most pertinent point. As the interview evidence suggests, the framing was viewed as being unconstrained enough to not too heavily prompt discussion but structured enough to focus deliberation towards certain issues. However, many of the initial macro-issues used to shape the whiteboard exercise and other activities was based on the prior research of the designers, who used an emergent analysis of media representations to establish these issues. However, as chapter two pointed out, the wider debate contains many assumptions that the workshops risked replicating within the workshops. While there were much internal

deliberations around these issues, participants were given less opportunity to generate the macro-issues themselves. That said, by accommodating negative opinions towards AVs (the fears), the workshops allowed the public-making practices to articulate some empirical challenges to the project's objectives, by delimitating the societal boundaries to adoption – many participants considered privacy, job losses, and being controlled by employers as fears (ibid.: 26). However, the extent to which these fears were internalised or shifted the framing of the issue is limited.

It is interesting to note that project participants were able to self-report their level of knowledge as part of the workshops, with just 6% regarding themselves as experts and 68% rating their knowledge as 'good' or 'average' (GATEway, 2016b: 19). This provided a minimum level of ontological definition about themselves *as* members of the public, as opposed to just providing their perceptions. This, however, was a limited feature. Largely, participants were still contained within predefined groups that they had little opportunity to redefine. As shown in the recruitment phase, these groups were thinly defined on the basis of a number of assumptions made by project members about who CAV development would help. This also returns to the question of what other groups could have been addressed by the public and who did not get the opportunity to speak – and what that means for the function of these public-making practices in terms of articulating the distribution of social effects entailed in CAV development. However, although the workshops did very little to expand the ontological definition of the public established in the recruitment phase, they did allow these groups to clearly explicate how they would be affected and how the effects of the innovation would be distributed. As Gail Ramster's comments and the episodes illustrated, participants were encouraged to learn together through deliberating each other's views. In this sense, the workshops fulfilled some of the criteria needed to be considered a viable technology of humility, but only in a limited sense.

Finally, it was often stated during the workshop that participants-cum-members of the public were being provided with the ‘opportunity to shape the design of the vehicles’. This reveals the limit of the empirical challenges that the ‘fears’ could pose, since it suggests fears are to be assimilated into the design process. The project report itself talks about ‘translating’ hopes and fears into opportunities (ibid.: 27), which opens up to questioning the extent to which the culture of governance in GATEway in which participatory public-making practices belonged to could construct a public that posed an existential risk to the development of CAVs. Could it? It does not seem possible.

This section has explored the participatory public-making practices embedded within the public workshops. This has focussed on the range of exercises that citizens formally participated in and described how those exercises were constituted by the project. It has once again highlighted the shared notions of inclusivity and the highly-managed aspects of this process. The democratic affordances for those citizens that participated in these public-making practices are mixed, since there are opportunities for social learning and deliberations about the distribution of the social consequences of AVs, but only within a regimented and technocratically derived framing in which citizens had limited opportunities to self-define their identity as a public. In the following section, I examine the participatory public-making practices found within the public trials – the central component of GATEway’s public engagement process.

4.4 “Would you like to share your experience?”: Participatory Public-Making Practices in the Public Trials

The story of the project is about how the public learn to trust and to accept automated vehicles in the city. And that’s been the key aim for me: getting

members of the public onto the vehicles and getting their feedback. That's all we want to happen (Interview 15, March 2017).

This quote from Nick Reed encapsulates how the public trials of the GATEway pods sat at the very heart of the project. The best way to state their importance is that without these trials, there simply would be no GATEway project. These trials involved much more than simply testing the vehicles in a public space and waiting for acceptance to arise. This may sound blasé – but it is not overly removed from Waymo's approach in the prologue. Rather, the tests that took place under GATEway were a carefully planned and closely managed series of events, the largest of which occurred in March 2018, designed to facilitate novel interactions between the public and technology which the project could observe. Embedded in these interactions, by design, were a further array of technology-intensive participatory public-making practices whose aim was to capture from these interactions information which could be used to gauge what the public thought about CAVs. In this final empirical section, I explain and analyse how this process happened.

According to a GATEway project report, the “public trials provided the opportunity to engage with the participants using three different research methods”, which included: the “observation and survey of pedestrian interactions”, led by the University of Greenwich; “online mapping of public perceptions within the urban context”, led by Commonplace; and an online “survey of participant journey experience”, led by TRL (GATEway, 2018c: 10). This section examines how these methods constituted participatory public-making practices embedded within the public trials. In line with the importance of the trials, these methods were the principal channel through which the project generated knowledge about the public. In total, there were 320 participants who completed the survey in its full phase in March 2018 (GATEway, 2018c: 13) and 40 members of the public in the earlier ‘mule’ phase a year earlier, in which a single vehicle named ‘Harry’ was deployed (GATEway, 2017: 2). Commonplace's

online sentiment mapping platform registered 21,279 visitors, including 3,253 who “highly engaged”, and a total of 746 who left comments (GATEway, 2018c). These are remarkably low numbers and well-below what the project had originally intended. For many, this sample will call into question the basic validity of the data that was generated on a representative basis. However, I focus on the *qualities* of the interactions that took place in this chapter.

The use of these self-described research methods to “engage” reflects once again the instrumentality of the project’s public engagement process and highlights the importance of knowledge-as an-outcome to the project; supporting the overall argument of this thesis. Akin to the analytic interpretations offered so far, I continue to argue in this section that, at this stage, the public engagement process limited the democratic affordances of citizens – particularly through technology-intensive means. Before demonstrating these practices, it is important to explain how the testing environment was constructed for the explicit purposes of participatory public-making.

4.4.1 *Constructing GATEway’s Testing Environment, Shaping Participatory Public-Making*

In addition to being the ‘Greenwich Automated Transport Environment’, the testing site for the pods was also officially designated as the ‘UK Smart Mobility Living Lab’. According to the official brochure, produced by TRL, the Living Lab is “a real-life environment where CAV systems, services and processes can be safely developed, evaluated and integrated with the local community” (TRL, 2017). The brochure is aimed at potential industry and government clients, emphasising how the testing site could be used to “bring solutions to market faster” and “develop policy, strategy, product, solutions, and business cases” (ibid.). Thus, GATEway was about: “not just delivering the trials but creating an environment where others can come and conduct their tests – so, speaking to other organisations that want to test, inviting them to

bring their equipment to that environment in Greenwich” (Interview 1, December 2015). In this regard, the testing environment demonstrated a multiplicity of instrumental functions; it was adapted depending on the purpose it was needed for, whether that was public policy, commercial product testing, or community interaction.

There were three key aspects to the environment which was adjusted for GATEway’s purposes. These influenced the performance of participatory public-making in important ways. The first aspect was the application of social psychology and the focus on ‘experiences’ that it entailed. The second aspect was the physical environment. The third and final aspect was the presence of the personnel who interacted with participants on the ground as they engaged with the pods. I will now explain these aspects.

The application of social psychology was integral to the public trials. Its introduction stemmed from TRL, who, as I explained in chapter three, provided several qualified psychologists who occupied key positions within the project. The application of psychology to understand behaviours linked to transport is intuitionalised within TRL – much like the application of inclusive design at the RCA. Both cases demonstrate how project members drew on their existing organisational expertise, techniques, procedures, and other resources, to shape the performance of participatory public-making practices.

The psychological theory that was applied is known as the “Construal-Level Theory of Psychological Distance” (see Trope & Liberman, 2010). As Eric, also a qualified psychologist, explained to me, this theory, “suggests that when people don’t have direct experience of something then they can normally construe it in the abstract but they can’t really concretely relate it to their lives – so that means that when you ask them about their attitudes towards something new there are lots of variations, there’s lot of uncertainty in their responses”. Referring to its use in the public trials of the pods, he claimed that “the best approach to that is to give them some direct experience which reduces their psychological distance to the new

thing, so they can relate it to their own lives” (Interview 11, September 2016). Thus, applied to the trials, the underlying notion became that if people could use or see the vehicles for themselves they would be able to provide more informed responses. As Nick Reed argued, we typically rely on an inadequate idea of AVs that is based on “people’s internal understanding of what you’re trying to describe to them in a single sentence usually - and then asking to make a decision based on that”. This made him sceptical of prevailing measures of public attitudes towards AVs. Referring to the number of surveys of public opinion, he stated that “it’s no surprise that the results might not necessarily be anything like what the reality of the situation might be”. In contrast, then, Nick Reed explained that the trials were about, “giving people that direct experience of automated vehicles and then asking them, before and after, what their view of this technology is” (Interview 1, December 2015).

Asked specifically about what kind of experience the project intended, “Chuck”, who led the trials, stated that, “several people in the project have said, you know, ideally you want that experience to be as boring as possible because then that shows that you have done it really well and that there’s nothing for them [participants] to really note except that it gets them A to B without a driver” (Interview 6, June 2016). Key to this hope is that the vehicles functioned from a technical standpoint. Alongside these comments by Chuck, other interviews revealed a perception among project members that participants were encountering the unknown which made the anticipating their experiences inherently difficult (Interview 2, April 2016; Interview 5, May 2016).

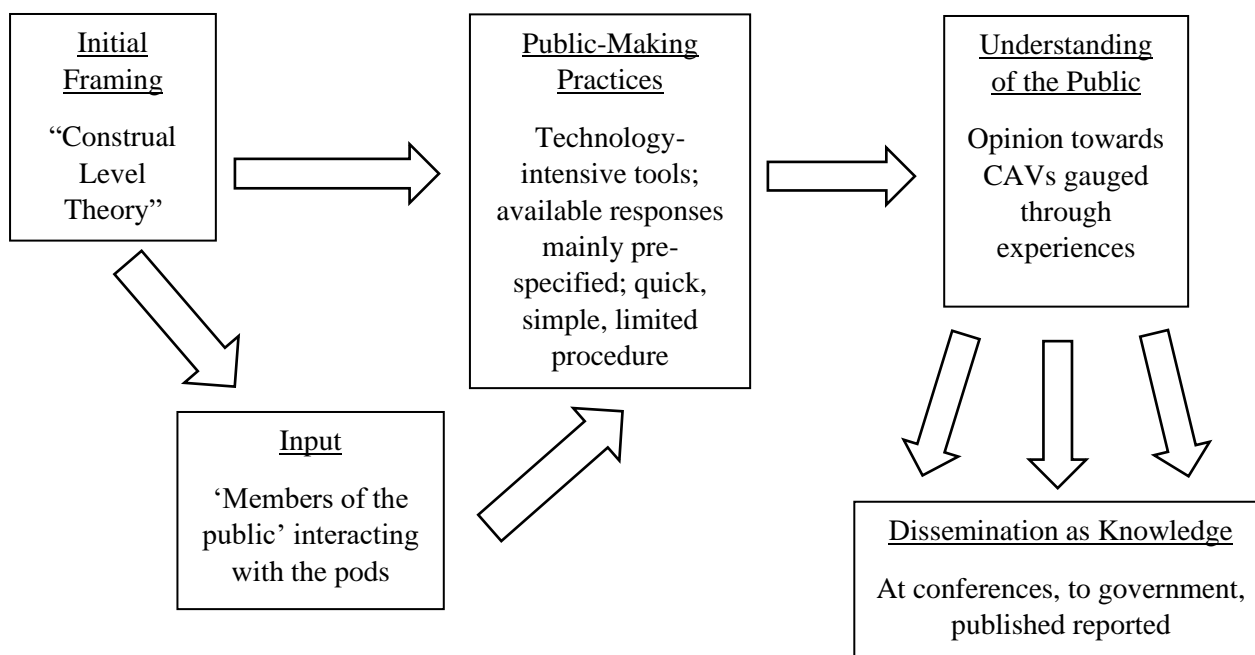
The key point is that by claiming to “capture participants’ experiences more concisely” (GATEway, 2018c: 12) a more accurate representation of the public was intended to be achieved. This demonstrates, once again, the instrumental aims of the project. As such, the

experience of interacting with the pod became the focal metric of the public in the trials¹⁹. These experiences were framed within a distinct psychological dimension of knowledge generation, itself performed through the research-methods-cum-participatory-devices that I examine in the next section. Importantly, the notion raised by Chuck that the experience should be ‘boring’, reflects the potential capacity for the project to shape these experiences and thus the responses from participants. In a simple sense, avoiding or mitigating pod malfunctions was important in this regard. Yet so too was the physical environment itself and the interaction with the trial team, as I will explain. As the comments of Eric and Nick Reed above show, the choice to base public engagement on experiences of interacting with the technology was itself intended to frame the knowledge outputs as being based on a more informed public. Yet foregrounding experience also established boundaries around what forms of knowledge could be produced through participatory public-making practices, because it necessarily excludes other forms of knowledge from being produced. Moreover, as the comments of Eric and Nick Reed reveal, the elimination of uncertainty in the public was seen as important in generating knowledge. This is in direct contrast to the outcomes aimed for within the technologies of humility approach, which emphasises uncertainty. This is in addition to these same practices being performed by the predefined groups derived through the online sign up process. To this extent, the application of social psychology created a tight framing around the articulation of CAVs as an issue through public-making practices, as represented topographically in figure 4.5.

The second key aspect which shaped participatory public-making was the physical changes that were made to the Greenwich peninsular to accommodate the vehicle tests. The most prominent changes included: the establishment of lane markings which were indicated by

¹⁹ “Experience” is mentioned 62 times across the 35 pages of findings and analysis in the official trial one project report (2018c).

Figure 4.5 A topographical representation of how social psychology influenced participatory public-making practices



a shuttle symbol (see fig 4.6); stop points conveniently located for passengers; and several information boards that provided information about the pods and their route along the Greenwich peninsular (see fig 4.7). These physical additions to the local environment indicated to people in the area where the pods would be, why they were there, and how people could interact with them by taking a ride. In this sense, they established the presence of the pods in a testing environment. In the case of the information boards, they appealed directly to anyone present to “tell us what you think”, stating that “public perception is an essential part of our research”, alongside QR codes that activated the project’s ‘rate my drive’ tool, which I examine below. Congruent with the website and press releases, the discourses presented here cast participation as being public. This is ostensive, yet there was also an implicit sense in which citizens that were physically present were encouraged to interact with the pods as a public, which can be observed in the testing environment.

Figure 4.6 A portion of the route, showing the lane markings, a stopping bay, and the shuttle symbol. This clearly established the presence of the testing environment.



Figure 4.7 One of several information boards that was placed within the local environment. Note the QR code, used to access the ‘rate my drive’ tool alongside the encouragement to “tell us what you think”.



The psychological dimensions discussed above emphasises the extent to which the GATEway site was a space for experimental research as well as public engagement. In both respects, the testing environment was therefore designed as a space which could support research-methods-cum-participatory-devices while maintaining the appearance and functions of a public or “real-world” space. As explained in project reports, “members of the public were able to engage with the vehicles in a real-world environment and, to some degree, an environment where journeys could serve a purpose (e.g. getting from home to the tube station)” (GATEway 2018c: 32). As Chuck explained, the intention was that using the GATEway pods “should be as with any other mode of transportation – except there’s no driver and the fact it is happening in a slightly unique environment [sic]” (Interview 6, June 2016). Importantly, as again laid out in the project reports, “not only did this have an impact on the quality of data collected throughout the trials, but it proved to be important to passenger’s experience” (GATEway, 2018c: 32). This explains why the pod route contained stops placed at useful locations, such as the entrance to the Air Emirates, where people would be expected to need to travel to or from under normal conditions. But equally, these stops were also strategic locations for the project to direct people towards the public-making practices that were enacted through the research methods. Episode 4.4 demonstrates this combination of test site and public space from the perspective of one of the marshals.

Episode 4.4

I’m walking the trial route to its final stop with Josh, one of the marshals, in preparation for the third pod run of the day. We walk adjacent to a simple white-paint marked lane, usually a cycle lane. This lane is where the pods travel on their route. We pass about fifteen people on our way down - a woman with a pushchair, two Polish men in an animated discussion, a cyclist. As we get to the bottom of the route, in a residential area Josh reflects on how much quieter his stop is. Looking around, I can see another information board with a map, a yellow stop zone where

people get in and out, and a large white pod symbol to mark the start of the pod lane. Josh is holding a tight folder with information about the project and a tablet which he uses to take people's information. He tells me how he tries to avoid looking like a salesperson, which he thinks makes it difficult to engage people at first. The pod comes and goes, with the occupants deciding to stay onboard. Josh chats briefly to the onboard steward and the riders, before waving them off. A few of the people are turning their heads and staring as the pod passes, while others appear uninterested. Josh comments on this, telling me that interactions are varied – some people just don't care about what's going on, but others are fascinated and want to know more.

This episode also suggests the way in which the space needed to open as much possibility for engagement as possible, in which members of the public either saw or used the pod, that could be used as the basis for participatory public-making. For example, Josh was highly conscious of the need to get people on the pods and to convey accurate information about the technology to them.

Josh's presence points to, finally, the all-important presence of the trial team. The trial team was made up of at least ten members of staff at any one time, including a trial manager, safety stewards, pod stop marshals, a roving marshal, vehicle support, and systems support (GATEway, 2018c: 7). The trial team was important to the practical function of the trials, for example, by charging the pods and releasing them at specific times. However, as suggested in episodes 1.1, 1.2, and 4.4, the trial team was also important in enabling participatory public-making practices. In my observations, this was demonstrated in both direct interactions with participants as they interacted with the pods and at the level of trial manager. As I show in the following chapter, key members of the trial team also engaged in communicative public-making practices.

In terms of direct interactions, as stated in project reports, marshals were “positioned at each of the four pod stops to provide information to passers-by and trial participants” (ibid.: 9). Episode 4.5 shows how the marshals reflected on and described their roles during a break between pod runs, illustrating the way in which the marshals internalised the strategy of the project.

Episode 4.5

We’re on a lunch break between pod runs. Half a dozen members of the marshalling team are sat on a circle of sofas in the base of operations. They’re talking over how everything has gone so far today. “I’ve had three off and two on”, one of them says. “I’ve had nine people”, says another. They’re talking about how many members of the public they’ve had riding on the pods at their stops. Throughout the discussion, the team sees their purpose clearly: they’re the frontline manpower that gets people on the pods and gets them to give contact information – so that they can be surveyed about their experience. They reflect on the practicalities of getting people on the pods. The hybrid system means that the marshal’s role is two-fold: to facilitate the people with bookings who have arrived at their stop and to convince passing members of the public to jump on one of the hop-on slots. This isn’t always easy – one of them is joking that she literally threw someone onto a pod. Another marshall comments that she isn’t always clear what to say to certain questions, and what she can say. She’s passed a stapled A4 booklet, which contains the “guidelines for stewards and marshals” when engaging with the public.

The marshals measured how well they have done by how many people they had managed to get to ride the pods. However, even with the novel presence of the pods, the testing environment, and the recruitment phase, this was still a difficult task for the marshals. To assist them, the engagement guidelines mentioned in this episode (see appendix item B3) offered a straightforward set of instructions to the marshals. Provided by the project lead for the trials,

these guidelines were aimed at formatting the interactions between marshals and project participants, by providing marshals with a scripted format for their interactions.

This begun by instructing marshals on how to prepare for their role (appear professional and polite, be informed about how the pods work) followed by instructions on “engaging with the public”. Rudimentary scripts are often used in the context of political campaigning to help guide how political operatives persuade potential voters (see Nielsen, 2012: 71), so it may be assumed that the purpose here is to encourage positive experiences of the shuttle pod and mitigate negative interpretations. This is suggested in how the marshals were to immediately frame the experience of riding the pod, as the guidelines provided specific instructions around the use of language, instructing marshals not to use superlatives or pejoratives and to avoid endorsing any views that participants expressed. The reason behind this was, as the guidelines state, to avoid “adversely affect anyone’s experience” or “re-enforcing their views”. In terms of safety and pod performance, this was also observable, as the guidelines clearly anticipated technical issues and thus provided marshals with guidance on how to mitigate this. Safety was a key issue throughout the project and perceived as the most likely source of controversy, as Chuck stated to me: “we don’t want any dramas because that means that something has probably gone wrong” (Interview, 13 June 2016). It was therefore important for the marshals to communicate the safety of the pods to members of the public, not least because failure to do so would deter people from riding the pods. Following the March 18th Tempe Fatality involving an semi-autonomous Uber vehicle, a scripted response was provided to the marshals in the (correct) anticipation that participants would have questions about the incident.

Importantly, where the marshals were asked to be directly persuasive was in prompting participants to enact participatory public-making practices. As the marshal’s engagement guidelines clearly state, marshals were instructed to encourage members of the public to “provide us with their email address to allow us to distribute TRL surveys and encourage them

to complete the commonplace survey via the QR code in the Pod”. Like the information boards, each pod contained a poster with a QR code (see appendix item B5) that would direct a pod rider towards the Commonplace platform, as described below. In effect, successfully following this script means turning interactions with members of the public into public-making practices.

In addition, at the level of trial management, the importance of public-making was also demonstrated. While accompanying the trial manager around the Greenwich site, he remained in constant radio contact to ensure that everything was in place. This appeared to stem from his anxiety that not enough people would ride the pods to ensure that the project achieved its aims. This is demonstrated in, episode 4.6, which takes place from the ‘control centre’, in Mitre Passage, where the trial manager was based.

Episode 4.6

March 2018. The Public trials are now close to their full operation, with the trial operating a hybrid model of walk-ups and bookings. “Alex”, a TRL researcher, is discussing the project’s database and the project booking system with today’s trial manager (the role rotates among senior project staff). The trial manager is a bit stressed. They’re sat at a desk on the upper floors of Mitre Passage – the base of operations overlooking the peninsular. Batches of people from the database are being sent targeted email invitations asking them to book available slots to take a ride in the pod. Alex and the trial manager are discussing a work around for the booking system, because they have representatives from a consortium organisation that need to be guaranteed a ride. They decide to remove a slot from the booking system, effectively to make it private. The trial manager is pleased that Alex has a good understanding of these technical systems, “so we can manage it”, he says. He is referring to the flows of people riding the pods – the public. They’re repeatedly concerned about getting enough people to ride on the pods. In practical terms, it is about the targeted contacting of people in their database and getting people onto the peninsular, into the pods, and then getting them to carry out the surveys or Commonplace. After her conversation with the project manager, Alex comments

to me that the response rate so far from the targeted post-ride surveys is higher than they had hoped for so far.

As well as the importance that was placed upon participants performing public-making practices, this episode also demonstrates how the database was utilised to recruit participants during the public trials. As shown here, this was predicated on the expertise of actors such as Alex, whose understanding of the technical system assisted the trial lead in his job on managing the collective performance of public-making that were going on below them. This mixture of the project's digital infrastructure, which was built up through the sign-up process described in section 4.2, and the wider contextual factors of the environment, described in this section, thus expanded the capacity of project members to 'capture' the experience and perceptions of members of the public in the live trials.

In terms of the democratic affordances of the public trials, the three contextual factors described here suggest several key points. First, they highlight how the design of the trials was geared to towards encouraging public-making, but within certain clearly defined parameters. For example, there is the application of social psychology to frame the performance of public-making within the notion of experiences, as well as the use of scripts that attempted to format interactions with the pods and discourage experiences that veered towards extremes. This limited the boundaries of legitimate knowledge production, by defining how forms of participation were framed, most notably in terms of the framing of experience. This was again combined with the use of the predefined groups held within the database, with targeted recruitment taking place. This presents evidence that accords with Marres (2017b: 13) claim that GATEway's "participation initiatives appear to be designed to achieve particular pre-determined operations upon public perceptions". However, the extent of this pre-determination requires further thought. For the most part, the design of the trial space was aimed at *minimising*

uncertainty, as can be seen in the above comments of Nick Reed and Eric. Marres analysis suggests a manipulation of events. The analysis here leans towards a view that the events were *controlled*. In this regard, there is little initial evidence to suggest the public trials functioned as technologies of humility.

Finally, there are clear parallels between this account and Lezaun and Soneryd's (2007) study of the public consultation exercises involved in *GM Nation?*, a public debate on food biotechnology. In their study, they briefly discuss the design of the public engagement process (Lezaun and Soneryd, 2007: 282-285). They too note how the exercise was designed to function as both a deliberative *and* a research environment, with the latter serving the productive function of informing government policy. Moreover, in comparison to the use of social psychology in GATEway, Lezaun and Soneryd also discuss the framing of the event, noting that a consultancy firm was brought in to run workshops. This consultancy firm applied "Heideggerian phenomenology and client-centred Rogerian psychotherapeutic practice" (ibid.: 283) to the engagement process. This is an interesting precedent in the literature. The use of obscure explanatory theories to frame public engagement is creates exclusive knowledge, because it is an initial frame that is impossible or very difficult for the participants to revise and based on expertise. In the case of GATEway, it removed or limited the possibility of feedback that went beyond experience, meaning that the performance of public-making practices were, in this interpretation, depoliticised, because they did not provide the opportunity to discuss broader social issues or consequences related to the technology they were engaging with, as I will demonstrate.

4.4.2 *The Public Trials in Action*

Trial participants directly shared their experiences of interacting with the pods through two online digital tools, described by the project as “research methods”, as outlined above. These included the two surveys and the use of Commonplace’s “online mapping” platform. All three of these forms of public-making practice were clear examples of a technology-intensive approach, relying on a wider technological context in which it was expected that participants possessed smartphones through which they could use their tools. (There was no offline option for these public-making practices and marshals did not perform surveys on the spot, despite the presence of the marshals on the ground). For those that could access them these tools offered an efficient means of providing their feedback. For project members, they helped to generate a digital dataset that collectively represented the public under the terms of the GATEway project. In this subsection, I will examine each of these tools in turn.

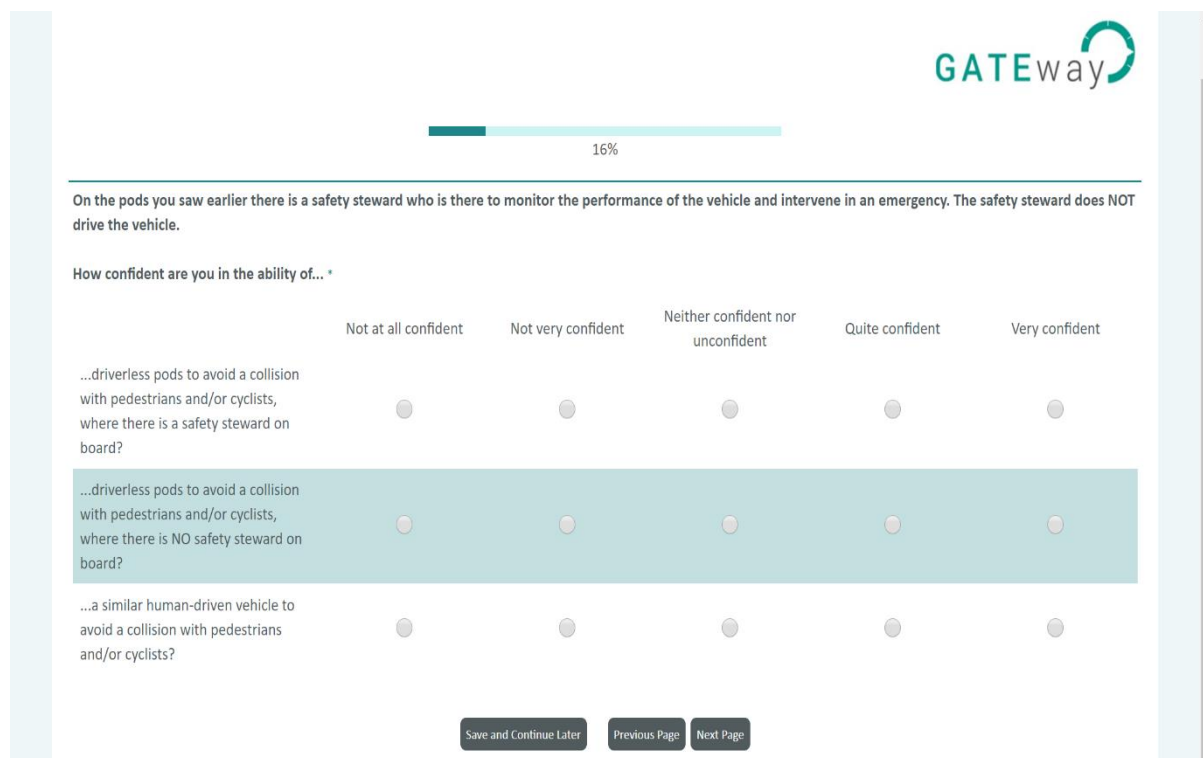
My argument is that the affordances of these tools digital architecture meant that the performance of public-making practices closely resembled what Jennifer Stromer-Galley has identified as “controlled interactivity”, in which citizen’s inputs were steered away from genuine participation and towards (GATEway’s) strategic aims (Stromer-Galley, 2014: 2; see Freelon, 2017, for further study). As a result, in combination with the contextual factors outlined in the previous section, the participatory public-making practices within the public trials did not constitute technologies of humility. As a result, the democratic affordances within the process were extremely limited, with this stage of the public engagement process, in contrast with the workshop, being much more focused on public-making as a controlled research process.

The research tools provided three respective ‘pathways’ of participatory public-making. The first, known as ‘rate my ride’, was survey-based. This was introduced in episode 1.2 as a key example of participatory public-making. Building on that description, appendix item B6 illustrates how the tool appeared to a project participant. It was acknowledged that this tool

was supposed to be “very simple survey form”, intended to be mobile-based, that sought a basic “thumbs up thumbs down type response” (Interview 13, November 2016). The simplicity of the tool was striking, since it reduced the experiences of the interaction with the pods to a click. Thus, in addition to the already-present psychological framing, as well as the specific grouping of the public, the actual instance in which participatory public-making practices were performed was highly constrained. The questions themselves could potentially be open-ended. For example, the first question was: “how does/did riding the in the driverless vehicle compare to your expectation?”. However, the only options for response were a thumbs-down symbol (“worse than expected”) and a thumbs-up symbol (“better than expected”). This contains very little quality of information, but as a *metric* could quite easily be posed to show support for the technology.

In addition to the simple ‘rate my drive’ tool, a final survey was sent out via email in early April 2018, aimed at generating information about participant’s ‘journey experience’. As a project report described it, “the aim of the survey was to gather evidence of the public’s perceptions as passengers [...] the data collected sought to develop an evidence base to support the future deployment of AVs in an urban environment and to help further the understanding of how members of the public believe their vehicles [...] fit with their travel needs” (GATEway, 2018c: 11). The instrumental purpose of the exercise is clearly articulated in the project report. The fact it states that the data was sought to “support” the development of CAVs is revealing, since it suggests that empirical challenges to the issue were only tolerated to the extent they made meeting the ultimate aim of adoption more efficient. In other words, there was no capacity for any of the participants, *as members of the public*, to reject the development of CAVs. As I will demonstrate in chapter seven, officials in CCAV saw public engagement as enabling a “social decision”. As I will discuss there, the actual mechanisms in the GATEway project cast doubt on this.

Figure 4.8. An illustration of the ‘journey experience’ survey.



The email that contained the survey was targeted, aimed at those who had used the pods and then given their email addresses to the marshals. Engagement with the survey was prompted in the email they received, which asked for “valuable input” into “people’s perceptions of driverless vehicles and their role in the future of transportation”. The questions in the email survey were predominately multiple choice (see figure 4.8) and focussed on the perceived impact of the technology on mobility (positive or negative), the extent to which people felt concerned about traveling in the pods around certain factors such as speed or cyclists, and how likely they would be to use the pods. Further questions delved this likelihood further, by changing the cost and timing variables of using the pods, if they represented an available service. It is clear to see how these responses could be shaped into metrics of acceptance – yet it is equally noticeable how disconnected this form of public-making is from any of the issues raised elsewhere in the engagement process, such as the workshops. This again suggests a filtering of perceptions and experiences, rather than allowing a direct channel through which people can speak directly to issues surrounding the pods. The use of digital tools to enact public-making practices is interdependent with the framing of public engagement in terms of experiences, creating knowledge through which public acceptance could be derived through the analytic interpretations of the researchers within the project, but not directly provided by the project participants acting as members of the public.

Finally, there was the use of Commonplace’s sentiment mapping platform. As shown in figure 4.9 the platform’s application revolved around a bespoke, online digital map of the local area where anyone who accessed the webpage could ‘pin’ their comments, their sentiment (red: negative; green: positive; orange: in-between) and select from pre-defined tags that it had been decided were relevant to the issue. These pins were (and continue to be) publicly available to anyone who visits the Greenwich Commonplace map. Commonplace also provided this data as real-time analytics to its clients, in this case GATEway. The customisation of a

Figure 4.9. The 'rate my drive' tool

The screenshot displays the 'Rate my Drive' tool interface. On the left, a navigation menu includes 'Rate my Drive', 'About', 'Map', 'Comments', and 'News'. The main area features a map of Greenwich Peninsula with 11 numbered location markers (1-11) along the Blackwall Tunnel and Millennium Way. A feedback form on the right contains the following text:

Log I

Where did you see or experience the driverless vehicle?
Thames Path

Why is that? What did it do well? What could be better?
Poor design

How helpful would driverless vehicles be in the area?
Environmentally friendly

Any other comments, thoughts or observations?
I realise it's just a concept but the cars were not as structurally sound as I thought they would be. I would not feel comfortable if they traveled at a higher speed.

There was no feedback on this comment.

Share Share

commonplace meant that interactions could be tailored to the GATEway project, modulating the agency of the project's participants as they used the platform to share their experiences and perceptions. For example, visitors were asked specifically to rate their sentiment around questions such as "would driverless vehicles be useful to you there?" and "why do you feel this way?". This mapping of sentiment allowed the project a clear metric during the public trials, which it could use to measure the public it was addressing.

The use of Commonplace epitomised the technology-intensive approach to public engagement, being an online digital platform run by a hired team of specialists (see Howard, 2006; Kreiss, 2016, on the use of technology specialists in organised politics). It was also Commonplace who developed and managed the sign-up process that I described at the beginning of this chapter. Moreover, Commonplace also provided an all-purpose sentiment map that was active throughout the entire project (see appendix B5). (This is where clicking the "add your views" button in figure 4.2 would take someone). As can be seen from figure 4.9, the design of the tool allowed short comments and pre-selected 'tag' responses. Building on the examination of the contextual features provided above, episode 4.7 describes the context in which this tool was used by project participants, in which prompts to use the app came from marshals and the QR code on the pod or information boards.

Episode 4.7

The 'rate my drive' interaction is advertised on the information boards and printed on the sides of the pods. I activate it while I am waiting with a marshal at one of the stops, whilst reading the information board. I've seen some of the pods go past, including one a few minutes ago, which was full. The way it works is, again, simple. The page uses the Commonplace platform to provide a map of the Greenwich peninsular, onto which I can 'pin' a comment according to where I saw the pod. The comment function encourages me to click some preselected feedback options (e.g. "inconvenient", "nice design", "better for disability/accessibility")

and finally to provide any other comments. I don't leave a comment, but I am curious to see what other people have posted.

It looks like there are between fifty and seventy-five tagged comments, at an estimate, all along the pods circular route. I am stood by the Air Emirates, so I see what others have posted while stood there. "Like them a lot. Think they are good and interesting edition to the Thames Path". This person also selected a tag: "nice design²⁰". Another tag, nearby, reads "did not like how the machine stopped as I cycled by. Would be better if it maintained speed". They selected a contrasting tag: "poor design²¹".

These comments could be geolocated, adding a geographical dimension to these participatory public-making practices. As can be seen in episode 4.9, these comments mapped cleanly onto the route. This tied the public, in as much as it was represented in these comments, to the material environment of the testing site, further integrating with the focus on the direct experiences of the pods. As an issue, then, CAV development existed within the boundaries of Greenwich and even more specifically within the boundaries of the pod ride itself and the experience that members of the public reported.

Commonplace is described on its site as an online platform that can provide "the quality and depth of engagement needed to increase reach, build trust, and get buy-in from your local community" (Commonplace 2018). As "Rob", a Commonplace representative, told me, the focus was on generating feedback from "local people and the area that they know and see every day" because it is "just a very effective kind of tactic for getting people to take the step to submitting their views or participating in a consultation [...] that has been our approach [...] that is probably the most useful information you can get". Applied to GATEway's objectives, Rob informed me that this meant generating "a dataset that will give us some insights about

²⁰ Comment can be found at: <https://ratemydrive.commonplace.is/comments/5abbb189325d8d0010ea8471>

²¹ Comment can be found at: <https://ratemydrive.commonplace.is/comments/5abb714d325d8d0010ea83ff>

how people and the vehicles interact with the urban environment [...] and partly how people's views change", adding that the with the respective groups that GATEway was trying to understand, they dealt with "slightly different data and it is collected in a slightly different way with respect to having slightly different demographic groups we've also got some quite interesting geographic data which may highlight some areas of locations where there are urban design opportunities or challenges" (Interview 13, November 2016). Rob's comments reveal how Commonplace was used to gather highly specific digital data from the people using the platform to provide their views on the pods.

Asked about the platform's application more broadly, Rob told me that "we don't describe it as consultation we describe it as engagement". I asked him the difference. "The difference is semantic to some extent, but consultation tends to be interpreted as something that is quite formal and legal or you know with some kind of legal connotations to it". There is a theme here between Rob's words and Andy's, in which they distance GATEway's approach from traditional notion of consultation. "But actually commonplace – although it does get used in formal consultation processes – is a tool which is more generally about community engagement – we describe it as the deepest most comprehensive way to engage people about issues to do with the place they live" (Interview 13, November 2016). This again demonstrates the participatory ethos that I have mentioned throughout this chapter, again clearly sublimated into the instrumental aims of the project.

The limits to what the project considered legitimate views were revealed when I asked Rob about a particularly negative comment that I identified, from one user who posted the following: "Yes a bad move! They will make people jobless!! Artificial intelligence is a dangerous move that will exterminate humans of rights and to quality of life [...]"²². Rob

²² Comments found at: <https://gateway.commonplace.is/comments>. This particular comment can be found pinned to the Blackwall Tunnel.

explained to me that they were likely to ignore these kinds of outliers, looking instead for the emergent themes of the responses (Interview 13, November 2016). This clearly suggests how the use of digital technology enabled the filtering of certain perceptions that were considered beyond the boundaries of legitimacy. This also demonstrates a limited framing of how participants could express their experience, in ways that were almost completely apolitical in their immediate sense, such as whether the pods were faster or slower than expected. Contrasted with the depth of contextual factors that made up the testing environment and the intentions behind the recruitment phase, this comes as a surprise. The range of public-making that was enacted through this tool was also well below what was expected, which one report assigned to the short time period of the trials (GATEway, 2018c), though attention could just as well be drawn to the reliance on this exclusively online means of public-making.

This concludes the presentation of empirical findings in this chapter. In the following section, I summarise the extent to which the participatory dimensions of public-making constitute technologies of humility and suggest, in this respect, the significance of the technology-intensive approach to public participation.

4.5 A Failure to Produce Technologies of Humility

As Jasanoff notes, participation does not ultimately mean that decision-making will be improved (Jasanoff, 2003a: 237), as cultures of governance that preclude meaningful dialogue mean that the simple existence of “formal mechanisms adopted by national governments are not enough to engage the public in the management of global science and technology” (ibid: 238). In this sense, technologies of humility should be viewed as an alternative to technocratic models (Braun, et al., 2010: 848), which as public administration scholar Dvora Yanow (2009: 592) has noted, tend to be seen in evidence-based policy-making. As I will show in chapter

seven, CCAV regularly engaged in this form of policy-making. This pre-empts important questions about the governance of CAV development directly linked to the participatory public-making practices that I have examined in this chapter.

In summary, the evidence and analysis in this chapter suggest that the participatory public-making practices within the project's public engagement process constituted technologies of humility only to a limited extent. For the most part, these definitive practices failed to satisfy the normative conditions which define technologies of humility. Moreover, these limitations were exacerbated by the technology-intensive approach to participatory public-making, which was used to exercise control over the input of project participants, in addition to providing a more efficient means of public-making. The use of digital tools to enable public-making practices was heavily interdependent with the framing of public engagement in terms of experiences. Thus, as a clear context of digital politics, I argue that GATEway should be understood as a 'technology-intensive project'.

In terms of *framing*, the limitations stemmed from many points. Firstly, the application of social psychology largely limited public-making practices to generating experiential knowledge about the public. This necessarily excluded many other forms of possible knowledge, in the interests of generating responses which were perceived as more informed and certain. This narrowly defined the frame of engagement. Moreover, the expertise behind the application of "construal level theory" belonged to a small network of actors in senior positions within the project, meaning this frame was not open to revision. In effect, the issue was defined too narrowly. The framing within the workshops was more expansive. The hopes and fears framing allowed for limited challenges to CAV development, though these were clearly intended to operate *fait accompli*; forms of public-making that made developing more CAVs more efficient. There was evidence that citizens deliberated the issue and engaged in social learning. Ultimately, however, as Barnett et al. (2012: 47, cited in Stilgoe, et al., 2014:

7) have argued, it appears that within GATEway the “the construction and expert control of public concern invites interactions framed in terms of expert reassurance rather than mutual exchange and engagement”.

Regarding *vulnerability*, the evidence and analysis clearly point to a situation in which citizens were defined *as* a public by the project, but unable to self-define what this meant. Enabled by the technology-intensive approach that the project took, participants were classified into groups that the project decided were affected by the issue. Though this was seen as being more inclusive, groups remained classified by expert discourses. There were suggestions in the workshop that citizens voiced their own identities, but this was not pursued by the project. This opens to speculation what groups were not included in the public engagement process, had participants being able to define themselves in more detail. Moreover, it is not clear that participants understood themselves as a public in any meaningful sense. They were, in effect, a public for an *other*.

In terms of *distribution*, the issues with the framing and vulnerability created a situation in which discussion around the implications of the issue was limited. For example, groups that were not initially considered as relevant were left out of the process, as there was no opportunity for citizens to revise this frame. Moreover, the focus on experiences meant that only the psychological aspects of engaging with the pod were considered, such as whether individuals felt it was safe. However, the workshops provided some affordances to discuss the distribution of the issue, but again this took place within a number of predefined frames.

Finally, regarding *learning*, the clearest opportunities for citizens to learn appeared in the workshops, in which they could directly communicate with one another. In this setting, shared perspectives and different public identities could be explored. Moreover, there is a limited sense in which Commonplace enabled social learning, as citizens could see what others had said about the issue. However, the affordances of the platform meant that people could not

comment back. Within the trials, the dynamic was clearly one in which citizens were there to be learned about, but not themselves to learn. Individual interactions were siloed by the use of the digital research tools. Only in the final report were citizens able to see the collective outcomes of their engagement.

4.6 Conclusion

In a press release provided immediately before the full public trials began in March 2018, the trials were presented to the public as “the opportunity to engage with the new technology and share their experiences” (GATEway, 2018). By situating participants as members of the public, the project calls upon itself to be held accountable to a critical analysis of the depth of democratic citizenship it offered, as this chapter has aimed to provide.

The GATEway project engaged citizens *qua* members of the public on its own terms. This chapter has examined the multitude of ways in which public-making practices defined this public engagement process. In addition, this chapter has provided an analysis of the democratic affordances within this process, by applying a critical framework. On this basis, it has challenged the democratic quality of this process, showing the numerous ways in which participatory public-making practices offer only very limited and highly managed inputs from the public. In many instances, public-making within the public engagement process did not afford members of the public the capacity to directly address the social and economic benefits of the pods, mostly notable in the framing the engagement within the experience of participants, which was reinforced through the digital tools used to enact public-making during the trials. These points also contribute to the discussion in chapter seven, where I discuss how this knowledge potentially informs the policy-making environment of CCAV.

In a broad sense, this chapter disputes Marres' assertion, discussed in the conclusion, that in GATEway "it appears that publics are only allowed to engage *qua* publics after the fact" (Marres, 2017b: 13) by showing how they are constituted as publics throughout the project. However, the extent to which public engagement did not pose a threat to AV development, or rather, were not allowed to pose a threat, is significant. Moreover, publics were not able to define themselves *or* the issue in an ontological sense – they could not decide the framing of the issue – which were among the most significant limitations to their involvement.

In the next chapter I examine the communicative dimensions of public-making.

Chapter Five: The Communicative Dimension of Public-Making

This chapter deals with the communicative dimensions of public-making within the GATEway project. To fulfil its key objectives, it was crucial for the GATEway project not only to facilitate participation, as examined in the previous chapter, but also to communicate with a broad audience through various methods of communication. As I will explore in this chapter, the project provided information which had two key purposes: (1) to inform citizens about the development of CAVs as a public concern, specifically in relation to GATEway's activity; and (2) to instruct and encourage citizens to participate in the project's public engagement process. Fulfilling these purposes required project actors to engage in communicative public-making practices which, to reiterate, are defined as practices which articulate or influence mediated representations of the public.

My argument in this chapter is that the performance of communicative public-making practices by project actors maintained control over the mediated representation of the project. Moreover, the exercise of power that these practices reflected, drawing on Chadwick's notion of power (Chadwick, 2017: 21) in a media system that I described in chapter one, facilitated the government-led strategy by generating representations of the public which showed support for the development of CAVs. For instance, as demonstrated in episode 1.2, direct access to and interaction with journalists was a key situation in which enactments of the public that suited the project's aims were possible. This chapter therefore agrees with Marres' argument that the GATEway project, and others, were highly managed events (Marres, 2017b: 13), but goes further with the analysis in the granular focus on practices.

The structure of this chapter is as follows. It begins by outlining the conceptual framework used to analyse the democratic affordances of the communicative dimensions of the GATEway project, and the public-making practices therein, drawing upon political

communication scholar Chris Wells' (2015) notions of "civic information" and "civic information styles". The chapter then applies this understanding to an empirical account which has three main parts. First, I examine the communicative norms that constituted the project's communication strategy. Secondly, I examine the outcomes of this strategy, focusing on the news media coverage the project gained. Thirdly, I explore how project members engaged in media-related practice (Couldry 2012: 37), around key events in the project, such as the vehicle trials, and propose what I term the *mediated performance of successful autonomy*. Finally, I summarise the argument that the performance of communicative public-making practices in the conclusion.

5.1 Civic Information Styles and Democratic Citizenship

The GATEway Project provided information through the range of communicative means typical in a hybrid media system, including social media channels, targeted emails, and news coverage. As I will discuss in this chapter, the method of communication that the project consistently relied upon was online news coverage. When engaging in communication, project actors had varying levels of control over the way in which the project and its associated elements were represented – including the public. Interactions with journalists, for example, often involved a degree of management, and caution, as a reflection of project member's otherwise limited control over the production of news coverage. Direct communication with project participants via email, however, allowed for high-levels of control. To generalise, the purpose of the messages that the project communicated can be placed into two broad categories: (1) to inform citizens about the development of CAVs as a public concern, specifically in relation to GATEway's activity; and (2) to encourage citizens to participate in the project's public engagement process. As one project member summarised neatly, the

project's communication involved, "making sure that people are informed [and] that they feel informed that they are able to give their views" (Interview 15, March 2017). For these messages to be effective, project actors needed to establish communicative relationships with large numbers of people. Though many of the organisations involved in the project had established audiences, *GATEway itself did not*. Thus, project actors were required to build communicative relationships through which it could both inform its audience and promote engagement.

To conceptualise the communicative relationships that the GATEway project established, and attempted to establish, with citizens, I draw upon Chris Wells recent notions of "civic information" and "civic information styles" (Wells, 2015: 8). These concepts provide both an accurate conceptual description of the project's methods of communication, as well as a way to critically approach the democratic affordances therein, as I will now briefly explain.

Civic information is defined by Wells as, "*the continuous flow of facts, opinions, and ideas that help citizens understand matters of potentially public concern and identify opportunities for action*" (ibid.: 7, italics in original). As he puts it:

civic associations have provided civic information with mobilizing frames aimed to both inform citizens and move them to engagement: whether they are providing knowledge about the issues facing the organization, or notices about action opportunities, such organizations' intents are always, directly or indirectly, to build a base of knowledgeable and inspired supporters ready and willing to be engaged in politics and public life (ibid.: 64).

The empirical focus on communicative public-making practices engages with this conceptual understanding of information through the broad constructivist lens I established in chapter one. Based on what Couldry refers to as "media-related practice", it applies the focus to what actors do "*in relation to media* across a whole range of situations and contexts" (Couldry, 2012: 37, italics in original) to the construction of civic information and the

Table 5.1. Civic communication styles

	<i>Older/Dutiful Style</i>	<i>Younger/Actualizing Style</i>
Appropriate sources	Experts authenticated through civic institutions: news, political leaders, officials of civic organizations	Varied and diverse; news, organizations, and movements of interest, social contacts
Modes of interacting with information	Centered on reception of information from news and key leaders	Expectation of participation in production and sharing of information
Information interpretation and assessment	Guided by membership/identification with social groups, parties; authoritative sources key to credibility	Driven by individual interests and trusted networks; credibility based on relevance and reliability
Action outcomes	Targeted, often official actions that place the actor as secondary to the organization's maintenance and strategic objectives	Expressive actions communicated through networked publics; actor is at the center, both influencing peers and expressing own views

Source: Wells (2015: 51)

articulations of the public that were found therein. This allows a critical perspective on how power-relations between actors shaped the construction of this information.

The second key concept I draw from Wells is what he terms civic information styles. Civic information styles are defined by Wells as, “orientations to political communications deriving from individuals’ experiences of self-identity, civic life, technology, and communication” (Wells, 2015: 8). In other words, these styles refer to a citizen’s favoured mode of interaction with civic information. They are the expectations and norms that citizens

apply to the following variables when engaging with civic information: “who is an appropriate creator, or *source*, of civic information; citizens’ inclinations for how to *interact* with information; the processes by which citizens *interpret and assess* information; and citizens’ preferences for the *kinds of civic action* made possible by interacting with civic information” (ibid.: 50, italics in original). Wells proposes that the broad differences in the distribution of these norms and expectations constitutes two predominant civic information styles within modern society, as shown in table 5.1.

The first style Wells refers to as the “dutiful style”. This emphasises more traditional, state-centric communicative relationship, in which citizens trust officials and are prepared to receive information from them. The second style that Wells identifies is the “actualising” style. This emphasises an ethos of participation in the generating information, in which citizens present a more pragmatic attitude towards the information they receive.

The civic information styles that Wells proposes draws upon and develops the widely used dual typology of actualising/dutiful citizenship that explored by Bennett (2008) and Bennett, Wells and Freelon (2011), among others. My use of Wells civic information styles in this chapter alters the use of these underlying typologies. Rather than focus on how citizens understand their citizenship in a communicative setting, the analytic focus in this chapter is on the expectations and norms that the GATEway project applied to the communicative relationships it established. In other words, it examines the basis on which project members that engaged in methods of communication understood the communicative relationships they were establishing, and what assumptions about the variables in table 5.1 were made. This notion of civic information styles therefore serves to orientate an interpretation of the media-related practices that GATEway’s project members engaged in in terms of the themes of this thesis: democratic participation and power-relations. It does so by asking: did the forms of civic information that GATEway project actor’s produce and the means by which they

communicated this information resemble a dutiful or actualising approach to the citizens that the project claimed to be engaging with? And what does this mean for the affordances of democratic citizenship?

Wells links civic information, and these stylised understandings about how it is produced and consumed, with models of citizenship within democratic society (Wells, 2015: 10). According to Wells, the current era of what he terms “media politics” is defined by corrupted relationships between citizens, media, and political institutions in which civic organisations have “turned their backs on citizen-members” on favour of more strategic forms of “communication warfare” (ibid.: 19), such as those described by Howard (2006). This analytic focus is supported by Baldwin-Philippi’s argument, provided in the introduction, that the construction of messages in organised politics points to the active understandings of citizenship that produce them (Baldwin-Philippi, 2015: 162). Moreover, as Chadwick et al. (2018) have recently shown, the communicative behaviours that citizens engage in can have “democratically dysfunctional” outcomes, where citizens engage in misinformation and disinformation. In the interests of democratic participation, then, there is a reasonable basis to apply this normative expectation upon GATEway.

Wells’ study is a suitable source of theorisation within the political communication literature as his study focuses on what he terms “civic organisations”. I adopt the term civic organisation loosely in this chapter, based on the same functional (rather than structural) definition that Wells provides, in which the focus is on organisational engagement with citizens (Wells, 2015: 61); this I argue accurately describes GATEway. I also distil from Wells’ definition the explicit and overarching focus on young people that his study investigates, leaving behind a useable definition of “organisations that *promote civic or political involvement*” (ibid., italics in original), which, in this case, refers to involvement in the issue of CAV development. I continue this discussion in the following chapter, where I examine the

organisational dimensions of public-making. For now, the definition provides a clear basis on which to explore the communicative dimensions of the GATEway project and align the empirical data in this chapter with Wells' concepts.

Based on further ethnographic evidence, this chapter links the production and circulation of civic information, and the performance of communicative public-making practices therein, to the instrumental political function of the project's public engagement process. This has already been partially demonstrated, in the previous chapter's account of how citizens participated in the GATEway project, as this relied on the dissemination of civic information for citizens to know how and where to participate. Building on this, this chapter suggests that there is evidence that both forms of civic information style were assumed by project members, as may be expected (Bennett, Wells, and Freelon, 2011: 839), as they engaged in communication. However, I argue that civic information was more often produced and circulated on the assumptions of dutiful civic information styles, as this better facilitated the promoting of the government-led strategy and provided more control over the mediated representation of the project.

In contrast to Marres' (2017b) critique, it is important to note that the exercise of power in a media system is not necessarily undemocratic, as I claimed in chapter one (see Mouffe, 2000). For example, political campaigns, which are emblematic of the function of a healthy democracy, stringently attempt to control their messages, even if their operatives tend to deviate from them (Nielsen, 2012). However, regarding the increasingly professional management of communication (see Davis, 2002; 2013; Lilleker, 2015; Stromback & Kioussis, 2011) it has been argued in the political communication literature that professionalization threatens to contribute towards both democratic deficits and the obfuscation of power-relations. Similar concerns are also present across the public understanding of science (PUS), literature closely associated with STS, in which the communication of science has been carefully and

explicitly linked to societal concerns with both democracy and power (Bonney, et al, 2016: 3; Dawson, 2018: 2; Stilgoe, et al. 2014; see also Nelkin, 1995, for a key study). Stilgoe et al (2014), for example, point to the increasing shift towards “dialogue processes” in public engagement with science (ibid.: 5) and the persistent concerns about legitimacy, trust, and power-relations inherent within them (ibid.: 6). Melanie Smallman’s meta-analysis of the PUS literature reveals an increasing critical concern with media coverage based on these concerns (Smallman, 2016: 193). These concerns across both literatures emphasise and affirm the need to understand how GATEway project actors performed communicative public-making practices.

As a final point, there are some limitations to this conceptual approach. First, this chapter does not measure the extent to which citizens were informed or participated through communicative means, although that is clearly an important question. James Dennis (2019), for example, has recently proposed a “continuum of participation” as the basis for this type of analysis. Secondly, although citizens engaging through the actualised style could be interpreted as performing communicative public-making practices, I do not explore that here. Elements of this are examined in the previous chapter, for example in the use of *Commonplace*, under participatory public-making practice. I do not, however, look at citizens who engaged via social media – partly because there did not appear to be a significant number, but also to maintain the analytic focus on the project as an organisation, which I cover in the following chapter.

I now present the empirical findings and explore the definitive role of communicative public-making practices in how the project controlled the mediated representations of GATEway and its activity.

5.2 The GATEway Project’s Communicative Norms

In this section, I present evidence of the GATEway project's communicative norms, drawing on first-hand evidence from interviews with project members, project documents, and observations of strategic discussions.

Norms are understood here in a straightforward sense as shared understandings of regular action in which a group of actors is collectively involved. In the context of GATEway, the focus on norms is a useful way to present an understanding of how and why actors within the project produced and circulated civic information in the ways that they did. I focus specifically on the norms which guided the performance of communicative public-making practice but take into account the empirically broad range of media-related practices.

5.2.1 *Devising a Strategy: What's the Message?*

Effective norms were important to the project in a strategic sense. As outlined in chapter three, media engagement was part of a dedicated project work package, working closely alongside the project members responsible for the forms of participation seen in the previous chapter. The importance that project actors placed upon media engagement was significant and hard to overstate. During a single day of project activity in April 2017, for example, the GATEway communications team gathered a database of over 300 news articles that covered the soft launch of the public trials (see appendix item B7). This was used as evidence of their engagement, which could be shown to officials from CCAV.

Importantly, as I will show, project members strove for representations of the public within this kind of coverage in which the public appeared to be supportive of the technology *and* which showed the public using the GATEway pods successfully. Where it was possible to influence these representations is where the role of communicative public-making practices was most important. I highlight this in section 5.4, when I discuss the public trials in March

2018. However, without the sufficient norms in place (and they were not always) very little of this would have been possible. In the following sub-sections, I present a selection of salient norms that guided the project's communicative dimensions of public-making.

The project's communication strategy was based around the generation and circulation of civic information that was intended to effectively meet the project's objectives: namely to promote the prospects of the adoption of the technology through the construction of public understanding, and to instruct encourage citizens to participate in the project's public engagement process. To ensure this, a significant amount of the work that went into the strategy involved deciding what the most effective and instrumental communicative methods would be²³. This revolved around detailed discussions between project members in which they decided upon both the right message to present as civic information and the appropriate communicative mediums through which to circulate it, as episode 5.1 illustrates.

Episode 5.1

September 2016. Monthly boardroom meeting. The soft launch of the public trials is expected soon. As the consortium expects a large media presence the discussion turns to how they will communicate the launch, orientated around the discussion of the media strategy. A three-day plan has been put together. The main points of the strategy include targeting major news outlets as a priority to maximise exposure and flagging the launch on social media to create awareness and buzz. Journalists will be able to ride shuttles to inform their coverage. Major news outlets (national, international) will get priority on the first day, and then smaller (local) outlets will get a go. The media strategy is layered, for national and local coverage.

There is a lot of deliberation among the project members around this: somebody mentions the importance of having "enough stories to tell" and noting it would be good to get a government minister involved to help boost the profile of the event. Someone else cautions against too much complexity in the strategy, stating that

²³ This also entailed and was shaped by the organisational dimension of the project, which I cover in the next chapter.

“people just want to see the vehicle moving”. The need to create a “media appetite” by reaching out to journalists, and “keeping the journalists happy” is mentioned several times. Another member mentions the importance of “educating the media” to ensure that the project gets an accurate representation, anxiously noting some of the negative media coverage. As he had done during an earlier part of the meeting, one of the media, public, and stakeholder engagement leads speaks up about the need to show that this project is about “society”, not the “technology”. There is an agreement among the room that this is the first time the public will have seen the pods in action, so they need to make sure that they get it right.

During strategic discussion such as these, a regular group of project members would emphasize the need to present the project strategically. In other words, to disseminate civic information that aligned with the project’s objectives. The main strategic element was the controlled operationalisation of journalists, through scheduled visits to the test site, ‘educating’ them, and building relationships. However, these discussions also showed how project members adapted their strategy to the demands of these journalists, by ensuring they had “enough stories to tell” or by creating a “media appetite”. In this regard, managing information carefully to avoid over-promising in a way that could damage the public image of the project was also emphasised. Moreover, there was also a hierarchy present in this strategy, in which national or international news organisations, and thus journalists representing organisations, were targeted as a platform for civic information and thus given preferential access to the project’s trials. For example, one discussion involved giving national press the morning slots to ensure their coverage set the agenda. These discussions suggested a communicative norm based upon a dutiful civic information style, in which they would act as authenticated experts providing information through news coverage.

However, the project members also stressed the need to pursue other means of communication, besides news coverage. Project members often brought up the need for other

project members to produce blog posts and social media posts to promote the project to the public. Vinette Taylor, who helped shape the communicative strategy of the project, was one of those who emphasized the need to use social media, reiterated this several times during an interview. She demonstrated her idea of “some really good feedback” by reading to me comments from people that she had engaged with on Twitter or who has commented on the project’s YouTube channel. She linked this to what she felt the focus of the project’s communication should be: “It’s not about the things, it’s not about the connectivity, it’s not about the platform, and it’s not about the big data that’s coming out of that platform, it’s about the question that people are asking and our customers are asking [...] it’s about putting people first” (Interview 5, May 2016). This was reiterated by “Sam”, a representative from Digital Greenwich, who stated that “the intention with the use of social media was to “use all of those channels to make sure we’re telling people about it [GATEway]” [...] encouraging them to sign up, give us your views” (Interview 16, March 2017). Both Sam and Vinette Taylor’s comments suggest an audience which would engage with the project through an actualised civic information style, in which information is presented through different sources with an expectation that citizens would also take part in producing and sharing civic information.

These accounts reflect the strategic groundwork for communicative public-making practices that was in place. There was a consensus within the project that building communicative relationships through news coverage was important. Moreover, some project members advocated communicating with individuals on social media, although as I will demonstrate, this strategy was not as pursued to the same degree of the former. Together, the strategic aim was to create in these communicative relationships the affordances that project members needed in order to be able to enact the public in ways that suit the objectives of the project.

If this outlines the means of communication that the project strategically favoured to disseminate civic information, then what was the explicit message that the project aimed to communicate? What was the content of their civic information? Several project members explained it to me:

For Greenwich the right message is that we are confident [...] to share the view of many people that AVs are coming [...] they're going to have huge benefits to society assuming they're rolled out in the right way [...] maximizing the benefits that AVs could bring (Interview 16, March 2017)

The story of the project is about how the public learn to trust and to accept automated vehicles in the city (Interview 15, March 2017)

It's getting that full picture and getting people to realise [we want to] break down those barriers and get that information out there (Interview 2, April 2016)

Across the different explanations of the message that I was presented with, a similar theme emerged in promoting the social and economic benefits of the technology that was linked to a public trust in the vehicles. Members within the project saw their role as getting this message across: these vehicles will make things better and you can trust them to do that. I will provide some examples of this below. The key point here is the congruency between the project's message and that of the government-led agenda at a discursive level. The notion of social and economic benefits is one that is embedded within the discourses used by government, as seen in chapter three, as is the notion of trust. In this sense, the project's communicative aims can be interpreted as strategic political communication that facilitated the government-led strategy. Once again, this demonstrates the basis on which communicative public-making practices took shape, since a supportive public was key to the government's aims.

The next subsection explores how project members saw the purpose of the information that GATEway disseminated, showing how it constituted civic information.

5.2.2 *Informing the Public*

The notion of building the public's understanding was an important normative perspective shared by project members. This norm had several aspects to it, as I will describe. The basic notion was put to me in no uncertain terms by Vinette Taylor, who told me that "it's [GATEway] very much about education, about educating and informing the public" (Interview 5, May 2016). This was also elaborated on by Nick Reed, who described how "on the media side they'll be exhibitions and demonstration days where we can allow the press to come and see what we're doing and present that to their audience and so through that help to build the public's understanding" (Interview 1, December 2015). Further project members also stated this, for example Rob, the Commonplace representative from the previous chapter, who said: "our aim at the moment is less about persuasion and more about [building] understanding" (Interview 13, November 2016). Taylor's and Reed's and Rob's comments indicate how informing what the former two described as the public through civic information was a key aim. This notion of building the public's understanding can be linked to the application of social psychology seen in the previous chapter, in which exposure was expected to produce trust and acceptance that would rest on 'experience'. This view was also shared among a broader range of project members during strategic discussions.

The view that the public needed to be educated was of course predicated on the implicit assumption that there existed a need for civic information because the public was uninformed and/or misinformed and/or disinformed. However, project members did not make these claims explicitly in either interviews or during observations. In other words, there was underlying and

unquestioned assumption that there existed a deficit in public understanding. Bauer has noted that the assumptions of a knowledge deficit can play into the hand of technocratic attitudes (Bauer, 2009: 223), creating in the context of GATEway a situation in which, as Stilgoe has noted, developers envisage deficits in public understanding as holding back the “unarguable potential” of AVs (Stilgoe, 2018a: 44). Project members often displayed in interviews sentiments such as: “the technology is there I keep saying that but it’s about educating people” (Interview 5, May 2016). This, however, carries with it important implications about the content of information being provided – as seen in Waymo’s public education campaign in the prologue, the lesson can be rather superficial.

This norm within the project of informing or educating citizens, ‘the public’, or ‘people’ (there was a lack of consistency across the interviews) intersected with the project’s norm of strategically leveraging news coverage. In aiming to distribute civic information that informed citizens via news coverage, the project’s communication became shaped around the expectations of a citizen who was adhering to a dutiful civic information style. This ties in with Wells own observations, in which despite the focus on civic information being on the organisations themselves, journalistic contributions remain critical to the “stock of circulating information” (Wells, 2015: 65). In GATEway, as I will show, there was a strong reliance on this norm. For example, to inform the public, the project often used authenticated representatives from the project as spokespersons to communicate with journalists, which I examine in the following subsection.

However, as well as seeing news coverage as an opportunity to circulate civic information that could inform the public, the project also perceived it at times as a definitive obstacle and even as a potential risk in this sense.

The ways in which project members perceived media coverage as an obstacle to the strategic production and dissemination of civic information covers a few points²⁴. First, many project members extended the information deficit that they perceived in the public to journalists (note the comments in episode 5.1 about “educating the media”). In interviews, Nick Reed often adopted the patient yet resigned tone of someone who has had the kind of conversation, that he described to me here, countless times: “journalists, yeah”, he sighed. “you have to go back a step and go well it depends what you mean and in certain areas it [CAV development] will happen very soon and in others it won’t” (Interview 15, March 2017). Journalists, he reflected, just do not tend to understand the topic because they look for certain frames which do not fit the reality as Reed and others understand it. This can be seen in how project members consistently expressed concerns about the kind of coverage that the journalists were inclined to provide, which is the second point. As Nick Reed put it, “They want black and white and its shades of grey isn’t it. I think it depends, it depends...” (Interview 15, March 2017). This suspicion was reinforced by negative or sensationalist stories that project members often stated that they came across (most of them reported following the news coverage closely), as suggested in episode 5.1.

This anticipation of risk was also connected to both serious malfunction of the vehicles and the creation of false or undeliverable expectations that could completely undermine the entire project. Regarding malfunction, as Chuck put it, “you don’t want to be the first trial that the media latches onto because you’ve injured or killed someone, or an animal, there’s so many things that could go wrong running a vehicle in a public space” (Interview 6, June 2016). Rob put it similarly, stating that “The project might become a kind of lightning rod for concerns

²⁴ It is important to note that most of my interviewees elaborated on this when I asked them (a) whether they followed news coverage about AVs or (b) what the difference between an autonomous vehicle and a driverless car was. For example, upon asking the latter, one immediately replied by saying: “there is probably a job to do in media of saying when we talk about driverless cars and autonomous cars actually what we’re doing is talking about the same thing” (Interview 2, April 2016).

around safety and changing jobs and so on because it is one of the first that's on the street [...] I feel like it could go either way" (Interview 13, November 2016). Secondly, regarding expectations, Sam explained that they needed to be extremely careful about what they said to the media in case they promised something that they would later be held accountable for: "we've done a lot of comms over the past year I suppose that has talked the first public trial of autonomous vehicles so it is important again that we are not making false promises". (Interview 16, March 2017). This was also expressed by Reed, who stated the need "to be careful about that and not be super optimistic all the time or utopian about how things will change, that there will always be more questions that need answers" (Interview 15, March 2017).

As a result of all this, the project developed a stance towards journalists that leaned strongly towards caution and controlled messaging. The use of PR specialists, as mentioned in episode 1.2 and discussed below in section 5.4, was emblematic of this. To explore how this stance became embedded in the relationships between project members and journalists in more detail, I now turn to the way in which the GATEway project deployed spokespersons as "primary definers", drawing on Hall et al.'s (1978) classic formulation.

5.2.3 *Targeting News Coverage: Project Members as Primary Definers*

A key norm that defined the GATEway project's communicative dimensions was the careful selection of specific spokespersons to both engage with journalists and otherwise officially represent the project. The positioned certain project actors as key performers of communicative public-making practice, demonstrating the way in which these practices helped to control mediated representations of the project.

The role of Nick Reed was emblematic of this norm. Episode 1.4, for example, shows Ed asking for Nick Reed to spearhead interactions with journalist at an official media event.

Nick was deeply admired within the project and was regarded by many project members as the unofficial face of GATEway. As one project member put it, “I think he is a superb spokesperson for the project – we have some very high-profile relationships and he is an excellent representative for the project so we’re very happy for Nick to carry on being the face of it” (Interview 16, March 2017). This is a role that Nick consistently filled whilst he was involved in the project, with frequent quotes appearing in numerous news articles (for example, Burgess, 2017; Hodson, 2016; Topham, 2017b) and his name put to quotes on the website, as mentioned in the previous chapter. Asked about a particular piece of coverage that appeared in *The Guardian* (Topham, 2017a), in which Nick was quoted, he commented on the value of the platform and told me that he was “pleased Gwyn [Topham] represented the chat I had with him very well” (Personal communication, 25 November 2017). Nick’s comments reflect the importance placed upon establishing relationships between the project and journalists, a position which some other project members also described during interviews (Interview 5, May 2016; Interview 19, May 2017) and which can be seen in episode 5.1.

In their interactions with journalists, the roles that specific project members, such as Nick Reed, played in communicative as can be understood as what Stuart Hall and colleagues influentially referred to as “primary definers” (Hall, et.al, 1978: 60). This classic concept has been revisited recently as a way to explore the authority of news sources on social media (Chadwick & Anstead, 2018), but I use the concept here in its original sense. Hall et al define a primary definers as credible individuals who are granted media access in order to provide the initial framing of events. For GATEway, this was a situation in which it was possible for their spokespersons to act as primary definers for their own events. However, this situation did not arise simply because the project allocated spokespersons. These actors needed to match up with the “structured preference” within the media towards those who have access to accurate or specialist information on particular topics (Hall, et al., 1978: 61).

In fulfilling the demand for coverage, journalists from international news outlets such as the BBC and *The Guardian* have also been able to claim a niche in providing accurate and useful accounts of regulation, accidents, testing, technical advances, and business deals. To provide this information on the development of AVs, however, journalists need regular contacts connected to the development of AVs. This is where key figures such as Nick Reed were able to offer themselves to journalists as primary definers, with the projects they were a part of a key source of visible credibility. As Reed put it, AV development is “a massive topic and although GATEway is not covering the full breath of the topic people still come to TRL to ask about ‘what it all means’. I get asked the question very often about ‘so when we will see these things on our roads?’” (Interview 15, March 2017). Nick’s comments here reflect two things. Firstly, that being an expert with a profile he was able to become a key contacts for journalists, who wanted to better understand and convey to their audiences what AV development is. This reflects a second key point, linked to the deficit that project actors identified in the media’s understanding, in which it was possible to shape understanding by taking up the powerful position of a primary definer. As Reed put it, when asked about the spokesperson role that he had taken up as part of the project: “I don’t think you ever feel comfortable. I certainly don’t ever feel fully comfortable - just cos’ its risk and reward isn’t it? There’s a reward in having your viewpoints out there, but there’s also a risk that what you say is misinterpreted or you’re caught off guard and say the wrong thing. But, people want answers and I’d like for those answers to come from the position that TRL has” (Interview 15, March 2017). This again suggests a reliance on a dutiful civic information style, as the civic information being produced here is both clearly intended to come through one source and is explicitly aimed at meeting the strategic goals of GATEway.

This suggests support for the argument made by Wells that “what we often observe in public communications is a cynical exchange between politicians [and other actors] and media

elites, as each obtains desired outcomes in sometimes antagonistic, sometimes collusive, exchanges” (Wells, 2015: 19). The need for designated primary definers is acutely connected to the careful management of civic information. Possessing and contributing primary definers to the issue placed the GATEway project in a position in which it could exercise power through the information it provided. This is important in the context of the public-making, as it provided ample opportunities for project actors to define and influence the articulations of the public within the civic information that was produced and circulated in relation to GATEway.

However, despite the many benefits in the relationship between the project’s spokespersons and journalists, it is important to note that there was a clear tension in this emergent interdependence between journalists and the project, as suggested in the previous subsection. The actions of spokespersons were not guaranteed to work, as journalists were also able to exercise power through their positions. This, again, is why these journalists were so closely managed. I return to demonstrate this key relationship in action in section 5.4. Before that, I examine some of the civic information that was produced by the GATEway project.

5.3 Examples and Project Members Reflections: Civic Information

Over the course of the project, a range of civic information was produced and circulated in order to inform citizens about the development of CAVs as a public concern and to encourage citizens to participate in the project’s public engagement process. The project had significant success in attracting news coverage. However, its social media strategy appeared far less successful. This is reflected in the relative emphasis in this section on news coverage, itself suggesting how the project’s communication gravitated towards building communicative relationships based on interactions with citizens assumed to be adopting a dutiful civic

information style. I also present some reflections from project members on the civic information the project produced.

5.3.1 News Coverage

Project members were often taken aback by the level of media coverage that they received. As Sam explained, “when they had the launch event which was a year ago or maybe a little bit longer [name] said, you know he got here at like 6 in the morning or relatively early and he was completely taken aback by the level of media interest, you know every kind of major news site was here and all descended on Greenwich and of course that is what we are happy to have” (Interview 16, March 2017). This broad news coverage offered the project a high profile, which it could use to spread the message of the project, inform the public, and encourage participation. It also provided the project members with a lot of work, as this coverage had to be carefully managed, leading to the range of norms covered above.

Typical coverage that the project aimed for and often received would contain three things:

- (1) an account of the pods working as planned;
- (2) some mention of public support and/or acceptance;
- (3) a statement linked to the government strategy, such as the social and economic benefits of the technology.

Take, for example, this BBC news article which covered the soft launch of the trials in April 2017 (Thomas, 2017). The article contains a statement which mentions in the first line that “members of the British public are getting their first extended trial of a driverless shuttle

bus”, with a quote from a project representative in which they state how “we hope to gain acceptance from members of the public for vehicles sharing this kind of space with them”. This is followed by a mundane and basic description of how the pods work, under the subheading “fail safe”. Finally, there is a quote. “Industry Minister Nick Hurd said: ‘The UK has a history of innovation in the auto sector and this type of technology has the potential to save lives as well as offer freedom to the elderly or those with mobility impairments’”.

The perception among project members was that this strategy was largely successful. As Sam put it, she felt that, in relation to the work done by the project, “if there’s an article about driverless cars there’s usually some quite bog-standard information which is government is investing, positioning the UK, trials happening in Milton Keynes, Greenwich you know I generally think it is positive and supportive”. For the most part, the perception was also that the project managed to avoid directly negative coverage, despite the fact the project was hampered by delays and ultimately underdelivered on its original scope for participation. As Sam continued, “there haven’t been any stories in the press about another delay for the GATEway project typical government IT project typical balls up” (Interview 16, March 2017). As per the comments of the project member in episode 1.4, many felt that the aim for the public to ‘only see the positives’ was achieved.

Favourable coverage was leveraged by the project. For example, during the full trials, as I will cover in the following section, the project retweeted positive news coverage. Moreover, in its final report (2018b: 22), news media coverage was highlighted as an area where it was felt the project had particularly achieved (see fig 5.1). However, some were less pleased. Talking about the news coverage surrounding the April 2017 soft launch (in which over 300 news articles were generated), Andy Frost voiced skepticism about how the vehicle had come across. “I think there was a lot of noise I think there was hardly any mention of GATEway”, he said, in reference to the project’s key messages. He also voiced his

Figure 5.1. Civic information as news media coverage perceived as successful

The Telegraph

"I realise something pretty remarkable. This machine is finding its own way around the world, almost like a living thing. The engineers on this project have built something that behaves like a living creature." **Reach: 25 million**

The Register

"It was just like a journey in a London taxi – right down to 120-year-old cypriots whooping just within inches of the vehicle" **Reach: 40 million**

AUTOCAR

"GATWay is definitely pushing the safety and control margins of manoeuvring in a hazard strewn environment to a new level" **Reach: 30,753**

MailOnline

"Nearly six out of 10 (57%) UK adults believe connected and autonomous vehicles will improve their quality of life, according to a recent survey of 3,641 people by the Society of Motor Manufacturers and Traders." **Reach: 2,009,100**

The Telegraph

"This is one of the best answers I've seen to the question of sustainable mobility, not to mention the most meaningful application of autonomy I've ever encountered." **Reach: 25 million**

METRO

"I felt extremely safe about the driving pod. For a start it had a top speed of 5.5mph, and it stopped to think every time any pedestrians or cyclists got too close." **Reach: 1,403,646**

GATEway

TV Coverage

5 live

LONDON LIVE

alpha

"The GATWay project it's trying to understand how we humans feel about the machines." **Reach: 10.6 million**

CleanTech

"not only to test the functionality of the pods themselves but also and perhaps more importantly, sense how the public receives the vehicles." **Reach: 3.5 million**

FirstNews

"this is cutting edge research after all, and the software is still learning." **Readership: 2.2 million 7-14 year olds**

sky NEWS

"Overall though, me and my friend found it completely changed our year on the car. I think they are safe in this use and I would definitely use one if they were a bit quieter." **Reach: 765,685**

WIRED MAGAZINE

"Autonomous vehicles are being developed by a number of companies around the world, including Ford, Tesla, Google and – if rumours are true – Apple." **Reach: 262,504**

BUSINESS INSIDER

"The GATWay project exemplifies the innovation that the UK excels at." **Reach: 505,635**

21

The GATWay project has truly captured the imagination of the nation and we believe that is due to its primary focus being 'people.'


Whilst the technology and software used were of paramount importance to the success of these trials, through placing people at the heart of the project and seeking to understand their perceptions and needs, we were able to provide a unique, never seen before, insight which was of interest to a significant number of media channels.

In addition, the project was also visited by numerous MPs and local Councilors throughout its lifetime and was used as a backdrop for ministerial announcements such as the Autonomous and Electric Vehicles (AEV) Bill and the recent review into driving laws in preparation for self-driving vehicles.

This interest was a significant benefit to the project as a whole, enabling us to reach a wide and varied audience with information on what GATWay was looking to achieve and deliver.

Here is just a selection of the articles and pieces of broadcast coverage:

Kristin Formaldez Medina
Senior Psychologist and GATWay Technical Lead, TEL



Source: GATEway (2018)

disappointment about the more specific presentations of the GATEway pod and lamented how ITV reporters had to “walk behind the vehicle from the Intercontinental Hotel right the way to the clipper because of the wrong type of sun” (Interview 19, May 2017). This suggests a perceived failure in producing civic information, because it did not show the public using the pods as intended or communicate about the project’s purpose.

Overall, project members were pleased with the news coverage that the project received. Sam reflected upon this. “I don’t feel like there are any challenges in getting coverage because the press is in a state of interest and readiness [...] the media has good will and is quite positive” (Interview 16, March 2017). It can therefore be suggested that the circulation of civic information within news coverage, and thus the reliance on the dutiful civic information style, proved to be effective in generating civic information that informed citizens about the development of CAVs as the project hoped it would. I will build on this point in the following section, where I show communicative public-making practices in action.

5.3.2 *Social Media*

As suggested above, the inherently interactive medium of social media meant it was perceived by project members as a suitable way in which to promote public engagement. As of August 2018, the project had a Facebook (284 followers), a Twitter (1690 followers) and a YouTube account (111 followers), and at one point an Instagram account (now deleted). As this demonstrates, the project’s official accounts had a low social media audience. Organisational accounts affiliated with the project had higher numbers of followers, such as TRL’s Twitter account (over 4000 followers in August 2018).

Despite the statements made above by project members such as Vinette Taylor, the expectation that the use of social media would lead to two-way communication was largely

unrealised. Consider the project's twitter output. The project tweeted over 1,100 times between February 2015, when the profile was created, and April 4th 2018, when the public trials came to an end. Large amounts of this activity were concentrated around key events, such as the March 2018 public trials. Prior to this event, there was a more than two-month gap in the account's activity, between December 2017 and February 2018. These gaps in activity, as well as evidently low levels of interaction with the tweets (overwhelmingly single-digit numbers of likes, retweets, and comments) suggested a broad failure to construct communicative relationships with citizens based upon actualising civic information styles. However, in the next section, I demonstrate how the project used social media during the live trials alongside the primary focus on targeting news coverage.

5.3.3 The Official Website

The specific elements of the website have already been illustrated in the previous chapter, where I discussed the project's interactive features. The civic information on the website and its close proximity to interactive features clearly helped visitors identify opportunities for action. Moreover, as covered, this civic information also positioned visitors as members of the public once they decided to take up the opportunity to engage. In this regard, we can clearly see the project's reliance here on an actualising civic information style. However, nowhere near as many people signed up to participate as project members hoped, pointing to the limited execution of this civic information, similar to the use of social media.

5.3.4 Targeted Emails

The project engaged directly with an audience of around 5,000 people that it had built up into a database from the online sign-up process that I analysed in the previous chapter. This communication took the form of targeted emails.

As a signed-up member, I received these emails. This communication was sporadic, and I received only half a dozen emails. Those that I received were exclusively used to update me about the project and to encourage me to engage in participatory public-making through periodic surveys or by adding my views to the Commonplace platform. For example, in December 2016, I received an email titled “season’s greeting and an invitation from the GATEway team”. It contained an invitation to take a short questionnaire about whether “you trust and accept automated vehicles” and to “add your thoughts” onto Commonplace’s sentiment map. This was deemed important for me to do, because “as a crucial part of our research we are continuing to gather lots of data about your views on automated vehicles and would welcome your contribution”. I knew from board meetings and other correspondence that the project was running behind because of procurement issues with the pod technology – the message in the email doesn’t mention any delays, but instead thanks me as a potential participant for my patience and informs me that the public trials will only proceed after “an intensive regime of safety validation”.

These emails were often sent out ahead of one of the project’s participatory events, such as the public trials or the workshops. Individuals who had been chosen to take part would receive an email invitation. However, these emails also helped to raise awareness about the project. For example, the email described above also provided an update on the project and a link to a blog post on the project’s website, further trying to inform its specific audience. Despite the fact that the project possessed a database in which its audience could be categorised into different demographics, I saw little evidence of targeted communication that took advantage of this.

5.3.5 *Local Communication with The Borough*

Finally, the project also engaged in direct communication with the local residents of the Greenwich borough. It was considered important to communicate to the residents of Greenwich because of the fact that the project was happening near their homes and affecting their environment. This took on two dimensions.

Firstly, as Sam put it, “our message to the people of the borough is these [CAVS] are coming and we want to be in the best possible position of understanding to make them right for this borough” (Interview 16, March 2017). There were numerous reasons for this. The first, as Sam revealed was statutory, as Greenwich Borough council was by law required to engage citizens in a consultation about developments such as GATEway. But secondly, the council also saw local level benefits to the pods as a potential service which it could potentially deploy in the area.

Secondly, the aim was to deter local opposition to the project. For example, because the project took away a cycle lane for the pod route, a minor controversy arose involving cyclists. Sam reported that the project therefore often held meetings with local residents, involving the local councillors and some project members, such as Nick Reed, who were able to communicate the purpose of the project directly to local people. In her account, this strategy eventually paid off.

I now turn to the final empirical section, in which I examine how actors in the GATEway project managed what I refer to here as the mediated performance of successful autonomy in the project’s key events. As a primary context in which civic information was produced, I emphasise it here in my analysis.

5.4 The Mediated Performance of Successful Autonomy

The majority of the GATEway project's communicative activity was periodic and based around particular events, such as the public trials. As I examined in the previous chapter, the public trials contained a number of participatory public-making practices. But they were also a key site of communicative public-making practices. In this final empirical section, I focus on GATEway's flagship March 2018 trial and demonstrate communicative public-making in action within what I term here the *mediated performance of successful autonomy*.

This term is inspired by what Stilgoe has referred to as the “public performance of inevitability”, which draws attention to the how public tests of autonomous vehicles by large commercial companies are used to back up their claims about the technology through controlled closely demonstrations (Stilgoe, 2018a: 34). In my formulation, “successful autonomy” refers to it strictly in terms of the project's instrumental aims of demonstrating the GATEway pod's social benefits by showing both public support and usage of the technology – it is not meant to imply a judgement on my behalf.

Owing to the focus on communicative public-making practices, the term “performance” is central to this term. Ervin Goffman is often cited in the political communication literature as a way to conceptualise performance (Craig, 2016: 12; Neilsen, 2012: 68). Goffman's conceptualisation refers to the fluid identify of the self and is applied to individual political actors such as politicians or campaign operatives. Here, I am referring to the performance of technical objects – the GATEway pods, by the project actors. In this sense, it is the performance of a technical other. There is of course the technical performance of the pods. The sensors must work and the pods must stick to their programmed routes. These, obviously, could not break down. But this alone was not sufficient – the pods also needed to work in specific way. Much of this was outlined in the previous chapter where I discussed the testing environment. In other

words, the pods had to work as a viable form of public transport. This required the presence of project actors who could convey this to journalists and members of the public who had come to use the pods.

Episodes 5.2 and 5.3 provide accounts from the March 2018 trials.

Episode 5.2

It's March 2018 and the public trials are underway. I've arrived in Greenwich on day three and I'm being shown around by today's trial manager. He's full of energy – busy. “We sent out a press release on Monday and we had the Minister [Jessie Norman, Minister for Business and Industry] here yesterday doing press”, he tells me as we walk hurriedly to the Intercontinental Hotel, where the pods will be setting off from. There is a lot of nervous excitement among the team as we arrive. Final checks and tests are being run. Nobody is quite sure how it will all go. They're judiciously talking through the pod runs, timings, and how to make sure that enough people experience the pods. We watch as a pod rolls in and comes to a stop in a marked bay. Two smiling women get off and thank the onboard steward, like you would a bus driver. The team looks on, studying their reactions closely.

Episode 5.3

Another pod has rolled up to the final stop at the International Continental Hotel. Passengers disembark, thanking the onboard steward. Andy rushes forward, smiling and eager for feedback on their experience. One of them tells Andy how much he enjoyed it. Andy is pleased, and then asks if the person would be happy to record a quick ‘vox pop’ that he could post on his Twitter. The man obliges.

“How was your experience today?”, Andy asks.

“Uh, I mean I was impressed by the way it anticipated, you know, when people were sort of coming its way and it stopped...”, the man goes on to explain how the pod would be useful to get around in an urban environment. Andy made around a half-dozen of these clips during the trials, which he posted to Twitter, where they were retweeted by the organisational accounts or by the official GATEway Twitter account.

These episodes immediately illustrate three forms of communicative public-making practice. First, there was the project's press release, which I have described in the previous chapter. Secondly, there was the event with Jesse Norman in which he came to promote the trials and announce a review of road laws in relation to CAVs. And thirdly, there were the vox pops that Andy recorded. These events illustrate how project actors attempted to use their available resources to enact the public. The press release, for example, mentioned that the public have the "opportunity" to be involved. The Jesse Norman event reflected the ability of the project to call upon a government minister to come and promote their activity. While there, the minister used a GATEway pod and spoke about the aims of the CAV programme. This was not accidental or opportunistic, as I will reveal in chapter seven, the project's communications leads worked closely with a communications official in CCAV, to ensure that the project's message was coordinated with the government's agenda. Thirdly, there was Andy's recording of vox pops. Although these had a limited reach on social media, they reflected the overall performative intent in project members practices.

Project members also engaged in communicative public-making practices through the project's social media channels during the March 2018 trials (see fig 5.2). In these examples, the project produced and disseminated civic information which either promoted news media coverage of the project which it wanted its audience to see or promoted the presence of the pods on the peninsular.

Over the course of the trials, this performance became more routine and organised, as illustrated in episode 5.4, in which the trial teams state of readiness to engage journalists is also demonstrated.

Episode 5.4

The team are gathered around for the start of the day's public trials. We're into the third week now and things are starting to run quite smoothly. Everybody knows their roles and they have the pod routes and timings down. The marshals stand in small huddles, discussing things that went well the day before and things that didn't go so well. The 'pod runs' have now developed a strong sense of routine and ritual; the pods dock into starting position, radio chat starts up, people get into position, and then the pods launch. While the marshals are focussed on engaging members of the public, the more senior members of the ground team are alert to the possibility that a journalist could turn up at any point. As I speak to the team, it is clear that everyone has a brief, whether it's the scripts that say don't talk to journalists or the brief that the PR specialists have given Andy and others. While we're talking, Andy hands me a business card from a *Telegraph* journalist who had just turned up that morning. "Interesting bloke – might be someone you want to get in contact with", he tells me.

The interactions between journalists and project members was initially described in episode 1.2. Ensuring the performance of successful autonomy was a consistent and holistic communicative factor that project members closely monitored. As that episode illustrates, media engagement was executed carefully on the ground and the presence of journalists was anticipated and planned for – particularly by the PR specialists. Marshalls, for example, were specifically instructed in their briefs not to engage journalists, and instead to refer them to a more experienced member of the project, such as Andy, who could act as primary definers and present the project as intended. While he engaged with journalists and project members – setting up the right angles and briefing the project's spokesperson on what to say – I managed to speak to the PR representative, as episode 5.5 describes.

Episode 5.5

The public relations specialist that the project has hired is calm. He sips his coffee while he talks, quietly taking people through the morning routine of media contact that they expect. I manage to get him alone and ask him questions. He tells me that things are going well. He praises Andy for telling a “human story” to the BBC journalist that visited, despite being a bit nervous when he went off script. I ask him about the Uber crash, and ask him what bearing it has had. “We’ve managed to can it”, he tells me. He tells me how they briefed the marshals to emphasise the contrast between Uber and the GATEway pods. Basically, he says, they’ve managed to come across in Greenwich as completely mundane which is what they were after because it connotes safety.

It just so happened that the trials coincided with the first pedestrian fatality involving an AV, in Tempe, Arizona, involving an Uber vehicle. This became an international news story. Wary of members of the public asking difficult questions, marshals and stewards were provided with information which distanced the GATEway pods on a technical level from Uber’s vehicle, in addition to being told to not communicate with journalists and to refer all media requests to the project’s primary definers. Another illustrative example of this monitoring can be seen in the way in which project members controlled and even guarded the sharing of technical information about the GATEway pods. This can be seen in episode 1.4, in which there is a reluctance to share information which may compromise the performance. At one point in late 2016, I received an email (addressed to all consortium partners) which contained a video of the GATEway pods hazard detection being tested by having people walk in front of them. The email contained an explicit instruction: “Please do not post anywhere as we do not want people to think...’Ah, good idea! I’ll try that”” (Personnel correspondence, October 2016).

The collection of communicative public-making practices that made up this performance of successful autonomy was varied. Ultimately, the demonstration of the vehicles working successfully in the presence of journalists, supported by the presence of project actors

Figure 5.2 Example of the project's tweets during the live trials

GATEway_TRL @GATEway_TRL Following

Tune into @BBCBreakfast to see our pods - live at 07:50 from #Greenwich

12:48 AM - 21 Mar 2018

4 Retweets 9 Likes

GATEway_TRL @GATEway_TRL Following

Have you spotted our #driverless pods out on the #Greenwich Peninsula? Pls follow this link to #RateMyDrive ratemydrive.commonplace.is/comments?utm_c...

DRIVERLESS PODS
off-road mobility saving time, right here, right now

OUT AND ABOUT IN GREENWICH
the world's first driverless pod

6:43 AM - 29 Mar 2018

4 Retweets 4 Likes

engaging in public-making practices, resulted in news coverage that provided the kind of civic information project members sought to disseminate, as described above. As suggested, the project members were hugely reliant on news coverage to produce civic information, congruent with a dutiful civic information style.

5.5 Conclusion

This chapter has explored the communicative dimensions of public-making through three different aspects of the project. First, I explored the norms upon which the project's communicative strategy was based, illustrating the basis upon which actors committed communicative public-making practices. Secondly, I broadly explored what the GATEway project's civic information looked like in practice. Thirdly, I showed demonstrated what I have termed the mediated performance of successful autonomy, demonstrating the role of communicative public-making practices in this mediated performance. On the basis of these accounts, there are several conclusions that I would like to draw from this chapter as the thesis heads into a discussion of the final dimension of public-making.

The evidence in this chapter suggest that communicative dimensions of public-making within GATEway were carefully controlled. This can be seen, for example, in the use of PR specialists to facilitate interactions with journalists during the trials and the selection of authoritative individuals to act as primary definers. As I have argued throughout this chapter, project members tended to rely on the dutiful civic information style as the basis for the communicative practices that they engaged in, especially when it came to using their interactions with journalists as an opportunity to articulate the public. This stemmed from an anxiety about the public image of the project, in relation to the overarching objectives of the project, in which negative representations of pods would have been a failure.

Weighing up the framework offered by Wells, some conclusions can be drawn out. First, when it came to appropriate sources, the project consistently put forward authenticated experts to act as primary definers and relied on political leaders to provide further civic information. There was, in effect, a narrow range of appropriate sources generating civic information, shown emblematically in the project's intense reliance on Nick Reed. Secondly, there was a heavy emphasis on providing civic information through news coverage because it was seen as being most effective at informing citizens. However, the project did attempt to provide civic information based on the expectation of participation through a purposeful use of social media. It was, however, ineffective.

There is of course more to the communicative dimensions of AV development than what developers and politicians say and what journalists report. Yet as I have shown in this chapter, in the reliance on a dutiful civic information style, the media related practice that project members engaged in demonstrated the importance of this dynamic to the GATEway project and its aims. I return to the implications of this analysis in the concluding chapter.

Chapter Six: The Organisational Dimension of Public-Making

In this chapter, I turn to the organisational dimensions of public-making within the GATEway project. The focus in this chapter is on the ways in which the project's public engagement process, examined in its communicative and participatory dimensions over the previous two chapters, was planned and managed by GATEway's project members. This was a challenge for the project's many different organisations, who needed to establish common ground on which to pursue the project's aims. To achieve this, common conceptions of the public were needed to guide concerted action. Public-making was a key element of this. As outlined in chapter one, organisational public-making practices are defined as practices which articulate notions of the public, within the project's organisational settings, that project members relied upon to guide how they planned and managed the GATEway Project's public engagement process.

My argument in this chapter is that the performance of organisational public-making practices by powerful project members shaped the public engagement process that the project offered according to the needs of the government-led strategy. As covered in the previous two chapters, the democratic affordances of this engagement process were limited in both the participatory and communicative dimension. This chapter builds on the central argument of the thesis by demonstrating how articulations of the public were sublimated into the instrumental aim of facilitating the government-led strategy, which led to the forms of public-making seen in chapters four and five.

The structure of this chapter is as follows. It begins with an outline of the critical framework used to analyse the organisational dimension of the GATEway project and the forms of public-making practice therein. It then explores three key empirical aspects. The first is how project members organised the projects resources around the public engagement process

explored over the previous two chapters. Secondly, it examines the interactions that took place between project members during strategic boardroom meetings. Finally, I discuss the relationship that senior project members had with project officials, leading to the account from within CCAV in chapter seven.

6.1 Networks of Governance and Organisational Public-Making Practices

Organising and carrying out the GATEway's Project's public engagement process required dozens of individuals from across the fifteen organisations that were involved in the project. As explained in chapter three, this pursuit was divided into six work packages which gave each organisation specific roles in supporting the process. For example, some 'project partners', as they were often referred to by one another, were required to develop the small fleet of functioning CAVs, whilst others provided the tools needed to gather the views of members of the public who interacted with the technology. In considering the input of all fifteen organisations in relation to the project's objectives, they can be described as an interconnected and concerted set of efforts to engage the public with the development of CAVs.

Organisational public-making practices were important in this regard, as they guided how the public engagement process itself was designed to function, elements of which I have discussed in both of the previous chapters. As I have suggested throughout this thesis so far, these practices must also be understood within a consideration of the broader organisational features of the project that the thematic concerns with democratic participation and power-relations guides critical attention towards. Thus, much like the cultural and technological contexts of participation that I discussed in chapter four, I argue that key to interpreting the organisational dimension of public-making is the need to analytically describe the

heterogeneous elements which constituted GATEway as an organisational form and which contextualised organisational public-making practices.

To understand these heterogeneous elements, I draw on Klijn and Skelcher's (2007) notion of "governance networks". Klijn and Skelcher describe governance networks as a "web of relationships between government, business, and civil society actors" (ibid.: 587). These networks are based upon a series of dispersed, flexible, and potentially asymmetrical interdependencies between these actors, and are typically associated with hybrid organisational forms (ibid: 588), that, as I will briefly discussed below, GATEway resembled. This conceptualisation also expands the notion of a civic organisation that was used in the previous chapter.

Actors within governance networks are able to steer the development of policy and its implementation through various means of deliberation or interaction that can accommodate interests. Conversely, such networks may also incorporate "strategically powerful actors" who are able to privilege certain interests in the process of policy development (ibid.). As this chapter will show, these features can be variously attributed to the ways in which collective project resources were allocated into the public engagement process, the interactions that took place between project members at the strategic level of the project, and the interactions that senior project members had with government officials. The concept of a governance network captures the tension, confluence, and interdependencies between the GATEway Project's organisational elements.

In as much as organisational public-making practices within the project can be understood as being contextualised within this governance network, in which actors mediate and steer interests – including and especially those of the public – then, as Klijn and Skelcher indicate, this raises a central problem regarding the relationship between such networks and the function of representative democracy and power-relations. Thus, as well as offering a

conceptual description of the heterogeneous elements within GATEway, Klijn and Skelcher also provide a normative framework, based on a systemic synthesis of the public administration literature, that analyses the relationship between these networks and the function of representative democracy. A central problem raised by Klijn and Skelcher is how the distribution of power affects the function of the network. To address this problem, the framework sets out four “conjectures”, which Klijn and Skelcher describe as “tentative theories designed to offer provisional solutions to problems” (ibid.: 589), to describe the relationship between governance networks and democracy. These are as follows:

- (1) the incompatibility conjecture, which argues that “representative democracy and governance networks conflict because each is predicated on a different set of institutional rules” (ibid.: 590). In this case, the governance network becomes closed domain of specialist interests, creating a democratic deficit in which the public interest is lost among contestations between different actors in the network.
- (2) the complementarity conjecture, which posits that “governance networks engage a wider range of actors in the policy process, connecting them in new ways, and this ‘oils the wheels of representative democracy as it struggles to govern in a complex environment” (ibid.: 594). In this understanding, the governance network allows for generally harmonious interactions between a variety of actors, thus engaging them in the public policy process. These types of governance network tend to revolve around the creation of quasi-governmental entities that address a single policy issue and facilitate participation with citizens. The governance network is a broad coalition of actors, engendered with a “democratic ethos”, that is “committed to realising policy intent” (ibid.: 595-596). In this model, elected officials have a supervisory oversight and are absent from many of the low-level decisions.

- (3) the transitional conjecture, which suggests that governance networks represent a “transitional process from state-centric government to a network form consisting of decentred, distributed nodes of authority” (ibid.: 596). In this view, governance networks are viewed as heralding the decline of representative democracy as a mode of governance, facilitated by wider societal shifts, such as globalisation.
- (4) the instrumental conjecture, which is built on the view that “powerful governmental actors increase their capacity to shape and deliver public policy in a complex world through the instrumental use of networks” (ibid.: 598). Here, governance networks are a tool in which government elites input their “relatively immutable” interests into the network, which in turn realises and reinforces them as an output of its activity. In other words, the governance networks deliver the national policy of accountable and legitimate government officials, who proactively create and reshape these networks.

Applied to the GATEway project, this framework attends to the ways in which project members acted in relation to one another within a governance network, especially in terms of how they steered interests, which in this case means being attentive to the definitive role of organisational public-making practices embedded within GATEway’s network of actors. By revealing, in the empirical account within this chapter, how this organisational dimension links to and enables the participatory and communicative dimensions of the project, the application of this analytic framework is also congruent with and further develops the critical analyses provided in chapters four and five. For instance, the lens applied here overlaps with the analytic outcomes of Jasanoff’s technologies of humility and Wells civic information styles, as both lead to a consideration of the political function and affordances of public-making in terms of democracy and power. My analysis is that GATEway’s governance network functioned according to the instrumental conjecture, with some aspects of the complementarity conjecture

suggested. This entailed a complex situation in which there is room to improve the democratic ethos of the public engagement process. As per the previous two chapters, I argue that organisation public-making practices had a definitive influence on this situation, being crucial ways in which actors steered the progress of the project.

In terms of GATEway as an organisational form, this analysis also enables an interpretation that informs the concerns within STS and political communication about the role of organisations. In STS, significant attention has been paid to the role of organisations that are responsible for governing technologies. In this space, much of the analytic concern has been focussed on addressing how the power of corporate and governmental bodies has been “interpreted as necessary to cope with the size or complexity of the technological systems these organisations govern” with a democratic system (Sclove, 1995: 114). Within the field of political communication, the ways in which political organisations are adapting their instrumental pursuit of political goals to the rapid diffusion of digital technologies has been a key concern, as covered in chapter one, with specific attention being paid to the ways in which the evolving constitution of these organisations “give rise to and structure political engagement” (Kreiss, 2016: 5). Chadwick, for example, has argued that the features of many political groups have begun to converge, in what he terms as “organisational hybridity”, in a systemic shift that has been enabled fundamentally by the “selective transplantation and adaption of digital network repertoires” (Chadwick, 2007: 284). Finally, I have also earlier in the thesis discussed the growing awareness within political communication research of the significance of wider forms of “loosely connected political groups appearing in changing political, economic, and technological contexts” (Karpf, et al, 2015: 1901; see Vaccari, 2013: 222). In examining the GATEway’s Project’s organisational dimensions, this chapter contributes empirical research to both sets of these concerns.

In drawing on Klijn and Skelcher's concept of governance networks, it is also important to highlight the public administration literature from which this concept has emerged. Recent trends in the literature have emphasised an increasing prevalence of interorganisational arrangements and dynamics within the domain of public administration (Emery and Giauque, 2014), which has undergone significant reform in the previous three decades (Buffat, 2014). Crucially, Tom Christensen and Per Lægreid (2012: 592-593) have argued that European public administration reforms have been characterised by complexity and hybridity, in which "multi-functional organisational forms" have emerged as a systemic feature. Similarly, Julia Battilana and Mathew Lee (2014) have proposed the concept of "hybrid organising" to describe the ways in which multiple organisational forms are understood and combined by various actors, which Madeline Powell and colleagues have recently applied to the observation of public service delivery in the UK (Powell et al., 2018). This suggests the broader political trends which contextualise the GATEway project, removing from the analysis the suggestion that GATEway is a unique or novel organisational form.

A key driver for this broad trend that has been proposed is the push by many governments for efficiency and reduced spending (Joldersma and Winter, 2002: 85), as seen in the UK with the Conservative Party's economic austerity programme. This has increasingly led to partnerships between government and non-government organisations, a trend that can be observed under New Labour's use of Private Finance Initiatives (PFIs), which as a broad trend Yves Emery and David Giauque (2014: 26) argue has led to a blurring of the "the boundary between the world of public organizations and that of private organizations". At this typological boundary, political scientist Jonathan Koppell (2003) has pointed to the rise of what he terms "hybrid organisations" to implement public policy. These organisations are hybrid entities in that they combine the features of both private and public-sector organisations, much like GATEway consortium which combines both local authorities and universities with

commercial companies. For Koppell, these organisations are a form of quasi-government in which responsibilities are delegated to organisations outside of the formal structure of government, as I demonstrated with the CAV programme in chapter three.

Importantly, this raises questions about the responsiveness of these organisations to the needs of government and their appropriateness as policy instruments. In some cases, it has been shown that “powerful governmental actors can increase their capacity to shape and deliver public policy in a complex world through the instrumental use of partnerships²⁵” (Frimreite and Lægreid, 2009: 294). My core argument that the GATEway project’s public engagement process facilitated the government-led strategy for CAV development supports this view. However, it is important to note that I do not argue this is a linear process and that the complex patterns of interaction within GATEway must be accounted for.

The following three sections of this chapter now provides the analysis and demonstrates the arguments outlined thus far, based on empirical observations of how project’s collective resources were allocated and arranged for the public engagement process, the interactions that took place between project members at the strategic level of the project, and the interactions that senior project members had with government officials. The final section leads into the descriptive account in chapter seven, in which I explore the inner workings of CCAV.

6.2 Organising the GATEway Project’s Resources around the Public Engagement Process

The effective organisation of project resources was crucial in enabling the public engagement process observed over the previous two chapters. On a practical level, any large project requires

²⁵ Where partnerships are defined as “at least two organisations with some common interests or interdependencies” (Frimreite and Laegreid, 2009: 283).

its resources to be managed carefully to prevent disorganisation and chaos. From the start, GATEway's organisational dimension was intended to be highly professionalised. There was, for instance, a "PRINCE2-trained programme manager" using "TRL's ISO accredited quality management system" (TRL, 2015, internal briefing, see appendix B1), a consistent use of Gantt diagrams to plan project progress, officially designated positions within the project team, and regular project meetings to report on the progress of the project.

When describing the organisational dimension of the project, "delivery" and "control" were terms that were repeated by senior project members. Despite the range of project activity, delivery more often than not meant referred directly to the public trials of the pods. Moreover, it emphasised the political function of the public engagement process; the project was delivering to the government to help facilitate the government's strategy. As an early GATEway project document stated, funding had been secured on the basis of "how their projects would help position the UK as a leader in automated vehicle development" (TRL, 2015, internal briefing, see appendix item B!). Control was emphasized due to the complex and diverse range of resources that the project required to deliver the trials. During his time as project manager, Andy Frost described his "day to day role" as having a consistent oversight of the project as a way of "making sure that the work packages are on target to deliver". Performing this role meant having "the control of time, cost, and quality on the project, managing issues and risks as they arise" (Interview 2, April 2016). From the project manager point of view, the most effective way to control the project was by harmonising the interests of the consortium partners into concerted action. This was also reflected on by Chuck, who described how the "communication channels between the different people who have been working in the project outside of TRL can be quite difficult to manage", which made the organisation of resources these different actors were responsible for a difficult task (Interview 6, June 2016). Many project members, such as Rob, lamented the lack of efficiency but

commented that this was “just the nature of these big research projects” (Interview 13, November 2016).

This reveals a hierarchal element to the project’s governance network in which actors from TRL, as the lead organisation, were responsible for organising the project’s resources around these key notions of control and delivery. In terms of the public engagement process, this provided TRL with the affordances to guide the allocation of these resources – especially through the articulations of the public that they provided. For instance, significant project resources were allocated to participatory public-making practices that were based upon TRL’s psychologically-informed articulation of the public, as covered in chapter four. This articulation was present from the very start of the project, with briefing documents making clear reference to “members of the public experiences of interaction with automated transport with a view to building acceptance” (TRL, 2015, internal briefing, see appendix B1).

It is important to note that GATEway was one temporary entity among many other projects. This emphasized the importance of delivery, as the project had a limited timeframe (the original proposal allowed for two years, running throughout 2015 and 2016) defined by the agreed allocation of government funding. The participatory and communicative forms of public-making within the project therefore relied on the organisation of these resources, which itself relied on articulations of the public at the organisational level of the project to guide the allocation of these resources around the public engagement process. Since public-making was an instrumental pursuit, predicated on efficacy and knowledge-as-outcome, this meant that, as Nick Reed put it, there was a “responsibility of making sure things happen to the right time and resource allocation that we’re given” (Interview 1, December 2015).

The narrow timeframe further explains why the project took the instrumental approach to public-making that was based around finding and using effective ways to generate knowledge about the views and experiences of the public. As Rob explained it, Commonplace’s

view during the consortium building phase of the project, regarding the project's proposed objectives, was that "if you're going to really do that properly you'll have to find the most effective way to understanding how people respond to these things – in order to do that it makes sense to try lots of different approaches". Rob therefore felt like a lot of effort needed to be put into finding the correct public engagement tools. The chosen tools were illustrated in chapter four. However, in the organisational dimension of the project, interdependencies with other actors in the governance network, who were at times not 'delivering', meant that Rob often felt like "you're not being particular effective with the time you're putting into it (Interview 13, November 2016). However, the depth of complexity involved in these interdependencies should not be underestimated. Efficient public-making, across all dimensions, was reliant on factors ranging from having the correct insurance protocols being in place, to agreeing funding, to ensuring specifics of the pod design that met DfT's code of practice, to minute technical details such as sensors being properly installed, as project documents often emphasised (TRL, 2017, internal briefing document, see appendix B2). Thus, the resources required for an instrumental approach to efficient public-making had to be holistically coordinated with the entirety of the project's other resources.

These resources cut across both the participatory and communicative dimensions of public-making. It would be impossible to account in one chapter all of the resources that were involved in the project. Rather, what I draw attention to here is how organisational public-making practices enacted notions of the public which guided this allocation of resources.

The varied nature of the project's resources contributed towards many additional layers of complexity and at times significant delay. Front and centre here was the lengthy procurement period of the vehicle technology around which the public engagement process was to be based. As shown in chapter four, the pods were at the heart of a combination of many other resources which made the project more than just a demonstration of the technology. The resources

involved in developing the public trials were extensive in the context of the project. As Nick Reed informed me: “that has about two thirds of the project budget and will be the highest profile aspect of the GATEway project” (Interview 1, December 2015). This meant that the public trials were costed at approximately £5.3 million of the reported £8 million budget. This, however, should be put into a wider context to demonstrate the capacities for AV development that GATEway had available. As Andy Frost put it, “we’re only an eight-million-pound project”, by which ‘only’ is made in reference to the multi-billion-dollar resources of what he calls the “big boys”, such as Ford or Google (Interview 18, May 2017). This once again reflects the UK’s political economy, but also closely demonstrates the degree to which the project was designed to pursue public engagement, as the project members both episodes 6.1, 6.2 anxiously stressed.

Episode 6.1

May 2016. I am sat with the project lead for the vehicle trials. He reflects that not as many people signed up for the trials as would be hoped, which was disappointing. He stresses the importance to me of getting people on board (literally) with the vehicles. A further ongoing issue with the procurement process means that the trials are facing severe delays, which means that the public engagement process won’t match up to what he hoped for.

Episode 6.2

It’s February 2017, Greenwich. Three members of TRL are having tea and coffee in the café, having observed the mule vehicle, ‘Harry’, operating autonomously on a route along the peninsula. They’re discussing the progress of the project and are in an optimistic mood after an apparent breakthrough in the boardroom meeting earlier that day. Full trials had been expected last summer. But now, as they note, the passing public can finally see the vehicle working. A few weeks before, the House of Lords Science and Technology Select Committee, as part of their autonomous vehicle inquiry, had also visited the site. It has taken months of

discussion and organisation to forge the strategy needed to get the vehicle ready and the full trials going – there have been disagreements and significant technical difficulties within the project. The project team sip their drinks and contemplate. “It’s good to see the pod out there”, they agree.

Since the entirety of GATEway’s public engagement process revolved around the function of these prototype vehicles, they were the primary focus of the project’s organisational work. As one project member put it: “There are core partners who talk about core issues [...] the shuttle trials dominate everything” (Interview 7, July 2016). The trials dominated everything not only because they were central to the project’s objectives, but because their development was a technically difficult process. Those who were more directly involved in the trials, such as Andy (whose second role within the project took him to the frontline of the March 2018 trials), spoke about the effort involved in getting Harry the mule vehicle up and running: “TRL and [Chuck] and I have put a huge amount of effort into getting it moving”. He illustrates the hands-on work put into the project’s mule vehicle by telling me, “I’ve got some of my blood on him from fitting a fuse to get him going” (Interview 18, May 2017). However, this was not supposed to be the case, as the project had won its initial funding on the basis that the original vehicle supplier had a ready-made option, allowing the project to focus almost solely on public engagement. After this supplier dropped out, the situation became much more hands-on in the way that Andy describes it. Episode 6.3 illustrates this.

Episode 6.3

February 2017, nearly 18 months into the project. We’ve just wrapped a long board meeting as the project gets ready to deploy the prototype vehicle ahead of full public trials. The prototype is called ‘Harry’ and we’re on our way to down to the waterfront to look at him/it. A team from Oxbotica is working on the pod, talking through some of the existing technical issues with the board members who’ve come from the meeting. A few children come up and get a closer look at the pod. The

pod has been in testing for a few months, as the site route needs to be mapped, the pod needs to work near-perfectly, and the DfT code of practice must be met. “The limits of physics are not the same as the limits of software” Andy Frost says, before jumping in front of the pod to test its stopping. This startles one of the engineers. The point here is clear: nothing could be worse than the pod injuring someone. But the board members are keen and are relieved to see real progress towards public tests, giving them a clear idea of what the full public trials will look like. Andy Frost tells me about how the builders on the nearby construction site are timing their tea breaks around the pods test runs but laments the fact the building site is there because it detracts from a normal public environment.

The swaths of resources dedicated to the design and creation of the pods created something of an irony, as for a project that proclaimed to be about the public, more time was taken up developing the pods than anything else. This was really due to the fact that the pods were in effect supposed to be an essential tool in the public engagement process, as opposed to an outcome of the project in themselves. Noortje Marres (2015) has discussed the role of devices in enabling material forms of participation; a key point is the political affordances that such devices provide to those engaging with them. In this sense, developing the vehicles involved numerous organisational public-making practices that could enact notions of the public, as the pods had to fit the specific purposes of the public engagement process. Project members responsible for the public trials needed to be able to understand clearly how the public would be using the vehicles.

This complicated the hierarchies within the project’s governance network. Project members responsible for the public engagement process found it difficult to convey these requirements, as they became submerged into the project’s technical resources. As Chuck, who was the project’s trial lead, explained, “we might have an opinion on something” [...] but getting that message across to the vehicle manufacturer and getting them to acknowledge and comply and have a conversation with us is quite difficult and I think that’s true of many of the

details – its getting the message across to the right person in the consortium and getting some action on it” (Interview 6, June 2016). In effect, enactments of the public were often lost among the technical complexity involved in assembling the pod. Chuck made it clear that this goes both ways, as in trying to construct a pod suitable for the public engagement process, they also tended to misunderstand the technical capacities of the pod. This leads onto the discussion of how the project members themselves required organisation within the project, as episode 6.4 and 6.5 illustrate.

Episode 6.4

“Keeping the team happy, keeping them informed, communicating the senior management team as to the progress on the project and the financial side of things, so reporting to Innovate UK, doing the quarterly claims...” Andy could go on. He is in the middle of describing his role as project manager, a role he has been in for a few months since the start of the project. He is otherwise effusive about the ambition of the project but spends a lot of time, and keeps returning to, describing how so much of his time involves communicating and organising the people within the project. “It’s a lot of work yeah – and then throw into the mix we have a monthly board meeting with all the project partners and Innovate UK come to one every quarterly and then we do have the advisory group as well...”.

Episode 6.5

March 2018, full trials. The trial manager is stressed. He has around a dozen marshals and stewards to coordinate today. He has been round to the stops make sure that everyone knows what they are doing, constantly clasping his radio to listen out for updates on preparations. The team at the first stop assure him that everything is going fine and that he is doing a good job. He has a lot to worry about: journalists, pod malfunctions, not enough people getting onto the pods. He runs through the times with them twice and checks who has had the training to do certain tasks, like ride in the pods as a steward.

Back in Mitre Passage, he explains that its so important to make sure that the trial team is organised because “marshalling is about managing members of the public”.

In effect, if he loses control of what's going on with his team, then he would lose control of the public engagement process.

Episodes 6.4 and 6.5 illustrate two different aspects of how personnel were organised within the project. In the first episode, we see the project from the perspective of the project manager, who describes the management of personnel as a key source of his work. In the second episode, we see the project from the more granular perspective of the trial manager as he helps to organise the marshals and stewards who engaged the public during the full trials. The GATEway project was made up of a highly-skilled workforce, many of who were leading experts in their respective areas, but even at the level of marshal were educated to a degree level. In order to fulfil the objectives of the project, the skills that different personnel possessed were organised into a series of highly specialised tasks that were ultimately brought together to execute the communicative and participatory dimensions of the project. For example, as we saw in chapter four, marshals were provided with scripts that instructed them to perform specific tasks when engaging with members of the public. In the previous chapter, we saw how certain project members acted as spokespersons who could act as primary definers when interacting with the media. These collectively contributed to the project's objectives – but to do so, they required personnel who could themselves organise the project's workforce.

A key aspect driving this is need for expertise. As Chuck explained, the project needed to have “the access to a wide range of expertise” in order to fulfil its objectives. “There is no way you could have a company broad enough to offer that depth of expertise in one place – for something like this a consortium is essential” (Interview 6, June 2016). As I touched upon in chapter four, when I explained the influence of social psychology and inclusive design on the participatory dimension of public-making, the deployment of these expertise resources relied upon organisational public-making practices that could arrange individuals with the necessary expertise around the project's public engagement process.

Certain individuals also played specific roles that were important to the objectives of the project. For example, in the previous chapter I discussed the role of spokespersons as primary definers. In episode 1.4, for example, we see how Ed calls upon Nick Reed to fulfil this role because of the experience and capability of Nick to perform this role. This is justified on the basis of Ed's immediate needs, which is to engage the media with the project and create a positive public impression of the project. In other words, Nick is trusted by the project members to be capable of performing communicative public-making practices. Later in the project, during the public trials, Andy Frost stepped into this role. However, he was briefed at length by the PR specialists, who emphasised the need to be careful and controlled when presenting the project, so as to ensure the mediated performance of successful autonomy that I described in the previous chapter.

As shown in chapter four, the project also relied on manpower resources that it could assemble from across the organisations involved. This often meant using lower-level employees who were looking for experience. For the marshalling and steward roles, calls were put out via email to project partners asking them to provide individuals who could fulfil the role. As a managed resource that enabled participatory public-making, they too were subject to the sense of efficacy that pervaded the project: "you've got to be very clear about where things go how they're presented to the steward and making sure you do that in a way that maximises their chances of doing that job properly and effectively" (Interview 6, June 2016). On the other hand, personnel were also selected because they believed in aims of the project, as Ed put it: "we would hope most of them are of a professional standard" adding that "most of them have joined because they're interested in ideas of social inclusion. They do that through the methods they use and most of those methods are to do with working with people" (Interview 12, October 2016).

I now turn to the boardroom interactions that I observed within the GATEway project.

6.3 Boardroom Interactions between Project Consortium Members

Episode 6.6

On a mild morning in the mid-spring of 2016, I am sat in the corner of an 11th floor board room on the Greenwich Peninsula, directly overlooking the O2 arena. I'm here to observe a monthly GATEway consortium meeting for the first time. There are around a dozen people in the room. Andy Frost, the project manager of GATEway, is leading the meeting. There are around a dozen people in the room, representing various members of the consortium, including TRL, Telefonica, Royal Sun Alliance, Oxbotica, and The Royal College of Art. A significant portion of the meeting focuses on the ongoing design of the test vehicles. There is some anxiety in the board room as it appears the project is already starting to run behind. The live-tests with the public, expected in the summer, now appears as if they will be running in September 2016. This is concerning from the point of view of showing the vehicles to the public and the media, because it is likely the weather won't be as good, meaning that crowds might not be as big as hoped.

Episode 6.7

Another board meeting. The meeting is heading into the early afternoon as the today the project's progress is being discussed and planned holistically. Overarching strategy, like the public trials and media engagement, are raised, alongside smaller details which require immediate action, such as disability access because of the pod's existing door features. As the various issues are passed around, the project members consistently approach them from "our perspective", or from "the perspective of...". Among this, various references to the public are made: as another "perspective" on these issues, as potential "users", as eventual "data", as trial "participants", and various other articulations. The discussion appears to be frustrating everyone as it is taking a long time to reach decisions as each time a different perspective is raised. Andy, the project manager, is trying to build a consensus in order to approve decisions. Finally, he makes the case for progress by

appealing to the interests of the stakeholders: “CCAV are keen, Innovate UK are keen, my boss is keen”, he says, “Let’s push on and get this done”.

As the strategic nexus of the project, the boardroom meetings were an ideal place to observe the interactions and relationships between the project’s consortium members. These monthly boardroom interactions were an essential part of the project’s overall organisation and were a place where key decisions about the complex challenges that the project faced were discussed and, hopefully, resolved. It was in these interactions that took place within the monthly board meetings that I often saw how the project moved forward, and where I could observe the project’s ongoing strategy and progress. This provided a clear distillation of the project’s governance network. TRL, as the lead organisation, would always chair these meetings and thus direct discussion during board meetings. Its strongest relations were with the commercial organisations such as O2 Telephonica and Royal Sun Alliance, who would frequently support them during discussions which stressed the objectives of the trials – as shown in Andy’s appeal at the end of episode 6.7. Asymmetrical interdependencies between the manufacturers and TRL led to disputes, which, after an acrimonious board meeting in April 2017 in which further delays to the development of the pod were presented, culminated in the software developer Oxbotica withdrawing from project and being replaced by Fusion Processing. Boardroom meetings laid bare how the heterogenous collection of actors within the project, itself a by-product of the collaborative approach instated by government, struggled to produce a consensus around agreed notions of the public that could drive the project forward in accordance with its objectives.

This diverse involvement in the project also afforded a certain fluidity to these efforts, in which actors were able to influence the events of the project and steer certain outcomes. This created difficulties. As one project member put it simply, describing the process of creating

consensus within the project: “the politics of it all makes it difficult” (Interview 6, June 2016). Within the official aims of the public engagement process were the numerous goals of each organisation, their differing views on how to pursue public-making, the relative importance that they placed upon different elements of the project, and the different expertise, procedures, and techniques that they contributed to the project. As a result of this, the organisational dimensions of the project were defined by a heterogeneous collection of these various elements. These elements consistently reconstituted one another, creating unpredictable and complex hybrids of these organisational elements which often resulted in tension. Yet without the combination of these elements, the project would simply not have been possible – a view that is exemplified by CCAV’s valorisation of the CAV programme’s collaborative approach.

This was clearly reflected in the diverse articulations of ‘the public’ that I observed project members enact during boardroom meetings. There are three points to be made here about this in relation to my argument.

First, it affirms how the public was a matter of importance within the project. Enactments of the public entered into these strategic discussions at nearly every point, guiding how decisions were being made. For instance, project meetings would be taken up with lengthy discussions about the ‘perspective of the public’ on a specific issue. The trials, for example, were consistently discussed in terms of how the public would experience the pods, reflecting TRL’s primary concerns. This drove the desire for thorough planning, because the notion that the public would reject the pods on the basis of poor execution was one that would signal failure. This gave the public, in as much as the project members conceived it, an observable influence on the behaviour of the project members. This interconnected with the frequent mentions of the public within internal documents, email exchanges, and interviews that I conducted. Project members relied on these notions of the public. But this was also a space where representatives from various organisations within the project were able to forge an all-

important consensus that drove the project on. This can be seen in Andy Frost's appeals in episode 6.7. Doing so would often mean agreeing on notions of the public, implicit or otherwise, that informed the public engagement process, as shown in episode 1.4 where Ed appeals to a "social" discussion involving the public. However, this was not always the case, as I now turn to.

Secondly, the articulations of the public that were enacted through public-making practices within the boardroom were unstable and capricious. In one board room meeting I attended in April 2016 (described in episode 6.7) I coded more than ten different articulations of the public, including a 'safer' public, a 'local' public, a 'British' public, the public as 'data' generated by the project, the public as an 'audience', an 'engaged' public, and a 'general' public. This established earlier on in my ethnography two things that persisted throughout my fieldwork: first, that GATEway lacked a unitary definition of the public that it could consistently rely on in a strategic sense; and secondly, that actors tended to mediate these articulations of the public in ways that aligned with their organisational perspective and the expertise, procedures, and techniques that they brought to the project. TRL representatives, for example, would consistently reiterate the need to align the project's efforts around capturing the experiences of the public as 'participants' while individuals concerned about the public image of the project, such as Vinette Taylor, would often appeal to the public as an 'audience' that needed to be communicated with. In as much as these articulations co-existed, they created tensions and inefficiencies. Episode 1.4, for example, shows disagreement between project members about how much information to share with the public. In terms of the project's limited resources, the competing notions of the public as an audience and the public as participants created bifurcated the immediate priorities of the project. Thus, despite the need for concerted action to plan and manage the engagement process, the project lacked a clear definition of the public that it could efficiently rely on, with the exception of the participant-as-public model

that project members from TRL would frequently articulate and use to drive the project forward.

Thirdly, this leads to a more critical problem: a submerged tension between the oft-cited social and economic benefits of AV development. As I covered in chapter three, these benefits are the respective pillars of the entire government-led strategy. In effect, these benefits are the response to question: *why* develop CAVs? However, my observations revealed an underlying tension between the two when it came to the GATEway project in-action. The discontent and tension that surrounded the perceived, relative importance of the economic and social benefits can be interpreted through the comments of Andy Frost, not long after he left the role of project manager, in reference to conflicts over the purpose of the project. “GATEway was never about the technology, it was about the behaviours around it”, he tells me, “but it’s become technology focussed” (Interview 18, May 2017).

In this final section, I now explore the organisational dimensions of public making that were inherent in project member’s interactions with government officials from both CCAV and Innovate UK.

6.4 The Relationships Between Project Members and Government Officials

As the project’s primary stakeholders, both CCAV and Innovate UK (acting on CCAV’s behalf) applied numerous expectations on the GATEway project. Senior project members were required to communicate with officials from these organisations during both the procurement phase and thereafter by regularly reporting the progress of the project throughout its operation. It is on the basis of these interactions that the project secured and maintained its very existence, making these interactions an extremely important responsibility for certain project members. Failure to meet the agreed scope would mean the cancellation of project funds and the

termination of the project. Because the expectations of CCAV and Innovate UK were strongly oriented around GATEway's explicit focus on public engagement, as I will demonstrate further in the next chapter, articulations of the public were bound up in these interactions. In other words, much of what was entailed in meeting the agreed scope was about what the public engagement process would ultimately deliver. In this section, I explore how project members managed these expectations.

In terms of understanding these expectations as a reader, the role of CCAV was outlined in chapter three and the following chapter is dedicated to an insider perspective of the policy unit.

6.4.1 The Influence of Innovate UK

Innovate UK is a business-focused government agency, of around 300 staff, based in Swindon. Its official objective is to “drive productivity and economic growth by supporting business to develop and realise the potential of new ideas” (Innovate UK, 2018). Its role in GATEway was pivotal, as it was the organisation which distributed and managed the central government funding allocated to CCAV – which supplied GATEway and other CAV projects. To more deeply understand the agency's role in relation to a project like GATEway, I interviewed three representatives from Innovate UK (Interview 3, April 2016; Interview 4, May 2016; Interview 17, May 2017) alongside my ethnographic focus on GATEway.

“Seb”, a Lead Technologist in Innovate UK's Digital Economy team, specialising in IoT, explained that, “in our core work I suppose, that is agnostic of political influence in that our sponsoring department BIS [BEIS] doesn't say you need to spend it on these things”. Citing his own work on developing the internet of things, he stated that the agency typically derives its objectives “based on what we see from industry because we are more industry focussed than

perhaps central government”. This industry awareness informs “what funding programmes we need to put in place for the next two or three years to try and meet those objectives”, he told me.

Since the government clearly advocates the pro-business ethos of Innovate UK, Seb’s political agnosticism appears to be based upon a narrow definition of political influence in which the government does not specifically direct spending. GATEway, however, was different since the funds were allocated *specifically* for CAV development from the treasury. Seb acknowledges these types of circumstances as ones where Innovate UK is required to be more flexible in its involvement, identifying them as “a political or social-economic need”, such as bilateral trade agreements or developing joint development programmes with other nationals. Notably, Seb also identifies as the political need “to target a particular promise that a minister has made”, citing the Northern Powerhouse as one example of when “politicians want to see something happen” (Interview 4, May 2016). Casting back to the emergence of the CAV programme discussed in chapter three, I revealed how it developed out of a strong ministerial interest in the technology – particularly that of the former chancellor George Osborne. In Seb’s terms, then, GATEway was a politicised pursuit of innovation that extended beyond the agency’s core pro-business concerns with growth and productivity, though obviously was still connected to those concerns.

6.4.2 *The Proposal Phase*

The relationship between the project and government officials is established during the proposal phase, though many individuals and organisations, such as TRL, have longstanding relationships with key organisations such as Innovate UK. The proposal phase is a complex process which is run as a funding competition. It is stipulated that organisations must be based

in the UK because of state aid rules, and, that consortiums should contain at least one local authority (Interview 17, May 2017). As Nick Reed recalled it, GATEway's proposal phase involved a series of event meetings "where interested parties gathered", which, "helped the government- DfT, BIS, Innovate UK to shape [...] what the terms of the competition would be", followed by a series of smaller meetings between potential consortium organisations ("talking to different partners"), followed by an application form describing the intentions, partners and the required funding, which was followed by an hour long interview near the head office of Innovate UK (Interview 1, December 2015). The establishment of projects is a bureaucratic and multilateral process in which Innovate UK and CCAV ultimately have the final say and where key decisions are made in government offices in Westminster and Swindon. In the following chapter, I give a first-hand account of this decision-making in action. As Nick Reed's comments suggest, the proposal phase served to ensure that the projects that were funded were in line with the agenda of the government.

Vinette Taylor, who is an experienced professional with established relationships in the UK's innovation sector, especially dealing with start-ups, explains to me the importance the relationship between a project like GATEway and Innovate UK. "I've done quite a few projects with Innovate", she tells me, before explaining that, "to do this stuff takes a lot of money and actually without the investment from Innovate and allowing people to ... innovate", we pause and laugh at the awkward noun to verb switch, "would mean that sometimes this stuff just wouldn't happen, or, it would happen but it would actually happen with the industry leaders and wouldn't allow for the flexibility for start-ups that are more agile to come in" (Interview 5, May 2016). Here, Vinette is acknowledging the collaborative approach that the GATEway project was a part of and speaks in support of it.

As well as funding, project members also spoke about the assurances for testing that government officials supplied. This was summed up by Nick Reed, when discussing the code

of practice that DfT had produced to guide public testing: “it wasn’t defining exactly how technology providers and vehicle manufacturers should behave – what tests they should do – but providing some guidance over what would be sensible, what the government sees as being a sensible approach. So, it’s just giving the confidence that these are the ways to proceed and encouraging that, so that was great” (Interview 1, December 2015). The funding and the assurances demonstrate the interdependencies that existed between GATEway and government.

6.4.3 Accepting the Role of Government

As a senior project member, Nick Reed was clear in his view that government should be involved in the development of the technology. He described the role of government as ensuring “equitable” societal outcomes around the development of CAVs, which he claimed could not “be left to market forces”. “There’s going to have to be regulatory input that ensures that mobility is managed in the best way for society”. Hearing this statement from a proponent of the technology is striking when compared to the situation in the US. “The risk of falling behind is that others will make progress and deliver these systems and we’ll end up buying them rather than getting the benefits of them for our own society. Jobs and careers and development, we’ve been left behind on other things, in the not so distant past”. In this broad sense, Nick feels the government is doing a good job of being proactive with developing the technology in the interests of British society (Interview 1, December 2015).

As Vinette Taylor’s comments above suggest, maintaining relationships with Government officials is important for CAV developers. Nick describes his relationship with Tim, the senior CCAV official introduced in chapter three, as “very good”. “You know, we cross paths often enough, at least once a month one way or another. Conferences or meetings.

Probably see, yeah there's a visit to Greenwich tomorrow, I might end up going to, which involves [Tim]" (Interview 15, March 2017).

More broadly, project members spoke about the need to satisfy Innovate UK and CCAV. As Sam put it, for instance: "when the proposal was put into Innovate it was very much about engagement and how people felt about the vehicles", distilling the purpose of project in relation to them, adding that among the various difficulties, "we just want to deliver what was promised to Innovate" (Interview 16, March 2017). "There are some areas we need to engage with them more proactively, certainly around the code of practice and trying to move that forward and make sure we satisfy Innovate UK, Royal Borough of Greenwich, CCAV and the Metropolitan Police" (Interview 19, May 2017). Altogether, this illustrates the powerful influence that government officials had within the project's governance network. In doing so, the articulations of the public deployed by government officials also circulated among the project's governance network. This emphasised the importance of public-making within the project, driving actors to allocate their resources and build consensus among one another. This was not so much to do with constructing the public that government officials wanted: although their strategy clearly requires one that accepts the technology, but more to construct a public that could be strategically spoken of.

Despite the close relationship with senior project members, junior members of the project, such as the RCA researchers involved in developing the workshops, reported that they felt "quite free" from the influence of government. As they put it, "we're in a bubble in a way" with the information they need to know being passed down to them to act on without too much interference, stating that: "they've put trust in us". (Interview 8, July 2016). They also stated that, "they're [government] not trying to tell us how to go about it [...] we have been left quite alone in terms of our work package" (Interview 7, July 2016). In practice, government officials didn't get involved with the management of the peripheral aspects of the governance network,

but still exerted influence over project members indirectly through the use and awareness of various government guidelines which they abided to.

This section has demonstrated the relationships between senior GATEway project members and government officials. This has further illustrated the instrumental conjecture at the heart of the project's governance network. The evidence is that the relationship appears to be about meeting the aims of government, as shown in the agreement and satisfaction with the role that government is playing. In effect, project members were eager to fulfil the policy intent of the government officials they engaged with, based on mutual interdependencies. I develop and support the claims in this section in the following chapter, when I explore the relationship from the perspective of CCAV's officials.

6.5 Conclusion

In this chapter, I have explored the organisational dimensions of public-making within the GATEway project. Using Klijn and Skelcher's notion of governance networks, this chapter has observed the various ways in which enactments of organisational public-making practice were situated among GATEway's heterogenous network of actors, exploring three key aspects: collective project resources were allocated into the public engagement process, the interactions that took place between project members at the strategic level of the project, and the interactions that senior project members had with government officials.

A key conclusion is that GATEway's organisational dimensions of public-making generated highly-unstable operationalizable articulations of the public. This is because of the range of actors which consistently transformed, translated, distorted, and modified 'the public' as it was carried through the governance network of the project.

Ultimately, however, it is clearly noted that actors consistently adopted organisational public-making practices in the interests of the government-led strategy through the chains of action through which the public was articulated. Note, for example, the frequent appeals made by project members to deliver on their promises to Innovate UK and the government, which often functioned as a kind of managerial skeleton key to open up deadlocks and keep the project progressing in a unified direction. This ultimately emphasises how the project's governance network was steered towards the instrumentality conjecture, in which a democratic ethos that could foster social benefits was problematically entangled with the economic incentives of developers. Finally, it shows how project actors appealed to the authority of government officials and their objectives to push forward the project, but at the expense of the democratic ethos.

Chapter Seven: From Public-Making to Policy-Making, Inside the Centre for Connected and Autonomous Vehicles

Over the course of the previous three chapters, I have argued that the GATEway Project's public engagement process, and specifically the forms of public-making embedded within it, served the instrumental purpose of informing and facilitating a government-led strategy towards CAV development. As stated in the GATEway project's final report, as a result of the project, "the knowledge gained will help to shape the national agenda for future transport and to provide the foundation for the development of new legislation, regulation and research" (GATEway, 2018b: 9). The government-led strategy that I refer to here was described in chapter three.

What this thesis has yet to explore, however, is an account of those actors within government who are directly responsible for and in control of this strategy. As political actors operating at the nexus of the CAV programme and British democracy, what do their roles involve and what practices do they engage in? In their own words, how do they make sense of these roles? And how do they understand the public in relation to CAV development? Responding to these key questions, as I do in this chapter, provides further evidence in support of the argument of this thesis.

Remaining with the ethnographic approach employed throughout this thesis, this chapter turns to an insider account of CCAV, moving from the dimensions of public-making to the dimensions of policy-making. This builds on the final empirical section of chapter six, which described the interactions between government officials and members of the GATEway project. However, compared to the more than two years of observations that I made of GATEway, the range of data I draw upon in this chapter is much more limited, being based

upon five visits made to CCAV between July 2016 and March 2017, as well as two recorded interviews, and access to some working documents. Based on the limitations of this empirical data, I take a more cautious approach to interpretation within this chapter and instead aim to provide a descriptive account that augments the arguments made over the previous three chapters. I achieve this by illustrating the links between GATEway and CCAV and responding to the questions outlined in the previous paragraph.

The structure of this chapter therefore follows this line of questioning. First, I provide an account based on five days of fieldwork observations that I conducted whilst shadowing several CCAV officials during their daily duties. Secondly, I explore how these officials made sense of their roles as officials, based on the two recorded interviews with senior CCAV officials and notes that I made during discussions with the officials that I shadowed. Thirdly, I examine the conceptions of the public I encountered within CCAV. In the final section of the chapter, I consider the implications of these limited empirical findings in relation to the overall argument of the thesis, as well as the analysis of the GATEway Project's public engagement process and its democratic affordances performed over the previous three chapters. In illustrating some key links between GATEway and CCAV, the empirical evidence and discussions in this chapter sets up the concluding chapter of the thesis, in which the argument, analysis, and thematic concerns of the thesis are drawn together and summarised.

7.1 Observing CCAV Officials in Westminster

For most CCAV officials, their duties are mainly based within the half a mile between Victoria Street and Horseferry Road, in Westminster, where BEIS and DfT, respectively, are located. Besides short trips to both Ofcom and The House of Lords, all of my fieldwork in CCAV took place between these two locations. As I show in this section – with the notable exception of a

select committee – desk work, including emails, reading documents, and writings briefings, as well as numerous meetings, were what typically defined the day-to-day duties of CCAV officials. In addition, some CCAV officials also made visits to the programme’s projects, although I was unable to observe this. These duties, at least in the Westminster settings that I observed, were relatively mundane in contrast to the general excitement that has surrounded the broader issue of AV development. However, the work that they engaged in remained highly complex, difficult, and varied in its content. It required, in other words, expertise.

It is important to emphasise expertise in this chapter. As Stephen P. Turner (2014: 3), in the science studies tradition, writes, “expertise is the biggest and most dramatic form of the inequality of knowledge”. As such, the issue of expertise has been central to many key debates in STS about the social organisation of science (Collins and Evans, 2002; Jasanoff, 2003b). Drawing on Foucault (1977), the focus on how CCAV officials exercise expertise points to the power-relations which constitute the circulation of knowledge within CCAV. The key question is the extent to which the knowledge produced within GATEway finds itself present in the day-to-day expertise of CCAV officials. In other words, besides the limited democratic affordances of public-making practice that I already have identified, does the knowledge produced by public-making actually make a difference *in a democratic sense*? Is there evidence to suggest that in practice, within government, the interests of the public (as forms of knowledge) influence how CCAV officials act? The account in this section, and throughout this chapter, suggests that this knowledge competes with many other forms of available knowledge in the exercise of expertise with CCAV. This is in contrast with the emphatic value that CCAV officials place on what they describe as the public’s ability to make powerful ‘social decisions’ about CAV development, as I describe in section 7.3.

7.1.1 *The House of Lord’s Science and Technology Select Committee*

Chapter one began with an account of Iain Forbes' testimony before the House of Lords Science and Technology Committee, in November 2016. This was a key session, in which the actions of the government were being scrutinised. The meeting laid bare much of the strategy involved in the CAV programme, including the importance of public engagement, as this is what the officials were required to discuss. These discussions were held in public, being broadcast live and made available online as both video and transcripts, making the stated intentions of the government known to anyone concerned with the issue. But what is far less visible is how this select committee fitted in with the everyday duties of Iain Forbes and other officials from CCAV. To illustrate this, Episodes 7.1 and 7.2 describe some of the official's routines surrounding the select committee.

Episode 7.1

It's the morning of the select committee and I've just sat down with Tim in CCAV's section of BEIS (four rows of desk, about twelve office spaces). Tim has already been in a while. He likes to start the day reading commentary about AVs, which is what he is doing now, between reading reports to help brief for the select committee. He is working across two computers, a government-issue laptop and desktop, and his desk is piled with notes. There is one other colleague in the space, who comments unfavourably on the reliance that ministers have on people like him and Tim to help them understand the issue. "Oh dear", says Tim, abruptly. He's just read a Paul Mason article, from the day before, about automation and employment. It attracts his attention as he expects that the select committee will ask a lot of media-driven questions, and job losses is a tricky subject to deal with. He thinks it is time for another coffee, as we need to head off soon to Parliament. He appears completely calm as he prepares the briefing. "It's my boss in the hot seat", he says.

Episode 7.2

“Do you understand all the acronyms we speak in?” Iain Yarnold asks me. “A lot better than I used to”, I respond. I’ve just arrived at the House of Lords, with three members of the CCAV team, having just walked from the newly coined ‘Department for Business, Energy and Industrial Strategy’. It’s 10.30am. Iain Forbes, the head of CCAV, and Iain Yarnold, from DfT’s International Vehicle Standards Division, are due to give evidence to the first session of the House of Lord’s Science and Technology Select Committee’s inquiry into autonomous vehicles. The officials huddle in the hallway and discuss the likely questions. They’re relaxed. Tim gives some briefing and discusses possible questions.

Afterwards, back in the hallway, the officials discuss the session. There isn’t much surprise about the line of questioning. As they see it, it was as clear that the committee was after the economic benefits of CAVs and how they fit into the broader ‘industrial strategy’. As we start to head back to BEIS, I ask Tim about the -IS in BEIS. He tells me industrial strategy is a new thing brought in by the government, following the post-Brexit vote changes in the cabinet. But it is something taking shape and felt across government, he says, “and CCAV is fitting into that picture”.

Select committees are designed to fact-find and create transparency; the CCAV officials felt they had little or nothing to hide. What they *did* feel anxious about was being caught out by a technical question or by a serious issue about the safety of the vehicles, such as those that were starting to emerge in the US at this time. The point is that this anxiety reflects how a failure to answer questions would have been construed as a lack of expertise, or in other words, created the impression that CCAV did not know what it was doing. Anticipation was therefore key, and for the most part their preparations paid off, as they did in fact receive the questions that they had expected to receive. This was made possible by the preparations of Tim, seen in episode 7.1 and the hallway discussion in episode 7.2. Knowledge about the issue was assembled, provided to key actors through briefing, and then presented. This form this knowledge takes varies. There is the specialised, institutional knowledge reflected in the question “do you understand all the acronyms we speak in?”. There is the technical knowledge

about the vehicles. There is the knowledge drawn from news coverage, as seen in episode 7.1, and there is also the knowledge of the broader government agenda, such as the Industrial Strategy.

This evidence suggests that CCAV officials are therefore experts in a pluralistic sense; their expertise is constituted by a multiplicity of knowledge. What sets them apart as political actors is their specialised knowledge of the UK Civil Service. As policy studies scholar Alex Stevens observed in his own ethnography of the UK Civil Service, the forms of knowledge that officials are encouraged to develop holds little relevance to the outside world and are in fact built around the “complex inner workings of Whitehall and how to solve problems within it” (Stevens, 2011: 245). As episode 7.2 illustrates, CCAV’s officials were aware of and able to respond to not only the specific interests of the committee but were also at the same time dealing with the challenge of positioning their policy unit in relation to the formation of the Industrial Strategy. This positioning of CCAV in line with the Industrial Strategy is a so-called ‘Whitehall problem’ – it is not incumbent upon any other political actors besides those CCAV officials. It therefore relies on their expertise *as* civil servants, that is exclusive *to* civil servants.

This is notable, because it points to the exclusivity of certain practices which ultimately affect the policy-making process involved in CAV development. While there is potential for public interests to influence other areas of their work, as I will suggest in this chapter, areas such as this appear to be highly insulated.

7.1.2 At the Desk of a CCAV Official

Episode 7.1 provides an accurate illustration of how Tim worked during my observations. When he was not in a meeting, or between meetings, he was in the CCAV office, at a desk, performing multiple tasks at once. For example, he spent a lot of time checking the news for coverage and commentary about AVs, which he sees as a way of keeping on top of the issue

and being prepared. This is because if he knows that media outlets are reporting on something, then he can anticipate that very soon it will be coming his way via the press offices, allowing him to be prepared. It also demonstrates the importance of news coverage as a source of information that informs his expertise.

However, again reflecting his pluralistic expertise, his role did not just involve gathering information, as has so far been suggested. Tim was also involved in producing forms of information. Discussion papers, calls for evidence, and funding competitions are all documents that he needs to create and certify. Moreover, these documents did not just inform, they were key ways in which he was able to engage with the CAV programme and affect matters. These documents therefore have influence. The *Code of Practice*, for example, was cited by Tim as one of the reasons that CCAV were able to convince Volvo to commit to a large-scale test of their AV technology in the UK (Kollewe, 2017; these tests were later delayed to 2021 [Camhi, 2017]), thus meeting the UK government's strategic goals of making the UK a 'world-leading' location for AV testing. It is outcomes like this that Tim is directly responsible for – it is his job to make this happen.

As a set of practices, the process of producing policy, regulations, proposals, and so on, is desk-based. It involves reading documents, sending emails, talking on the phone, searching the internet, typing up, and communicating with near-by colleagues. Materially, this represents the nexus of power-relations that officials occupy within the CAV programme. From these desks, events are made to happen. Episodes 7.3 and 7.4 demonstrate what this political work looks like.

Episode 7.3

I'm late arriving this morning – train delays. This is ironic to me, because I am now sat just a few metres from the rail team in DfT, opposite CCAV's section of desks. "Anna" is a policy adviser and recent addition to the team, but she doesn't expect

to be here long. She was placed into her position under the Civil Service Fast Track scheme, meaning that she will be moved again according to need. “You can apply an economics degree to almost anything”, she remarks on her shifting role. This morning she is working on two documents while I sit next to her reading information she has given me. To my left, Iain Forbes comes and goes between meetings and phone calls.

The first document is a presentation on data and security that she is preparing to give to a senior member of the CCAV team. The second is an internal document that provides research she has gathered on the same issues. This is to form “an evidence base” for policy, she tells me. She remarks that it is a struggle to keep this evidence up to date because the issue is so fast-moving and complex. At the same time, she says, you need to make this complex information as stripped down as possible without compromising the content to fit with the demands for efficiency within government. She notes that graphs and tables are often appreciated. “Simplify the document”, she stresses.

Episode 7.4

It’s early on a Monday morning, and I’ve just sat down next to “Grace” in CCAV’s section of DfT. This is my third visit to CCAV. “Grace” (a senior policy advisor who works specifically on the ‘C’ in CAV, connectivity), has a busy day ahead, so she immediately gets me up to speed. Grace is working on the policy strategy for vehicle connectivity, which she describes as “far more complex than autonomy”, but often neglected. She gives me a cluster of documents that she is currently using to draw up the strategy. It includes dense policy recommendation reports from the European Commission and the Transport Technology Forum, a spread sheet of seventy different connectivity services available in the UK and their relationship to policy aims, the write-up of a workshop CCAV held with local government and industry representatives, as well as Grace’s draft of the ‘Connected Vehicle Strategy’. “Have a read through this”, she says. “You might get bored”.

Grace is a flurry of typing, note-checking, and emailing. “You get so many things to read”, she says, as she Googles an acronym she hasn’t seen before. Grace has three notepads in front of her: one for information; one for tasks; and a personal schedule. Every time Grace gets new information, she puts it into her notepad,

which she is currently flipping through as she works on a brief for Iain Forbes, which is due. She shows me her schedule: a meeting at 11am and a 3pm meeting with Ofcom at their HQ in Southwark. Meetings are a stable feature here, she tells me. All around me people from different sections of DfT come and go from their desks, talking shop in the interludes: “So, if we...”, “Yes, I’ve read the report...”, “have you spoken to...?”. Not long after we’ve been sat down, I’m introduced to “Rachel”, who is a senior member of CCAV. “Would you like to come to a meeting I’m having now with the Transport Systems Catapult?”, she asks me.

As these episodes show, both Anna and Grace were strongly concerned with building up an evidence base upon which policy could be created. Dealing with large amounts of information from many different sources is central to their duties, so they need to be expedient and focussed. For example, when we meet in the lobby of DfT the first thing that Grace comments on is my coffee flask – it’s good I have one because it will help us not waste time. Moreover, the reason that Grace has three separate notebooks is that they are required to deal with the work load. Most of all, their duties illustrate the widely-recognised practice of “evidence-based policy making” (Cairney, 2016; Pawson, 2006) As Cairney (2016: 5) argues, this term tends to signal a vague and ideal notion that in actuality needs to be grounded in the policy process itself to understand how actors use evidence. In reality, policy advisers such as Grace and Anna cannot collect and process all of the available information and then present it as evidence for policy. They *do* collect information and present it as evidence, but they do so in certain ways that adhere to the environment in which they are in.

For example, Grace regularly lamented the fact that her strategic remit, connectivity, tended to be side-tracked with CCAV in favour of autonomy. Giving more attention to autonomy, she argued, was a mistake, because connectivity was a far more complex area with greater implications for society. For this reason, she reflected on how she needed to work extra hard to ‘push’ the issue within the department. To do this, she tried to build up as much

evidence as possible to construct policy and emphasised to me the importance of networking within the government to provide her with the means to push connectivity as a policy issue.

Anna, on the other hand, described how the information needed to be stripped down to its barest components to make it workable within an environment which she described as favouring sources of evidence which got to the point and did not spend too long on nuance. This did not mean that the nuance was ignored in the long-run, but that in the process of committing to policy decisions, this is what works. As Grace explained it, engaging with ministers, through briefing, is a key part of making policy happen. Ministers, however, are time-poor. Grace therefore regarded this as a relationship in which the onus is on the policy advisor to get things absolutely right and to present the information in a way that suits the minister. In doing so, Grace can achieve her goal of leveraging connectivity as a policy issue. This is comparative to Stevens findings, in which he found that civil servants used information to “tell stories” that fitted with the environment which “favoured certainty over accuracy and action over contradiction” (Stevens, 2011: 252). Consequently, it suggests that evidence-based policy-making is grounded in power-relations, as actors attempt to push interests that, based upon their expertise, they believe is important. In addition, they make use of their specific expertise as civil servants – knowing how to “tell stories”, as Stevens put it – to do so.

This highly pragmatic approach therefore raises many questions about what happens to the knowledge constructed through the GATEway Project’s public engagement process when it arrives on the desk of Anna or Grace. Since the CCAV fieldwork was prior to this moment, these findings cannot directly answer that question. However, one possible implication is that the richer forms of knowledge – meaning the nuances of the public – produced through public-making are likely to find themselves stripped down in a similar fashion to other forms of knowledge. Another implication is that the information about the public is less likely to be seen as having an inherent democratic value, and more likely to be valued by officials for its

potential impact on meeting a specific goal, whether that is pushing an area of policy, as seen with Grace, or in responding to the priorities of ministers, as described below in section 7.2.2. For example, in one conversation with Tim in which we discussed issues considered to be beyond solutions CCAV could provide, he stated that to overcome this, public engagement is not just advantageous as a potential solution, but a fundamental *need*. Thus, in my observations, the value of knowledge about the public sometimes appeared to meld to the needs to CCAV, rather than the other way around.

In the next section, I describe the important role that meetings played in the everyday duties of CCAV officials.

7.1.3 Meetings, Meetings, Meetings...

As suggested at the end of episode 7.4, meetings were a fundamental feature of a CCAV official's regular duties. In the five days that I spent inside CCAV, I attended several meetings. These included: a broad DfT meeting about air quality in London which Tim and I attended; a meeting between CCAV and the Transport System Catapult about future projects; a meeting between CCAV, the Advanced Propulsion Centre, and Innovate UK about funding decisions; a fact-finding meeting between Ofcom and CCAV; many small team meetings; and a departmental meeting held on the office floor of DfT which I was clearly instructed by Tim was off-the-record.

By itself, the fact that meetings were a regular feature of CCAV official's regular duties is unremarkable. However, many of the organisations that CCAV officials met with were themselves official organisations representing certain interests. Moreover, a common thread that ran through these meetings was, once again, the need for information. "It is important to stay on top of everything", Tim would often reiterate as we moved around Westminster from

one meeting to the next. Meetings therefore represented another source of knowledge that constituted the expertise that CCAV official's exercised. Episodes 7.5 and 7.6 describe two meetings that I observed.

Episode 7.5

We're in the London offices of Ofcom for a meeting aimed at building a dialogue between CCAV and Ofcom. There're half a dozen Ofcom employees here, including an Internet of Things specialist. From CCAV, Grace and Iain Forbes are all present. This is a good opportunity for Grace to push connectivity as a key policy issue. There is a lot of technical discussion about the feasibility of the country's data networks in relation to access – rural communities for example, would be at a disadvantage. I get the impression that there are some missed notes on both sides of the table during the meeting, as there appear to be some misunderstandings and long discussions about specific details. Lots of notes are taken. After the meeting, the CCAV team huddles outside to debrief. It is bitterly cold, so we don't stand long. Iain Forbes reflects on how the relationship could be useful in the future, but as he said in the meeting, there needs to be a lot of ground clearing.

Episode 7.6

It's 11.45am in BEIS and we're just wrapping up a two hour and fifteen-minute strategy meeting between Tim, two members of the Advanced Proposal Centre, and the CAV leads from Innovate UK. Huge amounts of information about projects, funding, and strategy have been exchanged and several cups of coffee have been drunk. They speak fluently in acronyms and technical terms. There are large folders and open laptops all over the table, in constant use. Tim has to leave as he has a meeting in the Department for Transport in 15 minutes. They agree that they need pick this up with another meeting, as not everything has been covered. We grab our coats and make the five-minute dash to DfT.

These episodes reflect two ways in which meetings were important. On the one hand, in episode 7.5, the emphasis on collecting information and building knowledge that could inform their expertise is demonstrated. This is “staying on top of things”. On the other hand, in episode 7.6, the way in which this knowledge is instrumentalised to inform important decisions, being made by a small group of actors, is demonstrated. Both of these episodes once again highlight the importance of expertise, as well as suggesting the power-relations which constitute the circulation of knowledge which informs this expertise.

In the meeting with Ofcom, the challenges faced in the process of constructing expertise are demonstrated – as they were in episode 7.1. The meeting itself reflected just one set of concerns involving *just* the issue of connectivity that the CCAV officials felt they needed to engage with. As a regulator, Ofcom serves as gatekeeper for issues involving connectivity that the CCAV officials anticipated may become relevant down the line. For example, ensuring equal access to the vehicles, as seen in the discussion. At this point, the interests of the public emerged, through Ofcom’s responsibilities. Moreover, Ofcom was also viewed as being well-informed about the issue of connectivity. As such, it could help CCAV with their strategy. This is why they organised the meeting. However, establishing and maintaining just this one relationship between CCAV and Ofcom required many complex and laborious interactions, as the meeting demonstrated.

The second meeting illustrates how closely CCAV and Innovate UK work together within the CAV programme, especially when it comes to allocating funding. Two hours and fifteen minutes is a very long time to be in a meeting and not everything was covered. In my observation, this said less about efficiency than it did about the complexity of the decisions that they were making. As covered in the previous chapter, this was to ensure that the scoping of the projects is in line with the needs of government and that funding is being spent accordingly – something Innovate UK is directly responsible for. This meeting was arguably the most

important meeting that I attended. Here, officials had gathered to make decisions about the next phase of funding – namely, which project proposals would get it (the winners are shown under ‘CAV 2’ in figure 3.1).

A key overall observation from the range of meetings I attended with officials was that the public was by no means the only priority that the government had. This is suggested in the organisations that CCAV met with. Many of them were specialised organisations, such as Ofcom, which could provide CCAV officials with the knowledge they needed to inform their expertise, much like the multiple sources of evidence that Tim could be seen gathering in episode 7.1, and Grace and Anna in episodes 7.3 and 7.4. Although I did not observe this, CCAV also regularly holds meetings with the Digital Economy team within the Department Digital, Culture, Media and Sport (DCMS), and is in almost constant contact with commercial companies who want to test in the UK, as well as liaising with the Automotive Council. As far as the circulation of knowledge goes, it appears that, in terms of possible knowledge about the public informing the expertise of CCAV officials, meetings do not offer a direct means for this to happen. Rather, this knowledge must be mediated by another organisation, as was seen with Ofcom. In terms of power-relations, these meetings matter, because they constitute a set of systemic relationships in which knowledge is circulated into policy-making practices.

I now turn to an account of how CCAV officials understood their roles.

7.2 How CCAV Officials Describe Their Roles

To gain an insider perspective on CCAV, I interviewed two officials. The first interview was with Tim, already introduced in this thesis. Tim is a career civil servant who was responsible for much of the policy unit’s strategy. The second official was “Charlotte”, a member of the stakeholder engagement and communications staff within the policy unit. Charlotte had been a

civil servant since 2008. She was recruited directly by Tim a few months after CCAV was established. Because CCAV was a newly established policy unit, much of her early work involved establishing a much-needed communications role. The interview with Tim lasted one hour and twenty minutes, providing much valuable information, while the interview with Charlotte was shorter, at around forty minutes. Additionally, I made notes on discussions that I held with several other lower-ranking officials, whilst shadowing them during their duties, which I also describe here.

Collectively, these perspectives help to inform how CCAV officials understood their roles within government. This is useful to the overall argument of the thesis, as it demonstrates the government's strategic approach to CAV development at the level of the officials who were responsible for it. As such, there are four key aspects to these accounts. First, there is the mechanistic metaphors that officials often used to describe their roles. Secondly, there is the importance placed upon ministerial priorities and government objectives. Thirdly, there is the way in which dealing with complexity shaped their roles. Finally, there is the striking notion of managing media coverage around the issue, in order to prevent controversy. Through these aspects, the instrumental relationship between CCAV and GATEway is also further illustrated.

7.2.1 "Pulling the Right Levers": CCAV as an Ordered Machine

Tim has around a decade of experience working within the UK Government. He was the first member of the CCAV team and joined as it was established in 2015. As described, his role encompasses the development and execution of the policy unit's overall strategy. In other words, Tim's role is to know everything that is happening across the CAV programme, foresee what could and should happen, and then to strategically guide that into action through the means of governance at his disposal. As such, this made Tim an experienced and powerful

political actor, in the sense that his actions often directly affected the CAV programme in significant ways. For example, as seen in episode 7.6, the decisions that Tim comes to alongside three other men can influence whether or not a particular project happens. This significantly shapes the development of CAVs, since the projects are the means through which they are developed. These decisions are made on a strategic basis as projects were selected for funding to the extent that they fulfilled the government-led strategy. This supports the argument made in the previous chapter about GATEway being an instrumental network, and as such, demonstrates the overall argument of the thesis. In other words, projects like GATEway, and the public engagement process found therein, owe their existence to a small network of actors within government, as seen in episode 7.6.

Tim regularly described this situation not as influence or power, but as “pulling the right levers”. For example, he described how his strategic role was to “to work out the four or five areas we should be investing in making sure we’ve got the skills to support [and] then making sure that government levers are in place to enable them”. Investing, however, does not just mean monetary investment. Despite the fact that the UK government has provided hundreds of millions of pounds of funding, Tim notes that this is not actually a significant amount of money in reality, noting that many large commercial companies would consider this small change. As he candidly put it, “we [CCAV] don’t have any money”. As a lever, then “it just can’t be funding”, so a key part of his role in the early stages was to consider and establish “the levers that they [AV developers] need us to pull [and] what is industry going to bring to the party as well” (Interview 9, July 2016). In this sense, he refers to the more traditional levers of relaxing regulation or, in the case of projects such as GATEway, using the centralised capacity of government to bring together organisations that collectively are greater than the sum of their parts, as seen in the collaborative approach described in chapter three and demonstrated in chapter six.

This metaphorical language of machinery used by Tim is interesting. Policy studies scholar Lester Salamon (2002: 1) has described the transformative proliferation of “tools” and “instruments” within government to address public problems, predicated on a specialisation of political expertise and more importantly, on the discretion of non-elected officials within government working with third parties (ibid.: 2). As Charlotte explained to me, the broader roles within the CCAV team are aligned with the needs for different areas of expertise. “In the team we have different people who specialise in different areas, we have a marketing strategy, regulation, other work on connectivity [...] data and security, so we have our experts [...] obviously we’re a very small team so we do have associates in various departments to drill down into deep with those things” (Interview 14, December 2016). To “drill down” is yet another machinery metaphor. Accepting this metaphor here, CCAV and its contents appeared to be organised to function as a well-ordered and multi-functional bureaucratic machine. In this metaphor, the officials, with their hands on the levers, are the Plato-esque operators of this machine.

Regarding projects such as GATEway, pulling levers is intended to operate at a distance. As Charlotte explained, when it comes to detailed, technical issues within the projects, Innovate UK was supposed to take the lead. As she stated, “in terms of the management of the projects, they are administered by Innovate UK, so they are able to deal with a lot of the more technical project consortia issues that may arise – obviously if we need to engage with them we will but they’ll be the first port of call in these aspects” (Interview 14, December 2016). Key parts of Innovate UK’s role in interacting with the GATEway project were covered in the previous chapter.

7.2.2 Ministerial Priorities as Key Objectives

A key part of many senior CCAV official's roles was to brief ministers, as mentioned earlier in the chapter. During our interview, Charlotte laughed at idea of an average day, as, in contrast to her previous role, there is simply so much going on. "It's a very fast-moving area" she tells me. However, she identified a series of regular features, one of which is briefing. "There will always be briefing... always briefing somebody", she commented. Most of her briefing is written, she told me, when asked how often she interacted with ministers. The reason she is briefing so often, however, is that the process, "can be very far reaching because we have a number of ministers who are interested in our area of work". She gave me the recent examples of DCMS, who just wanted a general update, and DfT, who needed detailed information on regulations to inform their plans on the matter. In the end, she said, the nature of the briefing is closely linked to departmental culture, because it "very much depends on the minister and the department that you are doing the briefing for". However, one thing that all ministers appear interested in, she notes, is "if we are a world-leader" (Interview 14, December 2016). This is a key point.

The idea of world-leadership in CAV development is one that appears often. In chapter three, it was identified as a discourse closely-related to the government-led strategy. As Charlotte's comments suggest, it appears to be an idea that government ministers are especially drawn to, and one that CCAV officials are subsequently sensitive to. Asked about this idea, Tim explained that CCAV's strategy is intended to operate not only a national scale but also an international scale, particularly when it comes to positioning the UK as a world leader. "Everyone wants to be a world-leader" he told me, and noted that in his experience, representatives from every nation seems to say it (see Schreur and Steuwer, 2016, on national competition). His strategic awareness therefore extends to the different types of development strategy that he sees other countries engaging in, from the US to Europe, which can clearly be seen in the *Pathway to Driverless Cars* report (2015a: 131, 2015b: 20). As a result, this led

CCAV to a position in which “we’ve accepted in the UK that we’ve got certain strengths and we’ve got certain weaknesses”. The strategic question that Tim therefore described himself posing on an international basis was, therefore: “what is our offer to the global players?” (Interview 9, July 2016). Much like the need to position CCAV in relation to the Industrial Strategy, what Tim described here also demonstrates how he is required to use his expertise to construct strategic narratives (Miskimmon, et al., 2013), as mentioned in chapter three, about the UK’s CAV programme. Moreover, this also appears to be a ministerial priority, as Charlotte’s comments at the end of the previous paragraph suggests.

Reinforcing this suggestion are further comments made by Charlotte during our interview, in which she explained to me that, as a government official, “your overarching objective whatever you’re doing is the government, it’s ministerial priorities” (Interview 14, December 2016). This reflection accords with the argument that the emergence of the CAV programme stemmed from an agenda-building process, as well as according with the reflections of Seb, the Innovate UK representative, in the previous chapter, where he described how the promises of ministers can lead to certain developments, such as the CAV programme.

7.2.3 “You Just Find More Worms”: Dealing with Complexity

As I described above, finding and processing a wide range of information was key to the role of a CCAV official – particularly the policy advisers. Dealing with all of this information, however, was noted as being difficult, due to CAV development as an issue being perceived as highly complex. As Grace put it to me while we looked through her documents, it is “like going into the garden to turn over rocks and look for worms – you just find more worms”. What she meant by this was what she felt was the endless complexity of the issue itself, which was not

helped by the fast-moving nature of the issue. This too is linked the need for briefing, since the issue is constantly in need of explanation.

As well as the description of the complexity of the issue itself, a key part of how CCAV officials understood their roles revolved around departmental culture. As Tim explained it to me: “getting two departments like Transport and BIS (sic)[BEIS] together is really hard”, he says, “because they’ve got different cultures, different languages, different objectives, different ministers with different interests”. He elaborates on “big cultural differences in terms of how we see the world” stating that within BEIS, “I think we’re much more business-facing” and that the team within DfT “stick much more to their brief on regulation, on cyber and data” (Interview 9, July 2016). This division was heightened by the fact that the office space of CCAV was split between both DfT and BEIS, which despite being less than a mile apart (when shadowing Tim, we often walked, quickly, between both buildings for meetings), manifested the cultural divide between the two. Despite an agreement in which officials from each department would go and work in each other’s buildings, there was according to Tim, no simple way to overcome this.

Adding to this notion of complexity were wider political events. My initial visits to CCAV coincided with a government shake-up following Theresa May’s rise to the position of Prime Minister. Tim told me that a lot of briefing work was done “after the elections [as] we had new ministers, new government, who we then had to bring up to speed” (Interview 9, July 2016). One of these changes was the renaming of BIS to BEIS. Not long after we met, Tim and I joked in the lift about what the acronym should be now that BIS has been renamed to BEIS. “Bay-zuh sounds like beige” he laments. “Be-iz?” I suggest. We agree BIS was better. Humour aside, the awkwardness in the acronym reflected the equally awkward strategic shift towards the Industrial Strategy, as mentioned above in episode 7.2, as well as a sense of uncertainty during the transition.

As a young team, this was especially true for CCAV, who were required to make changes while in effect still establishing themselves. As Charlotte put it, “we’ve always been very aware of the wider government agenda” but noted the difficulties here that come with “the new government and the incoming industrial strategy” (Interview 14, December 2016). I arrived for my first interview just a few weeks after the Brexit referendum and it became clear in subsequent visits how much pressure was being put on government officials and their capacity to make decisions. At this time, in mid-2016, there was a sense of bemusement and dark humour among the officials I spoke to, which by early 2017 had turned to a dull resignation of the fact. As Tim put it to me when we discussed the list of different organisations that CCAV was required to engage with, ““various colleagues are plugged into various EU things [...] I think I’m the only one who hasn’t been to Brussels – it doesn’t look like I’ll be going anytime soon” (Interview 9, July 2016), he remarked, ironically. The CAV programme maintains a relationship with the EU through the Horizon 2020 scheme, through which numerous projects were jointly funded. The approaching deadline of Brexit, however, created a strong sense of uncertainty among the officials about what their roles would entail. Grace, for example, was at one point collecting a range of evidence for connectivity policy from European Commission reports, with little knowledge of whether it would still be applicable post-2019. This shows, ultimately, that despite the often closed-off world of expertise that these officials inhabited, large-scale political events can have dramatic implications.

7.2.4 Preventing the “*Frankencar*”: *Controlling Media Coverage*

CCAV’s officials do not directly interact with journalists with any meaningful consistency. They are, however, obsessed with the coverage that they provided of AVs. This was linked to what appeared to be a heightened sensitivity to “bad news” that could affect their strategic

goals, much like as was seen in chapter five, where project members performed communicative public-making practices to maintain control over the mediated representation of the project. For example, in episode 7.1, Tim was engaging in his daily routine of studying the news coverage about AVs, because he needed to be aware of negative stories that could affect the public image of the programme and more specifically which may have manifested as difficult questions during the Select Committee session.

This awareness was emphasised by Tim, who reflected on the media coverage that GATEway had received. As he recalled, “the launch in Greenwich [...] Vince Cable [then the UK Business Secretary] said it was the biggest media scrub that he faced in his time as secretary of state – it was that large”. For Tim, on reflection, this coverage was a good thing – so long as it suited the strategic messaging of CCAV. As part of his role, he made of point of needing to keep a close eye on media coverage surrounding the public trials in which government-endorsed vehicles were being tested. About this, the media is hyper-vigilant, he told me, stating that “it’s just massive, everything something happens, it just crops up”. But, he added, “we are very aware that the media have been waiting to jump all over this stuff”. Here, he refers to the tendency for sensationalist coverage that portrays CAV development negatively. Because of this, he stated, “we have to be careful of that, because it could turn [...] when it turns into ‘Frankencar’ it [media coverage] becomes a liability” (Interview 9, July 2016). Evoking Frankenstein’s monster is an apt poetic reference. Not only does it cite the science fiction tradition of experiments which turn on their creators, but in the religious tones of Mary Shelly’s text, the evangelistic vs realist distinction that I proposed in chapter two. Preventing negative coverage was therefore a priority in his role, as well as that of other officials.

To avoid this negative coverage, one of the ways in which the policy unit is more involved in managing the projects is in terms of managing communication—specifically through Charlotte’s role. Although Government officials were not directly involved in the participatory

dimension of public-making with GATEway, they were much more closely involved in the communicative dimension. As Charlotte puts it, “they lead on what their events will look like – we like to be plugged into that as much as we can from the beginning [...] one of the most important things – especially with regards to the driverless car projects – is that we have consistent messaging in what it is that the governments interested in, what’s its agenda, how it is that that the projects are going about doing the work”. CCAV’s involvement, in this regard, was based on the perception that the public engagement projects were “the most public-facing thing that we are doing at the moment”. As such, they were exposed to the news media, which called upon her to “engage a lot with our three driverless car trials – so GATEway, UK Autodrive, Venturer”. As this account is explicitly linked to the communicative dimension of public-making explored in chapter five, I will quote at length her regarding her role:

In terms of the three driverless car projects we have what I call a kind of comms group. Quarterly I meet with the comms leads of all of the projects [...] and we’ll discuss things like what their current programme is – so it focuses a lot around the trials that they’re doing as obviously they are the most public-facing thing, what their comms plans are around that [...] we provide support for that, whether that be getting the minister to attend [...] or if they’re going to release a press release we’ll get a quote to support it, and try and align what they’re doing in their comms work along with our two press offices to try and keep that circle of communication going (Interview 14, December 2016).

In this account, there is further evidence to suggest that the performance of the communicative public-making practices in GATEway is directly linked to the imperatives of government to prevent negative publicity. In other words, to prevent the “Frankencar”. As I have already shown in chapter five, actors within the GATEway project incorporated the government’s agenda into the civic information they produced. They also carefully managed the journalists that engaged with the project.

7.3 How CCAV Officials Understand the Public

Tim laughs when I explain to him that I found out his contact details by digging through slides from an old presentation. He acknowledges that there is an air of seclusion that surrounds CCAV. It is not that the policy unit is secretive, it is just that buried among the mass of desks in DfT and BEIS, you need to know it exists before you are able to find it. As an initial impression, this does little to supplicate claims that political elites have withdrawn into state institutions to engage in technocratic circles of non-democratic practice (Mair, 2013). While there clearly lacks a direct connection between decision-makers like Tim and citizens potentially affected by the development of CAVs, there are still connections between CCAV officials and the public, that the former articulated. Where they exist, these connections, as I have stressed in the previous, are based upon certain understandings of the public, public engagement, and the issue of CAV development itself.

Some of the understandings that I report here demonstrate a conscious commitment to the norms of democratic politics and the value of public opinion. In a broader sense, they also demonstrate a desire for CCAV to be seen as a transparency component within the institutions of the UK government. Nonetheless, the fact that there is a lack of a direct connection between citizens and CCAV and the fact that, as discussed earlier in the chapter, “pulling the right levers” is a discretionary process cloaked in expertise, calls into question the accountability and transparency of CCAV as a policy unit, as suggest in the previous section by Salamon.

7.3.1 *GATEway and the Importance of Public Engagement*

Much like the head of CCAV, Iain Forbes, Tim and Charlotte were both clear to me about the need for public engagement with the development of CAVs in order to ensure its successful

adoption. Tim stated that he saw the importance of public engagement as underlying everything he does and that there is a permanent need to keep “that public element to it, because we see that public acceptance and understanding of the technology as critical” (Interview 9, July 2016). During interviews, they explicitly identified the programme’s public trials, including GATEway, as a primary means through which this could be achieved. As Tim stated:

they [the public] say yes we like they idea of this for these reasons, or no we don’t like it, or this is going to happen, how do we want to control it or take part in it [...] *that’s why we’ve designed in the public attitudes part of the three driverless car trials*, across the four cities, and that’s been extended into some of the trials we’re doing for CAV 1 projects (Interview 9, July 2016, emphasis added).

This explicit understanding of GATEway as a link between CCAV and the public was also put forward by Charlotte, who stated that, while “we don’t do that much direct engagement with the general public [as] our engagement will be at ministerial level or engagement with industry”, there is a central concern with “how you can engage the public, in what ways we should be engaging with them – so *we’re doing that through the driverless car projects and their public engagement pieces*” (Interview 14, December 2016, italics added). In these statements, the *raison d’être* of the public trials is public engagement – specifically, public engagement that informs the activity of CCAV. These statements, made by government officials, are significant in two key ways. First, they clearly demonstrate the overall argument of the thesis, because they reveal the instrumental link between public-making practices and the government-led strategy orchestrated from CCAV. Secondly, with regards to the concerns of this thesis, they justify the critical analysis of the GATEway Project’s public engagement process and its democratic affordances, because this link is subject to the norms of the UK’s representative system of democracy.

I push Tim in our interview on who the “we”, who he identifies as driving the need for the trials be focussed on public engagement, refers to. “Government has been driving that [public engagement] – for many of the projects that complicates things, the public consultation bits are a big challenge for them, so I don’t think it is something they would have chosen to do necessarily but I think through that they’re getting an insight into what the public thinks” (Interview 9, July 2016). This is echoed by Charlotte, who affirms that the need for public engagement “came from within government”. Building on Tim’s comments about the reticence of organisations to perform public engagement, she suggested that the political economy of the UK (in which I argue organisations interested in developing CAVs have far less power than an organisation such as Waymo) is what has enabled the government to step in and insist upon public engagement. As Charlotte states, “I think there was a need for coordination and government saw the opportunity in it and that if it was going to happen that we should be in a position to shape it” (Interview 14, December 2016). In this regard, it suggests that government officials are able to use their expertise to leverage democratic processes into the projects.

Building on this point, Tim explained that, “it’s important that people see what’s being developed and have a say in it [...] because ultimately it will be a social decision” (Interview 9, July 2016). I will say more about this crucial notion of a ‘social decision’ in the next subsection. Charlotte too mentions public engagement and its importance several times during our interview. In an explicit and unequivocal sense, she links public engagement to a democratic responsibility imparted upon CCAV, stating that, “public engagement is important because we need to make sure as government that we are actually serving the needs of what the public want” (Interview 14, December 2016). These understandings of public engagement acknowledge the ideal norms of democratic society, in which the public has the right to deliberate an issue and be a meaningful part of the decision-making process. Tim, however, acknowledges that in practice this process is not particularly smooth or effective – at odds with

the business-led mindset of efficacy within BEIS – but says CCAV remains committed to “having that messy public discussion, which may take more time and may throw up some challenges and problems, but I think it is probably going to be the better for it” (Interview 9, July 2016). It is notable, at this point, that Tim ruled out the “beta-testing approach” that you see in the US with companies like Tesla, or Waymo as shown in the prologue, because while he thinks they are interesting, they do not go well with the public engagement approach that CCAV has pursued.

On this note, Tim compares what he described as the “open” approach taken in the UK to that of the US or Germany, the latter two of which he regards as being secretive and commercialised (Interview 9, July 2016). There is a strong sense from Tim that he wants CCAV to be seen as working above board and with a transparency that can be actively contrasted with the approaches in other countries

7.3.2 Information Deficits

The notions of the public relied upon by CCAV’s officials contained a notable pedagogical element, in which the public was seen as in need of information. This, again, is comparable to the way in which the public was constituted within the communicative norms that existed within GATEway. For example, when Charlotte explained how they try to encourage communicate with the public using certain terms, she implies that there exists a certain information deficit within the public, stating that “autonomous is a word that necessarily resonates with the general public – it does with industry – but not with the general public”. Providing information that can inform everyone while at the same time resonate with their understanding is therefore “a balance that we try to create”. As Charlotte continued, in describing this problem practically, “when we’re doing press releases we try and talk to people

in a manner that they'll understand so we've gone back and forward with our various press office and we do tend to refer driverless as that's what resonates but then we do tend to underpin that with a bit of explanation in terms of what it is". However, this is not always possible, because as she admits, the CCAV team themselves often do not have the answer: "you'll get inquiries from members of the public about various areas of our programme and a lot of people want to know the answers to things that are yet to be defined" (Interview 14, December 2016).

Charlotte also extends this information deficit to the media itself. Again, this is akin to the project members from GATEway in chapter five. When asked whether she follows the news coverage on AV development, she told me she does but immediately lamented what she perceives as "little recognition in the media about the fact it will be a journey". Here, Charlotte was critical of the social imaginary that she feels the media tends to present: "when people talk about the 'driverless car' which I totally understand resonates with people but when you say it you immediately get the connotation of something out of movie when everyone is having a nap and there's no steering wheel" (Interview 14, December 2016). In contrast, she stated that she tried to bring it back to the technical understanding of AVs, the SAE levels, as a more informative way understand the development of AVs.

7.3.3 *CAV Development and the Public's "Social Decision"*

The notion that the public possesses the capacity to make a "social decision" that could potentially veto the development of CAVs is highly important in relation to the questions of democratic politics and power-relations at the heart of this thesis. As Tim put it, there was a perception that:

there may be very good reasons why we as a society chose not to have these technologies but that's the decision for a society to have and there's no right answer

or wrong answer there's different answers [...] the decisions themselves are ultimately consensus achieved from society (Interview 9, July 2016).

This notion of a social decision appeals to CAV development being supported by a broad consensus from the public. It was suggested that the perceived ability for this public to make a social decision was based upon the idea of an informed public capable linked to transparent governance. As Tim stated, referring again to the UK's "open approach", "the 'open' bit is to make sure the public's engaged", alongside other representatives from industry and academia, so that "that everyone is able to come and look at aspects of it" (Interview 9, July 2016). However, there are two points to be made that cast doubt on this.

First, it is uncertain to what degree this knowledge about public is valued any more than other sources of information. Both Anna and Grace prioritised information that could construct policy, so it is a test of the belief that the public makes powerful "social decisions", as Tim states above. There was little evidence to suggest that the knowledge that comes "from" the public is placed within a hierarchy in which is provided with the kind of value which reflects the capacity for the public to make a social decision.

Secondly, this reaffirms the importance of the analysis of democratic affordances that I have analysed across the previous three chapters. As I have argued at various points, the affordances for democratic citizenship within the GATEway project's public engagement process were highly controlled. There were limited capacities for citizens to behave in ways which could be described as making social decisions, despite the explicit link that Tim and others made between the projects and the policy-making activities of CCAV officials. Fundamentally, if the public is ultimately responsible for making a "social decision" in the eyes of government, then it needs to be provided with the adequate opportunities to do so. The evidence and analysis across the previous three chapters suggest that these opportunities were not there.

7.4 Conclusion

This chapter has provided an ethnographic account of the inner workings of CCAV through three strains of evidence. First, it has demonstrated how CCAV officials performed their day-to-day basis duties at the heart of UK government in Westminster. Secondly, it has revealed how these officials understand their roles. Thirdly, it has explored the understandings of the public that existed within CCAV.

A key focus of this chapter has been on the role of expertise within CCAV. This focus has helped to raise questions about the relative influence that the knowledge generated from GATEway's public engagement process has in policy-making compared to other forms of knowledge. Even if it does serve this purpose, the question is to what degree and in interaction with what other forms of knowledge. These discussions, and the suggestions posed by limited empirical evidence, have augmented the central argument, demonstrated throughout this thesis, that the GATEway project's public engagement process generated knowledge about the public which instrumentally informed and facilitated government-led strategy orchestrated by CCAV. Moreover, this chapter has informed the concerns with democratic politics and power-relations contained within this thesis.

I now turn to the concluding chapter of the thesis.

Chapter Eight: Conclusion

Among the wider debates about the development and use of the multiplicity of technologies that increasingly characterises society, this thesis has understood the political role that a single AV development project's public engagement process performed and examined the affordances for democratic citizenship that were available to citizens therein. Based on in-depth ethnographic data derived across more than two years of fieldwork, this research has presented wide-ranging evidence about how 'the public' was constructed as a political reality, in relation to the issue of CAV development, through a series of multi-dimensional practices performed by diverse network of actors, including citizens, through this jointly government-funded project.

An ethnographic research design, using the methods of fieldwork observation, semi-structured interviewing, discourse analysis, and collocated secondary sources formed the basis of data collection over a period of more than two years, between September 2015 and March 2018. In the context of both the GATEway Project and government departments, I came into direct contact with AV developers and policy makers, and observed first-hand the forms of public-making practice they engaged in. Through my research, I have been able to get under the skin of the ostensive aim of understanding "public acceptance of, and attitudes towards, driverless vehicles" (GATEway, 2018a) and examine the democratic characteristics of this publicly funded enterprise. As a researcher – across the dozens of fieldwork trips to sites in Greenwich, Berkshire, and Westminster, the 19 individuals I interviewed, and the thousands of pages of news stories, project reports, and government publications I have gathered and read – I have established a unique range of knowledge and understanding on the earliest phases of

UK's CAV programme and the forms of public engagement that were developed and used within it.

On the basis of this knowledge and understanding, I have argued that the GATEway project's public engagement process was distinguished by a key, instrumental political function: to facilitate a government-led strategy in UK by constructing defined notions of the public in relation to the development of CAV technology. Additionally, I have argued through a series of analytic lenses drawn from STS (Jasanoff, 2003a), political communication (Kreiss, 2016; Wells, 2015) and public administration (Klijn and Skelcher, 2007), that the process was often characterised by narrow and defined conditions in which power was exercised to maintain close control over the process, and thus that the process was fundamentally characterised by several democratic deficits. In many ways, this managed construction of the public is an unsurprising phenomenon that has been observed in many other STS studies (Stilgoe et al., 2014: 7). However, the monitoring of general trends with new data is crucial to rigorous social science and, in the case of this research, provides the opportunity to newly inform wider concerns about democratic politics and the development of advanced technologies. In using the case study of AV development as a point of perspective on these wider issues, as laid out in the introduction, this thesis builds on existing scholarship within political communication and STS, as this concluding chapter will now discuss.

This chapter begins by outlining the main findings. These findings are then contextualised within existing political communication and STS research on democracy and development and use of advanced technologies, taking into account the key contributions and limitations of the research presented in this thesis. Finally, a set of concrete proposals are provided that suggest ways in which public engagement with the development of advanced technologies such as AVs can be performed in ways which feasibly satisfy the kinds of democratic criteria that have been analytically applied in the empirical chapters.

8.1 Main Findings and Discussion

The primary findings in this thesis provide an understanding of the political role that a single AV development project's public engagement process fulfilled. I review the overall findings of the thesis here.

To begin with, I provided broad evidence, based upon interviews and secondary data, that the UK's CAV programme was based upon a government-led strategy emitting from a central point within government: The Centre for Connected and Autonomous Vehicles. This finding – CCAV is a little-known entity – contrasts with developments elsewhere in the world, especially in the US, where developments are commercially-led by large technology companies such as Google. This programme emerged as the result of an agenda building process (Cobb and Elder, 1971: 907) in which political actors within government, such as the former Chancellor George Osborne, were able to use their available resources to leverage the issue into policy. Crucially, the political economy within the UK – in which there is a conspicuous lack of large technology firms – has resulted in a collaborative approach in which many SMEs are collectively organised by government into consortiums, in the pursuit of this state-sponsored technology development. This study focused on the GATEway project as one of the earliest manifestations of this strategy and found that public engagement was a central characteristic. These broad findings fit well within the participatory turn continually observed across STS scholarship (Braun and Könniger, 2018; Pestre, 2008), including a number of engagement features observed by Rowe and Frewer (2005), but within this vein contribute a far greater empirical understanding of the macro-political dimensions of UK AV development than currently exists in other related work (see Marres, 2017a, 2017b; Stillgoe, 2018b).

Secondly, based upon the full range of ethnographic data collected in this study, this thesis presents findings on the granular features of the GATEway Project's public engagement process. Throughout this thesis, I have provided evidence that demonstrates that this process was characterised by a series of interconnected 'public-making practices' which were performed throughout the project. These practices enacted the public across what was identified as the participatory, communicative, and organisational dimensions of the GATEway project.

Participatory public-making practices were enacted by citizens who had been provided the opportunity to express their preferences towards CAV development. These practices were primarily based around interactions with a prototype vehicle technology, in which digital tools were used in a "technology intensive" (Kreiss, 2016) context to collect member of the public's experiences (e.g. episode 4.7 and figure 4.9). As shown in section 4.1 and section 4.4.1, however, there was a significant amount of management involved in these interactions (e.g. episode 4.5), resulting in an often-narrow framing of participation, as seen in the use of social psychology and its emphasise on citizen's 'experiences', for instance. Moreover, the predefined groups of the public that citizens were allocated into during the initial stages of the project, based on the digital infrastructure of the project and the use of a database which allowed the targeted and controlled recruitment of citizens, further limited the affordances that citizens were granted. These findings thus present qualitative evidence of a distinct form of digitally mediated public-making practice, the democratic implications of which I will explore in the following section, alongside the other two forms of public-making practice identified in this research.

The communicative public-making practices identified within the project were chiefly performed by a key set of actors within the project who were entrusted to engage in media-related practice within the project (Couldry, 2012: 37). For example, I provided evidence of the use of PR specialists (see episode 5.5) as well as certain project members who consistently

performed the role of primary definers (see section 5.2.3). The purpose of these communicative public-making practices was to produce forms of “civic information” (Wells, 2015: 7) in which the public was seen to be supportive of the project’s activities in Greenwich. In other words, communicative public-making practices helped ensure that the project produced a “*continuous flow of facts, opinions, and ideas that help citizens understand matters of potentially public concern and identify opportunities for action*” (ibid, italics in original). The evidence gathered from the ethnographic fieldwork demonstrated that there was a particular reliance on the pursuit of mainstream news coverage to transmit civic information, in which the project could put forward validated and credible spokespersons to define the project, its activity, and most importantly the public. In this sense the project largely succeeded in what I have termed the ‘mediated performance of successful autonomy’ (see episode 5.3).

The research also identified organisational public-making practices within the GATEway Project. These backstage practices were performed by key project members who were involved in the planning and strategy of the project, such as in the setting of the boardroom meetings (see episode 6.6 and episode 6.7). The purpose of these practices was to articulate the notions of the public, within the project’s organisational settings, that project members relied upon to guide how they planned and managed the GATEway Project’s public engagement process. In this sense, these practices were important in constructing and maintaining a form of social order within the organisational context of the project (see Vertesi, 2012). These practices were understood within the conceptual framework of a “governance network” Klijn and Skelcher’s (2007). Within this “web of relationships between government, business, and civil society actors” (ibid.: 587), captured empirically in the ethnographic data, representatives from the project’s many organisations consistently articulated numerous and highly-unstable notions of the public to guide the strategy of the project’s public engagement process. However, among this variation, actors consistently adopted organisational public-making practices in the

interests of the government-led strategy that guided the project, further highlighting the instrumental aspects of public-making within the project.

The overall findings of the research question what it means when AV developers claim to be engaging the public. In contrast to the ostensive notions of a public-led inquiry based around “understanding public acceptance of, and attitudes towards, driverless vehicles” (GATEway, 2018a) and government officials notions of fully engaging the public (Interview 14), the findings in this thesis show that the GATEway Project’s public engagement process served the highly managed and instrumental function of generating knowledge that could inform and facilitate an existing government-led strategy around AV development in the UK. Indeed, the efforts taken to construct the public, as shown across three full empirical chapters, as well as the agenda-building process within the UK Government, beginning in approximately 2013, that I identified in chapter three suggest an a more elite-driven model of AV development within the UK. My findings and analysis therefore provide a firm basis on which to argue, that AV policy makers and technology developers are offering inadequate forms of public engagement and that reforms should be considered, as I cover in section 8.3, below. Finally, the evidence in this thesis is a significant empirical contribution for what we know about the development of AVs. As I outlined in chapter two, there is both a clear lack of academic empirical research on this specific issue as well as an apparent lack of concern in the broader debate about the role of public engagement. This thesis steps into those gaps. In the face of much hype and expectation, this thesis is grounded in an empirical account of what the politics of AV development looks like up close.

However, although I have consistently highlighted the need for in-depth empirical research on this topic, this research is ultimately about more than just AV development. It also newly informs existing concerns about the relationship between democratic politics and the development of advanced technologies more generally; “artefacts have politics” (Winner,

1980). As I illustrated in the prologue, AVs are a contentious technology, which explains why its proponents are so keen to construct the kind of public-support that can offer legitimacy and authority. Thus, the findings within this thesis can be used to explore the broader significance of the role that public engagement plays in the development of other contentious technologies. Moreover, given the substantive repertoire of public engagement mechanisms available (Rowe and Frewer, 2005; Smith, 2009), a broad democratic horizon arguable exists when it comes to the development of AVs and advanced technologies more generally. Why then, do we tend to see so much that resembles incumbent forms of democracy, in which citizen's participation is channelled, simplified, and rationalised through "institutionalised conduits" (Blaug, 2002)? What would wider and less managed forms of engagement means for AV development and the development of advanced technologies in democratic society more generally? Is it simply a case that citizens need to be better informed in these kinds of contexts, as Collins (1988) argues? Or do we need a wholesale "democracy of our own devices" (Howard, 2005)? The political limitations that were placed around the GATEway project's public engagement process that I explored in this thesis can thus be used to inform these significant questions about the techno-democratic future, to which I now turn.

8.2 Democracy, Power, and Technology: Contextualising the Main Findings about GATEway's Public Engagement Process

It should not come as a surprise that the GATEway Project attempted to manage the construction of a public that could offer legitimacy to the development of AVs. Previous research within STS has shown the multiplicity of ways in which publics can be constructed in many different contexts (Barry, 2013; Felt & Fochler, 2010; Irwin, 2001; Lezaun, 2007). Taken as an experiment in the technology itself, the use of the public as a form of legitimatisation in

a technoscientific context has a genealogy that can be traced back to at least the seventeenth century, in the form of scientific demonstrations among the bourgeoisie (Shapin and Schaffer, 1988). As shown in the prologue, with Waymo's own carefully controlled forms of demonstration in Arizona, it is not altogether too difficult to identify the political controversies that can stem from these controlled forms of knowledge construction (see Whatmore, 2009). As Harry Collins (1988) identifies, genuine experiments are problematic because they must take place in controlled scientific seclusion. Thus, what the public is more attuned to witnessing are fine-tuned "demonstrations", in which the purpose is to educate and persuade on matters of fact, or, alternatively, "displays of virtuosity", in which the audience witnesses a "revelation of technical virtuosity in the handling of phenomena without consequences for the audience, rather than education of proof of unknown or disputed facts or theories" (ibid, 729). This raises the key question of what GATEway's trial was in fact a test of. As was affirmed in the project's discourses and in many interviews (Interview 1, Interview 14), GATEway was not a test of a technology, but in fact the public. Thus, I have argued here that the technology itself was never really in danger of being contested within the confines of the project – it was the public that was being contested. In this regard, the findings presented in this thesis thus portray GATEway as another instance of how "the construction and expert control of public concern invites interactions framed in terms of expert reassurance rather than mutual exchange and engagement" (Barnett et al. 2012: 47, cited in Stilgoe, et al., 2014: 7).

What is important, and what I have attempted to analyse in this thesis, is what this means and implies for a democratic society in which advanced technological developments of this kind become ever more commonplace. What are the political conditions under which public support can emerge around such technologies, how are these technologies legitimised, and how is the knowledge and opinions of citizen's subject to power relations inherent in any form of engagement? To understand this, in this research I have paid particular attention to

gathering evidence from the granular level of practice within the project's public engagement process and to the particular connections to government strategy that GATEway possessed, so that this evidence may be analysed vis-à-vis a set of democratic criteria and debates that I have raised throughout this thesis. The discussion in this section revisits the collective findings in the context of the important debates about democracy, power, and technology within political communication and STS.

As advanced technologies become an ever-more pervasive part of everyday life, the contingent design features of these technologies offer actors of all the kind the opportunity to establish "patterns of power and authority" (Winner, 1980: 135). The key question is whether there are there genuine modes of democracy that can be associated with the development of complex technologies. While the 'participatory turn' is a recognised empirical trend in STS (Bucchi and Neresini, 2008: 457; Felt and Fochler, 2010: 219; Jasanoff, 2003a: 235), within which this study of GATEway can be placed, the shift from recognising and advocating these forms of engagement towards analysing them (Braun and Könninger, 2018: 676), remains an ongoing project. Likewise, when it comes to new forms of digitally-mediated participation and communication, such as those demonstrated in this research, we must remain attuned to new forms of political organisation within these shifting technological contexts (Karpf, et al., 2015: 1901; see also Vaccari, 2013: 222) and be prepared to offer fluid conceptualisations of democracy (Papacharissi, 2010: 11). Thus, across both STS and political communication research, there remains a need to develop and continually update the 'bigger picture' when it comes to the ever-dynamic relationship between democratic politics and the development of advanced technologies. For instance, the digitally-mediated forms of participatory public-making practice examined in chapter four suggest the transference of the kinds of hypermedia usually seen in political campaigns (Howards, 2006:170) into the context of state-led public consultations on technology development, bringing with it a whole range of concerns about

how political actors can manage and control political culture within these settings. The recent work of Noortje Marres provides a useful point of comparison with the findings on this thesis for how public engagement with AV development informs the wider relationship between democratic politics and technology. Marres contributions are significant here as she has explored public engagement as a factor in the development of AVs, under the terms of what Marres and her colleagues refer to as “experiments in participation” (Lezaun, et al., 2015), building on the contribution of Collins (1988). These are defined as “the deployment of settings, devices and things to curate processes and moments of participation in which, under at least partly controlled conditions, taken-for-granted ways of doing are unsettled, and which elicit expressions of public affairs that would otherwise remain under-articulated or exist only *in potential*” (Lezaun, Marres & Tironi, 2015, cited in Marres 2017b: 13). Thus, akin to the approach taken in this thesis, Marres also applies a normative democratic position in her analysis of the GATEway project’s public engagement process.

In her own writing on AV development, Marres broadly identifies key features of the CAV development programme, such as the UK’s stimulative regulatory approach and direct government support for street trials. With this brief description of this broader context, Marres also focuses on the specific participatory initiatives used within the GATEway project, such as what she terms the “locative opinion mapping exercise”²⁶ (ibid.: 12) undertaken by the consultation platform Commonplace. Focussing on the fact that the projects are “explicitly framed as instruments for ‘increasing public acceptance’” (ibid.), Marres argues that the trials are managed to achieve certain pre-determined outcomes (ibid.: 13). In this regard, based on the application of experiments in participation as a normative democratic criteria, Marres stresses that “very little can be put to the test in these trials. Given how little citizens and social actors know, and can do [...] they fail to examine a central challenge of co-existence [between

²⁶ The designer of this tool, who I interviewed, refers to it as “sentiment mapping”.

the technology and citizens]” (ibid.). Marres thus concludes that the public trials within the GATEway project are “*threats to democracy, and/or the culture of public accountability: the experimental introduction of new automotive society then presents itself as a vector for the commercialisation, privatisation and managerial-ization of public space*” (ibid: 17, italics in original). Marres therefore makes very bold claims about the ways in which the forms of public engagement with GATEway inform how we understand the relationship between democracy and the development of advanced technologies more generally – specifically identifying GATEway as a negative contribution.

While there are several common points between Marres’ contribution and this research, including the application of a normative democratic criteria, there is considerable scope to build on Marres’ claims. First, Marres’ position is derived from highly limited empirical data – Marres neither visited GATEway’s Greenwich site nor spoken to any of its project members, with her interviews in fact being conducted with an organisation that had no formal affiliation with GATEway. Secondly, Marres account does not locate the GATEway project within its wider political context in terms of public policy or its connection to the UK government and CCAV. My own conclusions therefore advanced on Marres’ claims about the relationship between AV development and democratic politics. This advancement is based, firstly, on the more in-depth selection of qualitative data that I have presented as evidence in this thesis. Secondly, it is based on a more comprehensive analysis, using the trio of refined conceptualisations of public-making and the analytic criteria applied across the empirical chapters. Based on these findings and analysis, I disagree with Marres’ main conclusion that the GATEway Project constitutes a dichotomous “threat” to democracy.

Instead, I conclude that the forms of public-making practice that I have demonstrated in this research are in fact symptomatic of and in fact clearly point to a decaying form of democratic governance that is in urgent need of reform. It is recognised in western democracies

that political elites have withdrawn into the state institutions they occupy and often prefer to engage in technocratic circles of non-democratic practice when it comes to decision-making (Mair, 2013). In other words, GATEway and its forms of public engagement cannot be a threat to democracy, because that democracy has been eroded. This is why the findings within chapter seven, the kind which Marres does not present, are so vital, as they show the disconnect between the democratic ideals in the government official's statements about the primacy of the public and the actual instances of on-the-ground engagement within GATEway. However, in both the generic forms of public engagement and the participatory discourses employed by the project, characteristics of democratic politics coexist and are in tension with the kinds of "commercialisation, privatisation, and managerial-ization" that Marres 2017b: 17) that I have further identified with the GATEway Project. If we take organisational public-making practices as an example, there were a 'multiplicity' (Mol, 2002) of publics being articulated by these practices, but it was the notions of the public that could most effectively be instrumentalised according to the government-led strategy that tended to steer the direction of decision-making within the boardrooms. As indicated in the relationships between project members and representatives from Innovate UK, the top-down pressures to fulfil commercially driven objectives created tensions with the participatory ethos that many project members often evoked. These conclusions inform how we understand the relationship between democratic politics and the development of advanced technologies.

In chapter one, I discussed the "democracy as collective world making" approach (Brown, 2015: 15), in which the emphasis is on understanding the material practices that produce knowledge about the world. This perspective has been widely adopted in this thesis across the three dimensions of public-making practice I have explored. As a form of collective world making, what do the material practices within GATEway mean for how we consider publics in relation to the development of technologies? In one sense, it potentially instils a

sense of suspicion about the motivations of technology developers and the enforcement of political hierarchies that are geared more towards commercialising new technologies than they are civic means. As part of trend, we may expect that technical be reduced to the kinds of displays of virtuosity that Collins (1988) describes, displacing political contestation onto the public. In terms of public engagement with technology development, then, attempts to solicit knowledge about the public should always be scrutinised to ensure that questions and concerns about the technical are not being deflected under the guise of public engagement. Democratic world-making, in other words, should always entail a symmetry between the public and technical, where both can be contested. Additionally, the evidence from GATEway's public engagement process also demonstrate the extent to which this is about power, and the need to constitute power relations between actors existing within the multi-dimensional participatory, communicative, and organisational settings of any given public engagement programme, that we recognise as democratic (Mouffe, 2000: 100). The lessons from GATEway points towards the role of powerful, yet democratically non-accountable actors within organisations such as Innovate UK. The existence of these influential actors raises significant questions about the potential of heterogeneity as an expression of democracy in institutional settings (Callon, Lascoumes, Barthe, 2009), given the evident asymmetries in power.

Moreover, this thesis contributes to the need to generate new concepts to understanding evolving forms of democracy. This is achieved through the development of Barry's notion of public-making, providing a refined conceptualisation of the contemporary relationship between democratic politics and technology development. I place this contribution in relation to the urgent need to explore, understand, and examine the organisational settings of technology developers and proponents. Social orders in technoscientific context are embodied and practiced (Mol, 2002, Vertesi, 2012). Thus, the kinds of practices that take place within these settings can produce "visions of what it means to act as a participant in contemporary digital

democracy”, as Baldwin-Philippi (2015:162) illustrates in the case of political campaigns. Within GATEway, organisational public-making practices were crucially in forging the link between government-led strategy, with all its economic imperatives, and the instances of direct interaction between developers and citizens. As both STS and political communication researchers push forward and converge on understanding the increasingly complex technological systems that define our society (see Bucher, 2018), this thesis contributes just one potentially useful conceptualisation to understanding these enormous social and political trends.

Finally, in an indication of what this emerging area of political research may encompass, and of the limitations of this thesis, political scientists Miranda Schreurs and Sibyl Steuwer’s (2016) international comparative analysis of AV development and its political, social, and legal dimensions offers a valuable contribution. Capturing huge swathes of the ongoing activity of commercial organisations and governments, they draw eight tentative conclusions in their analysis, which are as follows:

1. Nations are competing to form the most advantageous legislation
2. Smaller automotive (Volvo, Nissan) and non-traditional companies (Google) have made early attempts to gain public attention
3. AV development is used to portray a nation’s technological and economic credentials, although political leaders have held back from publicly promoting the technology
4. Developers have heavily relied on improving safety as a key message
5. All countries, but especially Japan and in Europe, link AVs with efficiency and environmental protection

6. There are number of unsolved legal, ethical, political, and social issues which are only just being slowly debated
7. AVs are not integrated centrally into strategic visions of the future of transport
8. The most governmental activity to be seen is in support for research and development, with persistent uncertainty around which types of AV technology will prevail (Schreur and Steuwer, 2016: 165-168).

Schreurs and Steuwer's findings demonstrate the need to provide detailed case studies that can be used to provide informative comparative political analysis of developments across the world, and within that pursuit to provide studies of public engagement. This is one area where STS and the study of political communication can continue to be combined, as I have done so in this research. Crucial to the latter point is how their analysis points to numerous issues in the relationship that AV developers (and developers of other technologies) may have with the forms of public engagement that they choose. Point two for example, reflects the ways in commercial organisations have been trying to attract the public's attention, whilst point three suggests a disconnect between politicians and the public.

The first limitation of this thesis that Schreurs and Steuwer's findings point to is that the bulk of the findings in this research are drawn from a single case study of the GATEway project. The problem with using single case studies is a well-documented issue, because it is difficult to ascertain how representative they are without introducing comparable variables. The findings and broader significance of this thesis would undoubtedly have been strengthened with directly comparable data, preferably from a cross-national perspective. This would have allowed for a discussion of the way in which CCAV, for instance, differs from its counterparts, and how these differences further inform the evolving relationship between democratic politics and the development of advanced technologies. However, is possible that by looking at two

cases it would not have been possible to study GATEway at the level of practice, as this granular approach produced large amounts of empirical data.

Secondly, Schreurs and Steuwer's study emphasises the fact that my findings are culturally specific, as I discussed in the introduction. In terms of the final findings, outlined here, the contextual factors that influenced public-making practices and even the broader political conditions from which the GATEway project emerged are also cultural factors. The UK has a specific political economy, in which organisations have much less power and influence than the giant technology firms in the US, such as Waymo. Unlike in the US, this is partially what has allowed a government-led and collaborative approach to emerge, which itself allows government officials the leverage to push for forms of public engagement. This limits the wider conclusions that can be drawn from the study.

Finally, the findings and analysis and the discussion in the conclusion points towards the need for an analysis of political economy that this thesis does not provide. I did not set out to study political economy in my initial research design. However, I believe the findings in this thesis show why analyses of political economy should be central to the broader project of examining the relationship between democratic politics and the development of advanced technologies in future studies.

8.3 Accountability in Theory Only? Considering Future Proposals

This thesis has analysed the actions of the representatives of AV development within the GATEway project in terms of democratic criteria. However, there remains the question of whether it is fair or reasonable to hold GATEway's practitioners to account in this way. Afterall, should we expect practitioners to be holding Jasanoff's technologies of humility in the front of their minds or be holding their boardroom meetings in accordance with a well-

defined governance network? Of course, these are unrealistic expectations. In which case, is the democratic analysis provided in this thesis only useful for identifying what is “theoretically problematic”? In other words, does the analysis create a strawman effect, in which GATEway’s actors never claimed to be acting democratically?

The response here is twofold. Firstly, the analytic criteria applied to the actions of GATEway Project are not intended as heuristic methods of democracy to be prescribed to my fieldwork participants. Rather, they are analytic tools aimed at deriving deeper claims. Without them, the analysis in this research would be reduced to naïve claims or to reproducing the claims made by the participants about the value and purpose of public engagement. Thus, while it may not be possible to offer the analytic criteria *itself* as a prescription, this section does offer several proposals, *based on the* analysis derived from the application of the analytic criteria, that practitioners could deploy. Secondly, while the evidence from the interviews suggests that the project members did not see themselves as explicitly political actors, there is a normative justification for holding the practitioners to account using the democratic criteria used in this thesis. By claiming to engage the public in the issue of CAV development, the GATEway Project, and the institutions of government to which it was acting on behalf of, therefore invite scrutiny of how and in what ways it did so. Thus, the development of CAVs in the UK, being conducted under the guidance of the government, is beholden to the principles of UK’s representative democracy. But in what ways can the democratic affordances of this situation be improved? What lessons are to be learnt from the GATEway project model of public engagement? And how can these lessons be applied back to the development of CAVs, and perhaps other forms of technological development elsewhere? This section puts forward some suggestions.

In offering proposals to improve the public engagement process observed within GATEway, I cannot substantiate the claim that GATEway is completely representative of the

CAV programme and thus universally applicable. Different consortiums, in different projects, with different objectives, will operate under different conditions. GATEway was, however, a manifestation of the government-led strategy behind the CAV programme. Based on the view that GATEway represents an existing model of public engagement, my overall proposal is that the CAV programme, as it continues expand its reach, strategy, and funding, *should continue to adopt projects such as GATEway on a permanent basis*. Although I have pointed out several democratic deficits in the previous section, I tentatively argue that improvements to the model could lead to prolonged public engagement that firmly influences public policy on the issue of CAVs,

With CCAV in place, the UK is well positioned not only to pursue not only the development of the technology, but also enact a strong programme of democratic engagement around the issue. This is an opportunity that should not be passed up and one that has potentially far-reaching implications for how we could conduct the democratic development of other complex technologies. The political economy of the UK, devoid of large technology firms, provides the space for deliberate citizen engagement in which governments and commercial organisations could feasibly work together in the interests of citizens and to design towards civic means, as Howard (2015) suggests in the case of the internet of things. But to ensure this, CCAV must continue to develop projects such as GATEway in ways that build upon its predecessor to include more democratic potential. Based on the view that GATEway represents an existing model of public engagement, my overall proposal is that the CAV programme, as it continues expand its reach, strategy, and funding, *should continue to adopt projects such as GATEway on a permanent basis*. Although I have pointed out several democratic deficits in this thesis, I tentatively argue that improvements to the model could lead to prolonged public engagement that firmly influences public policy on the issue of CAVs and other advanced technologies.

Existing critique in this vein already exists. In a scoping study carried out on behalf of DfT, Tom Cohen, Peter Jones and Clémence Cavoli (2017) of the UCL Transport institute offered several practical recommendations for the UK's CAV programme and its approach to developing the technology. Among these recommendations were (a) the need for further deliberative exercise with citizens and organisations and (b) to explore and appraise the role of the public sector (Cohen, Jones, and Cavoli, 2017: 32-34). The authors are generally critical of existing deliberative exercises. They claim that they are often inflected by the partiality of those carrying out the deliberative exercises (in that they support AV development), use small or biased samples, and have poor research designs. Within GATEway, it is fair to say that the sample size was much smaller than the project hoped for, with just a few hundred interactions with the pods. This is to be put down to the procurement issues, with the pod trials running just a few weeks, rather than the six months originally planned. Moreover, nearly every member of the project was an advocate of the technology: this too raises significant issues about partiality – thought they must of course be balanced against the professionalism and integrity of the project members that I have studied.

Rather than address these structural aspects, which would require an full analysis of the political economy of AV development not provided in this thesis (see Kirsch, 2000, for an example) the suggestions that follow have a more processual focus. In particular, they focus on expanding the democratic affordances of the public engagement process used with GATEway, based on the view that this model should be widely used across the CAV programme and even beyond with other advanced technologies.

8.3.1 Proliferate Public Ontologies and Expand the Frame of Authorised Knowledge

- (1) Which means: citizens must be able to define themselves as a public, in addition to providing their views, experience, and opinions.

As shown in chapter four, it was often made clear to participants that their engagement in the project was *as* members of the public. This can be seen in the discourses used on the project website and during the sign-up process and in the project's broader communication. However, a common thread across all three dimensions of public-making was the inability for citizens to define *themselves* as a public. The designation of citizens as members of the public was largely performed by the project during the public engagement process. This is problematic. It meant that the participation of citizens, and most crucially the knowledge that they produced through public-making practices, became defined in terms of group identities they belonged to but had not being involved in defining. This has implications, given what it means to be part of a group of the public and how that group itself is understood is based on a set of assumptions from which further claims can be made. Citizens and project members, and indeed different citizens, may have different ideas of what it *means* to be part of a group. Citizens should therefore actively engage in defining these groups. The benefits of allowing citizens to define themselves as a public can help loosen the tight control over public-making, prevent the use of knowledge for only instrumental purposes, and allows greater levels of deliberation as citizens have to consider not only their views but also the basis of their views. In practical terms this can be achieved through the same technology-intensive means that were already used by the project, by designing in means for citizens to describe themselves politically. This can lead to emergent ontologies of the public to be used in the public engagement process, as opposed to pre-defined categories.

- (2) Which also means: expanding the framing of the issue and of knowledge creation

Participatory public-making practices, especially in their technology-intensive forms, offer an efficient way to generate knowledge about ‘the public’ and its preferences towards an issue. As data, this knowledge holds many potential political influences. As shown in this thesis, it can be used to inform policy-making. But it can also be used to inform public debates, if disseminated through the media, or used to guide the decision-making of commercial developers of AVs. The important point is that this data is used democratically. This is what Stilgoe (2018) has argued, in a similar vein, regarding the experimental data generated by AVs during accidents and tests. All of the data produced by the GATEway project was made publicly available in a series of reports that were published in June 2018, not long after the project was completed. However, the use of this data was left largely in the hands of the project. I asked one of the project members directly what the data would be used for. “Ut helps everybody who might be concerned with the environment in which self-driving vehicles might operate to think what the possible consequences might be and to think ahead and how to respond”, I’m told. He mentions vehicle designers, city planners, and traffic authorities – experts – as those that might be particularly interested (Interview 11, September 2016). This suggests that the information generated by participatory public-making practices informs an elite-oriented mode of decision-making. These enactments of the public are crucial ways in which the technical claims about CAV development, and its credibility, are enmeshed with politics. In this sense, it is important in a democratic system that public engagement continues into the dissemination phase of the project, continuing to guide the use of the data in a democratic way.

8.3.2 *Pluralise Civic Information and Spokespersons*

- (3) Which means: cultivate a wider array of ways for citizens to engage freely within developments in order to provide greater interaction and limit managed communication

It is undoubtedly important that the project 'got its message out', as many of the members constantly implored. The vast efforts out into the dissemination of civic information that informed citizens and encouraged them to participate in the project showed how highly project members valued the importance of doing so. There were very few ways in which the project attempted to hide its activity, apart from the internal conflicts around the procurement of the pod technology. However, the overreliance on political communication that was more suited to a dutiful civic information style ultimately led to the predominately broadcast-type style of political communication, in which news coverage became the main way in which the project disseminated its message. This was an outcome of the perceived need among project members to adopt a cautious and managed approach in their communication, based on a concern that journalists would misinterpret them. At the same time, the project relied heavily on journalists to report their activity. Problematic relationships between journalists and political organisations are not a new phenomenon. In the face of this, however, the option to explore forms of political communication aimed at actualising civic information styles in involving more direct communication with citizens was not as explored as it could have been.

- (4) Which also means: pluralise the type and number of primary definers (people who have the 'right' so speak) to provide a wider representation of views and prevent organisational interests co-opting public engagement

Primary definers play an important and powerful role in the presentation of facts in news coverage (Chadwick, et al, 2018). Thus, who gets to perform the role of spokesperson, and act

as a primary definer, has important implications, assuming different actors will present facts in accordance with their interests. Different organisational actors played this role in GATEway, with evidence in chapter five showing how particular project representatives were repeatedly used as a primary definer. Competence and experience were clearly a factor as they could be relied upon to present the GATEway project in accordance with its aims. This also reduced the perceived risk that came with presenting the project publicly. As credible experts, this approach also adapted the communicative dimensions of the project to the dutiful civic communication styles. Ultimately, however, it left communicative public-making in the hands of a very limited number of project members, and overall actors. This meant the task of constructing a mediated notion of the public was an exclusive activity. Though it is easy to understand why project members felt this was the best approach, it restricted who could contribute to constructing the public in a mediated setting. The role of primary definers must be pluralised to ensure that the civic information produced by projects reflects a broader range of concerns, including those of the public. This is not a straight forward task, as journalists tend to prefer accessible sources. However, including the voices of citizens who had been a part of the project would contribute to a much more inclusive range of communicative public-making practice. In addition, instituted members of the public who are close to the project would also provide the same benefit, leading to the fifth and final recommendation.

8.2.2 Institute Citizen Board Members

- (5) Which means: put citizens and workers on the project boards to ensure greater representation of public interests

There were 15 organisations involved in GATEway, yet none of them could be described as directly representing the interests of citizens. With the presence of inherently partisan AV developers on the project board, such as Oxbotica, there is little reason why citizens should not have been afforded the same. Fundamentally, conflicts between the social and economic benefits at the organisational level *must* be avoided to ensure the democratic purpose of these kinds of public-making endeavours. Since commercial organisations are needed to provide the technology, one way to achieve this is to include established citizen groups and/or ad hoc groups of citizens on the project boards. How would these citizens be chosen? It has already been established that project consortiums within the CAV programme must contain local authorities. These local authorities possess the means to contact and assemble groups of citizens who could be formally brought into the project, offering direct democratic oversight and involvement in decision-making at very little expense. This offers potentially the most dramatic benefits to the model of public engagement seen within the GATEway project, as it would remind all project members of the civic purposes of the process.

8.4 On the Arrival of the Technology Firm

The Centre of Connected Vehicles remains an active policy centre as of September 2018. In July 2018, a ‘Future of Mobility Grand Challenge’ was announced, signalling the government’s continued desire to support the activity of CCAV and pursue the development of AVs in the UK. At the time of writing this, in August 2018, government officials continue to develop and pursue strategies, gather evidence, and hold endless meetings with different organisations and interests. In the UK’s government-led environment, the decisions they make will have significant effects on the development of AVs in the UK. As (and in fact if) the technology emerges, the extent to which public engagement continues to play an active part in this process

will partially inform, and reflect, what we know about the democratic quality of our society and the development of technology therein.

However, all of this may be inconsequential in the long run. I give the final say in this thesis to one of my informants, Andy Frost, who sounded a powerful warning about the arrival of the technology firms if AV development ever does ‘succeed’. As he told me, AV development is ultimately “going to be driven by the people that are on the standards bodies – most standards bodies, a lot of them, those will be OEMS and manufacturers and technology providers because they will have a vested interest [...] I think it is inevitable that the big boys will take the lead”. And, as he said, these developers: “have one priority – and that is to sell it” (Interview 19, May 2017).

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List of Interviews

Interview participants were given the opportunity to have their contributions anonymised or to go on the record. As in the body of the thesis, the use of apostrophes in the first instance signifies a pseudonym. Where it does not compromise their anonymity, the following list provides contextual information about the interviewees and the date on which they gave their interviews. A record of the consent forms has been kept.

Interview 1
9 December 2015

Nick Reed, as GATEway Project Technical Lead. Employee at the Transport Research Laboratory since 2004. A chartered psychologist with Psychology qualifications from both Oxford and Cambridge University. A primary contact for fieldwork.

Interview 2
5 April 2016

Andrew Frost, as GATEway Project Manager. Wide career background, including sustainability and ten years as police officer. Employee at Transport Research Laboratory since 2015.

Interview 3
29 April 2016

“Peter”, an Innovate UK representative. Technologist in the Digital Economy team. Not directly related to GATEway, informative on Innovate UK’s organisational practice.

- Interview 4**
19 May 2016
- “*Seb*”, an Innovate UK representative. Technologist in the Digital Economy team. Not directly related to GATEway, informative on Innovate UK’s organisational practice.
- Interview 5**
19 May 2016
- Vinette Taylor*, Head of Internet of Things for Telefonica UK. A key GATEway project board member. Wide-ranging additional work in entrepreneurial business sectors.
- Interview 6**
13 June 2016
- “*Chuck*”, a Project Lead for work package five. Employee at Transport Research Laboratory. A key board member. A primary contact for fieldwork.
- Interview 7**
7 July 2016
- “*Rebecca*”, senior designer at Royal College of Art. Worked as a Project Lead for GATEway’s work package three (media, public and stakeholder engagement).
- Interview 8**
7 July 2016
- “*Susan*”, “*Chris*”, “*Gabby*”, researchers at the Royal College of Art. Contributed in various ways towards GATEway’s work package three (media, public and stakeholder engagement).
- Interview 9**
15 July 2016
- “*Tim*”, a senior civil servant in the Centre for Connected and Autonomous Vehicles. A primary contact for fieldwork.

- Interview 10**
9 September 2016
- “George”*, an insurance representative on the GATEway project board. Advised and observed the project.
- Interview 11**
13 September 2016
- “Eric”*, a senior member project board member and a researcher from the Transport Research Laboratory. Led and informed the psychological research approach to public engagement in the project.
- Interview 12**
7 October 2016
- “Ed”*, a board member of the GATEway project and a project work package lead.
- Interview 13**
24 November 2016
- “Rob”*, a representative from Commonplace.
- Interview 14**
13 December 2016
- “Charlotte”*, communications staff in the Centre for Connected and Autonomous Vehicles.
- Interview 15**
6 March 2017
- Nick Reed*, as GATEway Project Technical Lead. Nick left the project and TRL shortly afterwards to join Bosch Ltd.
- Interview 16**
10 March 2017
- “Sam”*, a Senior staff member at Digital Greenwich, a commercial company set up by the Royal Borough of Greenwich to develop its smart city strategy, which included GATEway.
- Interview 17**
31 March 2017
- “Howard”*, an executive at the Transport System Catapult.

Interview 18**4 May 2017**

“Lisa”, an Innovate UK representative. Previously part of the Innovate UK’s Transport Systems team which was heavily involved in establishing the ‘Four Cities Trials’.

Interview 19**17 May 2017**

Andy Frost, after recently leaving role as GATEway’s project manager. Re-joined the project as an employee of Westfield shortly after.

Appendix A. Methodological Appendix.

A1. Questions used in Interviews.

The range of questions that I asked evolved as I gained a better understanding of the CAV programme and as conceptions of the public began to emerge in my interview data through the coding process. Many of my earlier questions focussed on how the vehicles worked or addressed vague notions, based partly on my inexperience and partly on my lack of immersion in the field. The comments I made on earlier transcripts and notebooks show that I was frustrated with this approach. This, however, helped point me towards the key revisions I needed to make in the questions I was asking. Eventually, I established a group of consistent questions, the specifics of which I adapted to each interviewee, depending on their role:

- 1) What do you enjoy about working on the GATEway project / within CCAV?
- 2) Can you tell me more about your role? What does an average day look like to you?
- 3) How did you end up coming into this role?
- 4) Who do you engage with in your role?
- 5) What kind of challenges do you face in your role?
- 6) What *are* the obstacles to “public awareness, acceptance and acceleration of uptake and investment²⁷” around autonomous vehicles?
- 7) Do you read a lot of news about autonomous vehicles?
- 8) How do you see the GATEway project/CCAV fitting in with broader changes in technology and innovation across the rest of the UK?

²⁷ Quoted from the GATEway project’s aims.

- 9) What's the purpose of the GATEway project's public engagement process?
- 10) What does innovation mean to you?

These questions allowed me a degree of consistency as well as a much-needed flexibility. Many times, the open-ended nature of the interview structure would mean only a handful of these questions would be asked, as the interviewee would take the lead and articulate their role. In doing so, interviewees would often reflect on what motivated them, providing key insights into how they viewed the development of CAVs, with many consistently espousing a firm belief in the technology's socially progressive potential, which itself became a key finding.

I attempted in these questions to create a blend of questioning that focussed on both individuals (to understand their practices) and processes (to understand the wider context of those practices), in line with the analytic concerns of my thesis. Moreover, I tried to avoid leading questions and aimed for questions that were open-ended but still directed towards the concerns of my research. For example, question five was aimed at getting informants to discuss conflicts, to help me understand power-relations. At other times, it was possible to be more direct, such as in six, as I was quoting back the project slogan to its members.

A2. Gaining Fieldwork Access

As I hope this thesis has convincingly demonstrated, public-making was more than direct engagement with citizens. It extended, holistically, throughout the GATEway project. As well as being present in the citizen workshops, the vehicle trials, and the online interactions, public-making was also present in board meetings, in policy drafts, email exchanges, and many other interactions that took place between project members, government officials, citizens, journalists, and so on. What these interactions tell us about democracy and power has been my central concern in this thesis. However, many of these interactions leave little trace or are inaccessible to outsiders. It is possible to acquire board-meeting minutes, or policy drafts, or to read endless news articles. But even then, this only provides a partial account of events observed from a distance. Ethnography, as I have argued, was therefore necessary as a research approach to get at the inner workings of the GATEway Project and to observe the complexities of public-making up close and in practice.

I have already explained in chapter three the methodological details of this approach. In this brief appendix section, I provide further depth to this by explaining how I gained and maintained fieldwork access to the GATEway Project and to CCAV, and why I chose to do so. This I hope adds transparency to the qualitative data that I collected, as well as illuminating the more interstitial aspects of ethnographic fieldwork that I experienced.

From Getting In ...

GATEway was not the initial target or focus of my research. The project began with a search for cases studies that could be used to explore the social and political effects of emerging technological developments and innovations. The initial search phase took me many places, from regional NHS offices, where I conducted background interviews and exploratory

discussions with health care professionals who were using internet of things devices to treat dementia, to hackspaces in Brighton, Reading, and London, where I took part in events and interviewed members from these communities about their culture. This research data still exists and will perhaps be used at some point in the future. GATEway was the third of what was going to be three case studies which explored the broad and naïve question, devised back in early 2014, about the effects of technology on society. Back then, influenced by the work of Heidegger and Feenberg and other philosophers of technology, I wanted to write something profound. And at that point, few things seemed less profound than ‘driverless cars’.

I found out about GATEway in June 2015, when I came across a news article from December 2014 which announced that the project had secured funding. Following initial communications in August 2015, the following month I acquired a meeting at the headquarters of the Transport Research Laboratory, located in Crowthorne, Berkshire, with its then Academy Director and also at the time technical lead of the GATEway project, Nick Reed. Nick Reed, it turned out, was a nexus. In plain terms, he knew everybody and was widely knowledgeable of the emerging CAV programme. Nick immediately pivoted me, as a researcher, into the programme and provided me with crucial early momentum in my fieldwork. This snowballing effect overlaid my intention to “follow the actors”, as Latour puts it. Thus, as a result, the further I became embedded within GATEway, the more aware I became of the scale of the CAV programme that was emerging beyond it. This immediately appeared to me to be an issue of governance, as I explained in chapter three, and at this point I formed my initially Dahlian concern.

At this point, I made the decision to pursue GATEway as a sole fieldwork site. There were two key reasons for this.

First, there was fact that I made initial contact in the early stages of the project, which would allow me to observe it almost entirely from start to finish – and thus provide a complete account of public participation in the development of CAVs. However, this intended plan was complicated by severe and long-running delays to the project. Moreover, there was much information and access that I requested that was not granted, for various reasons. Usually, time constraints were a primary factor in most reasons given. Importantly, I decided that tracking GATEway from start to finish would require my full capacity as a sole researcher or I would otherwise risk collecting superficial data. This also allowed me to focus my resources on building relationships with informants.

Secondly, over time, I cultivated an insider status within the GATEway project which in turn provided me with a firmer foothold within the fieldwork site. This was perhaps the biggest key to how I secured fieldwork access. I found that I became knowledgeable of a medley of previously obscure matters ranging from state aid rules, to LiDAR, to the principles of behavioural psychology. This knowledge afforded me the social capital I needed to convince project members to speak with me, as I often came across as a fellow expert. In cultivating this insider status, my presence within the CAV programme extended to the point that I was able to secure fieldwork and interviews with more project members.

In this regard, immersion in the topic was a significant part of my fieldwork experience and in gaining fieldwork access. Harry Wolcott defines fieldwork as a “form of inquiry in which one is immersed personally in the ongoing social activities of some individual or group for the purposes of research” (1995: 66). Like many of my informants, I followed AV developments across the world and built up a pragmatic technical knowledge of how the vehicles worked. For example, I built a personal archive of news articles, going back to October 2010, which allowed me to trace AV development across the world over time. This immersion was incredibly useful. First, it provided useful secondary data to help

supplement my account. Secondly, it was crucial to building rapport, as mentioned. Thirdly, it allowed me to contextualise my interviews and observations within current developments. Knowing, for example, that Baidu or Waymo had made progress was important, as it would probably be near the top of many of my informant's agendas. Finally, it allowed me to retain critical distance. Many of my informants believed very strongly in the development of CAVs and would often solicit my views. On one occasion, I was asked if I would co-author a report – which I declined. To avoid being swept up into the enthusiasm that often surrounded me, I forged my own view on AV development. Although I do not express this view here, I found its pragmatic use extremely useful as a way of retaining the measure of objectivity necessary to conducting this research and to not get drawn too heavily into my informant's views. That said, many of my informants were extraordinarily candid and open about how well everything they were doing was according with their strategies and were often highly critical of their own efforts.

Linked to this was the efforts that I made to visit as many organisational headquarters as I could under the pretence of conducting interviews. The additional advantage of holding the interviews in person within organisational settings was two-fold. First, it augmented the fieldwork observations by allowing me to gain limited insights into culture of the organisations involved in the CAV programme. For example, one interview with an insurer took me to the upper floors of 20 Fenchurch Street, and I visited the headquarters of the Transport Research Laboratory five separate times. The second advantage was that it was used as an opportunity to build my network of informants through polite requests to meet other individuals, often using the line “since I'm here...”. Most of the time this was unnecessary, however, as many informants would often willingly introduce me to their colleagues.

Gaining access to CCAV was especially difficult. As the centre of government activity, it was an obvious choice of fieldwork site for this research. This fieldwork was arranged after I had gradually developed an understanding of how the CAV programme functioned and had cultivated my insider status. In the early phase, the fact that I was a university researcher provided me with sufficient status to gain access. In later stages, rapport with well-known individuals and a deep insider knowledge built my credentials as an insider.

... To *“You’re Basically Part of the Project Team!”*

On my final day of fieldwork, in March 2018, I sent a message to Nick Reed to find out if he was attending an event in Greenwich to mark the end of the project. He responded, telling me that he would be there soon. I let him know that I was there already, and he replied with a thumbs-up emoji, before sending the message “you’re basically part of the project team”.

Talking to various people, in the same room, on the 11th floor of Mitre Passage, in Greenwich, where I had stood a dozen times before, it was clear to me what this meant. I knew most of the people in the room by their name and could recall what they did in the project and what organisation they were from. In conversations, I recalled anecdotes. At one point, I was part of a friendly conversation about someone’s son. Ethnographers often worry about ‘going native’, but this was not a common occurrence for me, as my interactions mostly worked on the pretence of a quasi-professional interest in the development of CAVs that was read into my presence as a researcher.

Ultimately, I spent more than two years inside GATEway. In many ways, it became an ever-present object in my life. Even when I was not physically present, I was contacting people via email (I saved over 100 important emails), reading news about the project, or else simply *thinking* about the project. In this sense, it felt strange when the project (finally)

finished in March/April 2018. On this basis, I was able to gain valuable insights into this topic of research, that connects to a number of important concerns about democracy, power, and technology, in the 21st century.

A3. Generating Codes and Memos from Fieldwork Notes

This is a sample of the open coding process. As described in chapter three, it was based upon a grounded theory approach. The bold writing in each box refers to the category of data held in that box. I have provided illustrative snippets from one fieldwork event to show how this process worked. I have also included examples of the memos that I made while conducting this fieldwork.

Event e.g. GATEway Project Meeting (Location e.g. Mitre Passage)	Date e.g. 20.09.16
<p>Raw fieldwork notes typed up</p> <p>e.g.</p> <p>There are around 15 different people present, from various organisations. There are some new faces, as people within the organisations have taken on new roles left behind by the previous person. The start of the meeting is taken up with introductions and the announcement that the project lead is been given some extra support to help with the workload. Most of the meeting is taken up with a discussion of the project's progress, along the vectors of three planned trials. Much of this hinges on a detailed discussion of a range of technical details. "She's moving" says the project lead, to summarise the progress to date. The technical issues are passed around the room and debated from "our perspective" or "the perspective of". Many of those present draw attention to the issues with the hold ups with the trials, given the encountering of technical difficulties, and how that will fail to meet the expectations of "Innovate". Innovate UK, that is. It is made clear that Innovate UK's aims must be met. Around these issues, much of the meeting is spent trying to build consensus and get partner approval over decisions.</p>	<p>Dialogue noted</p> <p>e.g. "from an innovate perspective", "delivery of the project"</p>

<p>Initial Codes Generated</p> <p>Yellow: Multiple organisations as feature of GATEway</p> <p>Purple: Complexity, challenges to aims</p> <p>Blue: project progress, delivery as important</p> <p>Grey: public trials as central</p> <p>Green: different perspectives between project members</p> <p>Red: government strategy as a priority</p>	<p>Further evidence available</p> <p>e.g. minutes provided.</p>
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<p>Response to my presence</p> <p>e.g. I shake hands with people I know and those I'm just meeting. Everyone assumes I am part of the project until I explain that I am observing and that I am from a university. The university bit puts them at ease – appears to mean we assume a shared expertise level.</p>	<p>Basic Reflection</p> <p>e.g. I am inside / outside. I do not participate in the project, but my own expertise is seen as a token of entry here.</p>
<p>Initial Questions</p> <p>e.g. why do we have these board meetings? It is a crucial norm of the project – a consortium of different expertise and interests. It is therefore a point in which the project 'comes together', but does it? Appear to be a way of condensing down everyone's' progress. What's the priority in terms of progress? How is progress understood? These board meetings are monthly and often good indicators of where the project is at as a researcher. Do project members feel the same as practitioners?</p>	<p>Basic Analysis</p> <p>e.g. board rooms are both limited in terms of what all actors see, but also revealing as they show events coming together. Signs of tension based on different interests of the organisations. Links between what government wants (Innovate UK) and the project does. The expertise of the project members is varied. Engineers and software experts alongside the public engagement specialists and the transport experts. Demonstrates an acknowledgment of the complexity of AV development.</p>

Appendix B. Evidence Appendix.

B1. TRL (2015) Internal Document

GATEway - Advisory Group meeting 1 briefing



GATEway - Greenwich Automated Transport Environment - Advisory Group meeting 1 briefing

Abstract

In 2014, the UK Government launched a £10m competition entitled 'Introducing driverless cars to UK roads', managed through an organisation called Innovate UK. It sought collaborative project proposals of 18 to 36 month duration to test automated vehicles in an urban environment. Projects were to focus not on technology development but upon issues of public awareness, acceptance and the acceleration of uptake and investment. This paper describes the GATEway project led by TRL that was successfully awarded funding through this competition and is now embarking upon a two year study of automated vehicles in Greenwich, London. This will include live trials of automated shuttle vehicles, autonomous valet parking, driving simulator tests, teleoperation and the development of traffic management and pedestrian modelling tools in relation to automated vehicles. This will be supported by a comprehensive stakeholder engagement plan and an extensive programme of dissemination.

1 Innovate UK competition: Introducing driverless cars to UK roads

1.1 Background

In 2014, the UK Government launched a competition entitled 'Introducing driverless cars to UK roads'. This was managed through an organisation called Innovate UK, which is an executive non-departmental public body, sponsored by the Department for Business, Innovation & Skills (BIS). With the potential to have great significance for improvements to public and private transport, the competition was also supported by the Department for Transport (DfT).

DfT and BIS initiated the competition with a view to investing up to £10m in collaborative research and development projects to investigate how driverless cars might integrate into everyday life in the UK. This represented a commitment by the UK Government to build on the existing science and engineering base and advance the research and development, manufacture and use of driverless cars in the UK, with an aim to establish the UK as the global hub for the research, development and integration of driverless vehicles and associated technologies into society and thereby attract future investment. The competition guidance suggested that up to three urban test locations would be selected to undertake this research. The focus of the competition on urban transportation suggests that the challenges associated with the provision of mobility for increasingly urbanised populations in industrial nations were considered to be highly significant.

Proposals were to be collaborative and led by a commercial business organisation. Consortia had to include local authority partner but could also include other businesses and research organisations. Business partners were to incur at least 70% of the total eligible project costs. Larger commercial organisations participating in proposals could expect to receive up to 50% public funding for their project costs. Small to medium commercial organisations could receive up to 60% of project costs whilst public organisations, research institutions and charities could receive up to 100% of project



costs. Proposed projects were anticipated to have total eligible costs in the range of £5m to £10m although projects with eligible costs outside of this range would also be considered. Delivery of projects had to be within 18 to 36 months of project initiation.

1.2 Competition objectives

The objectives of the competition were wide ranging and far reaching. They were listed as follows:

- a focus not on technology, but on researching and building a deep understanding of the impact on road users and wider society
- the ability to resolve a wide range of typical challenges, including congestion and road complexity
- research on the interaction with other road users
- interoperability – enabling different solutions to be tested side by side
- the ability to scale up, both in physical environment and number of users
- transferability to different city/town infrastructure
- information for legislators and insurers
- acceleration of development, uptake and investment in the UK
- acquisition of new skills and knowledge in the UK for development of new products, services and processes
- promotion of low and ultra-low emission vehicles
- engagement and dissemination on a world stage including through the media
- increased public awareness and acceptance.

It can be seen that the competition funding was not intended to aid technology companies in the specific development of automated vehicle systems but to build an understanding of how the public would interact with such systems both as users and third parties. Successful proposals would also indicate how their projects would address the societal, technical and legal challenges that are associated with automated vehicles. By addressing these challenges, consortia were to demonstrate how their projects would help to position the UK as a leader in automated vehicle development.

1.3 Competition award

In December 2014, Innovate UK announced the winners of the competition. Three consortia were awarded with funding to pursue their proposed projects. They were:

- GATEway – Greenwich Automated Transport Environment
This project is led by the independent transport research organisation, TRL (Transport Research Laboratory), and is to be delivered in Greenwich, London.
- UK Autodrive
This project is led by the independent professional services company, Arup, and is to be delivered in Milton Keynes and Coventry
- Venturer



This project is led by the design and engineering consultancy, Atkins, and is to be delivered in Bristol.

This document describes the GATEway project in more depth.

2 GATEway – Greenwich Automated Transport Environment

The GATEway project is planned to run over two years in the Royal Borough of Greenwich, led by TRL Limited with a consortium of eleven partners, including multinational organisations, world renowned UK universities and highly capable SMEs. The start date of the project is January 1st, 2015 giving an end date of December 31st, 2016.

2.1 Consortium

Table 1 below lists the eleven organisations participating in the GATEway project.

Table 1. Partners in the GATEway project

Status	Organisation	Short name
Lead	TRL Ltd	TRL
Partner 1	Transport Research Laboratory	TRLab
Partner 2	The Royal College of Art	RCA
Partner 3	University of Greenwich	UoG
Partner 4	Royal Borough of Greenwich	RBG
Partner 5	Phoenix Wings	PW
Partner 6	Telefónica UK	TF
Partner 7	Royal Sun Alliance	RSA
Partner 8	Shell Global Solutions	Shell
Partner 9	Commonplace	CP
Partner 10	Gobotix	GB

In addition to the funded partners within the GATEway consortium, there is also a cross-sector project advisory group. This group will meet three times over the life of the two year project and will be provided with study plans and project deliverables such that they can provide relevant insights from their own sectors, helping to ensure the project delivers the most pertinent results. The advisory groups includes members from national and local Government authorities, road operators, technology developers, vehicle manufacturers, road safety groups, legal firms and car hire organisations. Meetings will be chaired by Lord Borwick of Hawkshead, a peer in the House of Lords (the second chamber of UK Parliament). In addition to his own experience leading the development and manufacture of electric vehicles, Lord Borwick has led debates in Parliament on the importance of automated vehicles to the future of mobility.

2.2 Greenwich, London

The Royal Borough of Greenwich (see Figure 1) is the hosting borough and urban location for the GATEway project.



Figure 1 Royal Borough of Greenwich – highlighted among the 33 London boroughs (inset: Greater London highlighted in the UK)¹

Greenwich is internationally renowned as the location of the Prime Meridian, established in 1851 and becoming the global reference point for the estimation of time. The ability to measure time relative to an agreed standard permitted navigators to determine longitude, thereby allowing accurate positioning at sea. This feat was achieved by John Harrison in the 18th century who was rewarded for his efforts with 'Longitude prizes' – cash payments determined by the Board of Longitude to encourage innovators to solve this problem. This link to accurate navigation and innovation through competition has an elegant association with the GATEway project that will investigate the performance of vehicles that can navigate for themselves, funded through the Innovate UK competition.

Greenwich is also home to the Old Royal Observatory, which, along with The Queen's House (by Inigo Jones) and the Royal Naval College (by Sir Christopher Wren), form the Maritime Greenwich UNESCO World Heritage Site.

Beyond these historical links, Greenwich is a rapidly growing borough, with population growth that is among the highest in London. As a result, the Royal Borough of Greenwich

¹ "Greenwich UK locator map" by Greater London UK district map (blank).svg: Nilfanion, created using Ordnance Survey data derivative work: Renly (talk) - Greater London UK district map (blank).svg. Licensed under CC BY-SA 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Greenwich_UK_locator_map.svg#mediaviewer/File:Greenwich_UK_locator_map.svg



council has an established Smart City programme – using technology to meet the needs of this growing population. This being led through the Digital Greenwich enterprise centre located in the council offices. Furthermore, Greenwich has an array of transport links into which the GATEway project can integrate. The London Underground, buses, taxis, roads, Emirates Airline cable car and Thames Clipper river buses all converge on the Greenwich peninsula, whilst overground rail serves the wider borough, including the imminent development of a Crossrail station at Woolwich Arsenal. The Greenwich peninsula itself is undergoing considerable redevelopment through the Knight Dragon developers, with a plan for large numbers of new homes and a commercial district. It is also home to the O2 Arena – the world’s most popular entertainment venue.

These features emphasise the suitability of Greenwich as the host region for the testing of automated vehicles within the GATEway project and the automated transport test-bed that will be created.

2.3 Work packages

The following sections described each of the six work packages into which the GATEway project has been sub-divided. It is worth noting that due to the design of the project and the work allocation across the consortium, all work packages are able to begin on the first day of the project.

2.3.1 WP1: Project management

(WP Leader: TRL)

WP1 is led by TRL under the guidance of a PRINCE2-trained programme manager and using TRL’s ISO accredited quality management system. Specified partners lead each work package. Technical quality will be monitored by TRL’s established technical review process and trial activities will be reviewed by TRL’s ethics committee to ensure the highest standards of trial design, safety, privacy, confidentiality and integrity.

2.3.2 WP2: Resilience, risk management, liability and insurance

(WP Leader: RSA)

WP2 (Resilience, risk management, liability and insurance) led by RSA, addresses management of trial risks and the learning that will be achieved by consideration of resilience, risk, liability and insurance. Imperial College (cybersecurity), TRL (safety analysis and trial design) and the Royal Borough of Greenwich (local insight) will support RSA. The importance of this work package is central to the success of the trial and the creation of safe, established and robust testing environments and protocols.

2.3.3 WP3: Public, media and industry stakeholder engagement

(WP Leader: RCA)

WP3 (Public, media and industry stakeholder engagement) will be led by Royal College of Art, supported by Shell. Starting from a public, media and stakeholder engagement plan, designs of vehicles and infrastructure will be developed to convey to media, stakeholders and the wider public how automated transport systems would operate. They would be used in extensive and insightful qualitative research with potential users including individual interviews, focus groups and workshops. In addition to users and



stakeholders, workshops will cover the interests and views of other road users, younger and older groups, disabled travellers, technophiles/-phobes and misuse/abuse of automated transport. Insight into societal response will also be gathered via a social media sentiment mapping exercise undertaken by Commonplace. A project website and social media engagement plan will build awareness and excitement around the project. The activities in WP3 will be closely associated with the trials undertaken in WP5 to ensure that the project captures the subjective insights of participants who have experienced or engaged with automated vehicles in the trials.

2.3.4 WP4: Synthetic environments and teleoperation

(WP Leader: TRL)

WP4 (Synthetic environments and teleoperation) will be led by TRL. The Greenwich Synthetic Automated Vehicle Environment (G-SAVE) will be developed – an accurate, industry standard format 3D model of the roads, buildings, car parks and associated infrastructure of the peninsula. The fully immersive model will be used in TRL's portable driving simulator (MiniDigiSim) for focus groups and engagement and in TRL's high fidelity driving simulator facility (DigiCar) in a trial assessing driver behaviour and human factors issues.

Automated vehicles may eventually form a mobility service involving large numbers of vehicles across an urban centre. However, faults, breakdowns or complexity of the driving environment may create situations where a human operator must intervene to recover a fully automated vehicle to a safe mode of operation. To investigate how this may be achieved remotely, a real hybrid vehicle will be equipped to enable safe and secure teleoperation using TRL's MiniDigiSim driving simulator and tested in a closed environment, mindful of practicality, eCall and cybersecurity issues. This will be undertaken by Gobotix, with the support of TRL.

2.3.5 WP5: Live automated vehicle trials

(WP Leader: Phoenix Wings)

WP5 (Live automated vehicle trials), led by Phoenix Wings, will demonstrate the use of the Greenwich locations as a test bed for automated vehicle evaluation and development. The first trial is fully automated shuttle transport on routes around the Greenwich peninsula to investigate user interaction and experience of 8 fully automated eight passenger shuttle vehicles in an operational setting. This will enable the operation of the shuttles as a small scale transport service and the project can assess the effectiveness with which it meets the demands of a range of different travellers in the region.

The second trial an investigation of user behaviour with autonomous valet parking. The trial will equip two electric cars with suitable equipment to enable a driver to depart from the vehicle at a vehicle drop-off point and thereafter, the vehicle will automatically and safely drive itself to a parking space within a defined parking area. When the driver wishes to return to the vehicle, they can summon it to a collection point. The vehicle will again drive unaided from its parking space to the collection point where the driver can enter the vehicle and resume control. This has three key benefits: firstly, the ability to park cars more densely thereby making better use of available infrastructure; secondly, it saves time for the vehicle occupants as they do not have to laboriously search for a



vehicle parking space; thirdly, car park environments have numerous risks for human drivers and pedestrians that could be significantly reduced if the movements of all vehicles within the parking area are electronically managed.

The third trial is to be defined in conjunction with the customer (Innovate UK) and based on feedback from the public, from stakeholders and from the project advisory group. It is likely to entail a phased introduction of more extensive trials of automated electric vehicles, starting with experiences in private areas before escalating to more integrated environments such as the O₂ Arena, transport hubs, the Royal Observatory, University of Greenwich and Greenwich Millennium Village. The third trial may involve automated shuttles, cars and/or a van. Vehicle manufacturers will be invited to participate in development of their automated systems in the test areas.

A pedestrian monitoring, evaluation and modelling exercise will be undertaken by University of Greenwich, creating a prediction tool for automated vehicle/pedestrian interaction. This will extend the University's EXODUS pedestrian modelling software.

The project will investigate vehicle to infrastructure connectivity and back office management of the automated systems, including ticketing. The critical TRL-developed traffic light management system, SCOOT, is being advanced to enable interaction with connected vehicles. We shall use this experience to optimise interaction of automated vehicles with connected infrastructure.

The trial development process including ethical approval, insurance, testing protocols and analysis plans will be documented as a specified deliverable and results will inform developments of global standards in the interoperability of automated transport systems.

2.3.6 WP6: Evaluation, exploitation, dissemination

(WP Leader: TRL)

WP6 (Evaluation, exploitation, dissemination), led by TRL, will evaluate the success of the GATEway project against the original aims under the scrutiny of the advisory group. The evaluation will critically consider achievements; how successes will be taken forward as a roadmap; modelling of potential uptake of driverless transport based on the Greenwich results and wider implications for London, the UK and international opportunities; what challenges to driverless transport remain; and how these should be prioritised and addressed. Project data will be gathered in a format that facilitates sharing through the independent third party organisation appointed to support the competition. In addition to targeting journal and conference papers, a final project summary booklet, including an exploitation plan, future deployment roadmap and standards guidance for low carbon automated transport will be widely distributed. A final project dissemination event will be held in Greenwich.

3 Conclusion

The GATEway project addresses all of the original objectives of the competition. It will be a challenge to successfully deliver the six work packages within a two year period. The capabilities of the consortium partners and the detailed project management planning that has been undertaken suggest that this is achievable. The two year design was intended to reflect that the technology in this domain is moving rapidly. In order that UK industry can capitalise on the results of the project as quickly as possible, it was



considered that a two year project duration was optimal within the 18-36 months window described in the competition guidance.

Whilst the technologies to be demonstrated within the GATEway project are not groundbreaking, the focus will be on giving members of the public experiences of interaction with automated transport with a view to building acceptance and a better understanding of the true business case for automated vehicles, including the development of suitable standards for their testing and subsequent deployment.

The urban setting for the trials – particularly in London, a high profile, densely populated megacity, adds additional complexity. However, it can be anticipated that results achieved in London will have resonance in many large, international cities across the world.

Finally, it is the intention of the consortium that the GATEway project will create an internationally renowned test-bed environment where issues of risk management have been addressed, liabilities have been considered, trials management protocols are in place and stakeholder engagement is facilitated. As such, this environment is intended to appeal to automated vehicle manufacturers and associated technology providers as a fitting home for the development of their products. Success in this regard will mean that the project is genuinely a gateway to promising opportunities for the consortium and for the UK in the research and development of automated vehicles.

B2. TRL (2017) Internal Document

Trial 1: alternative ACS supplier (Fusion)



Trial 1: alternative ACS supplier (Fusion)

1 Introduction

GATEway Trial 1 seeks to demonstrate first/last mile public transportation on the Greenwich peninsula and a possible secondary location. The trial deploys seven shuttles developed by Westfield and Heathrow that will carry passengers autonomously along a prescribed route.

The recent decision by Oxbotica to not supply the autonomous control system (ACS) for the seven shuttles has prompted a plan for an alternative ACS supplier.

This proposal ensures that Trial 1 remains consistent with the original stated objectives for GATEway by delivering a full fleet of automated shuttles for trial by the public.

2 Fusion

2.1 About Fusion

Fusion has been operating since 2012, developing situational awareness systems for the transport sector. For example, its CycleEye system has been deployed on buses in Bristol for three years and has proven to be effective and robust. The system combines radar and low light camera sensors to ensure that drivers are alerted to cyclists alongside the vehicle in all weathers, day and night, even in the most challenging, poor visibility conditions.

Fusion is also providing the situational awareness capability to the Venturer consortium, and the sensing and control system for the INSIGHT pod. To date this system has been deployed on smaller vehicles but not yet on a pod.

2.2 Fusion ACS



In summary, Fusion offers an ACS that provides similar use case functionality at the peninsula and a potential secondary site, which would enable all Trial 1 research activities to complete to the original proposed scope.

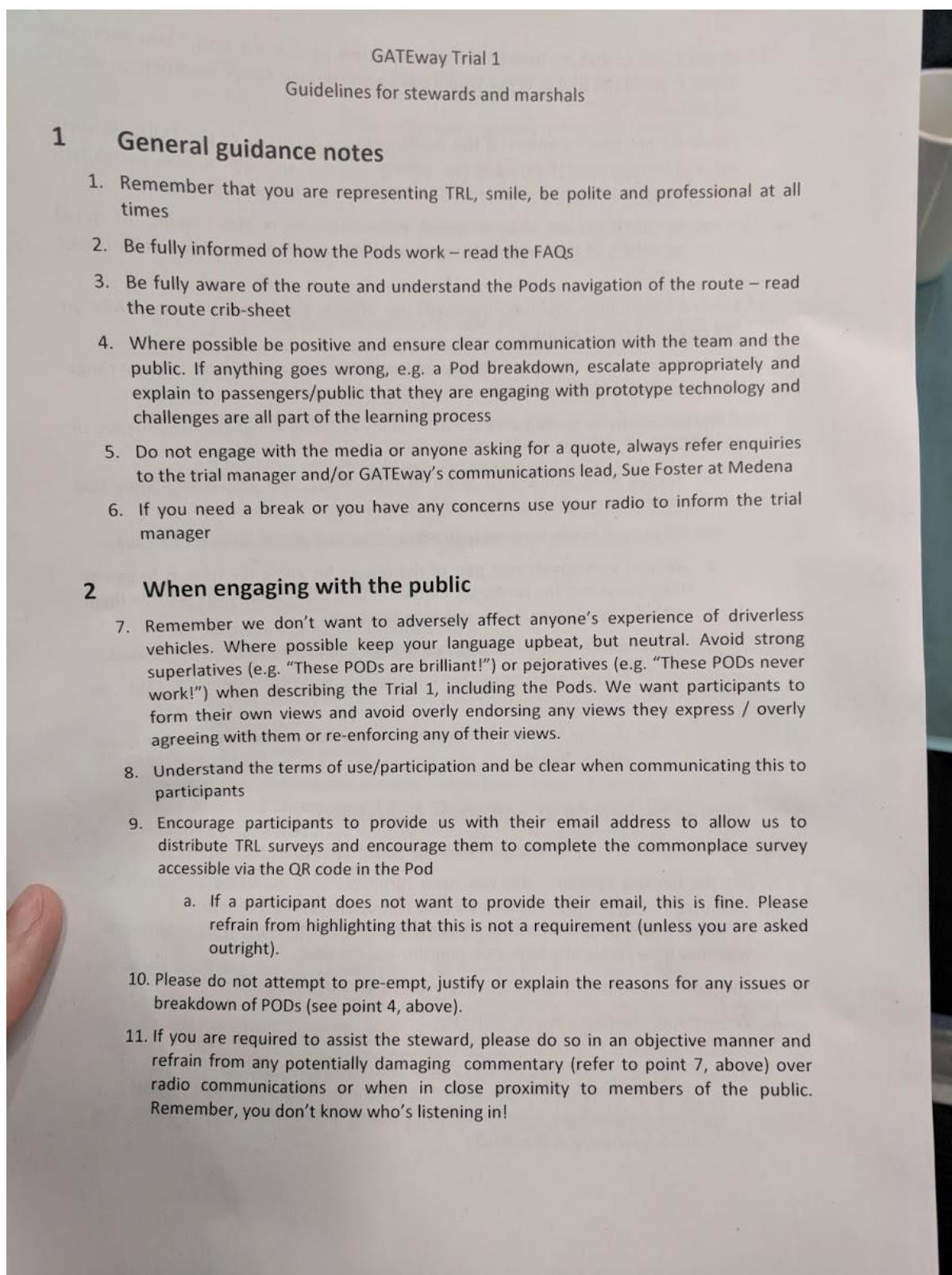
4 Research activities

Numerous consortium members have research activities and/or development plans around automated vehicles that require delivery of a pod service as originally proposed (Table 1).

Table 1. Trial 1 outline research activities by consortium member

Consortium member	Research activities supported by Trial 1
TRL	<ul style="list-style-type: none"> • Safety case development – to demonstrate safe trial operations as a springboard for future AV trials and tests in Greenwich, and to inform future regulation and guidance • Quantitative public surveys – to engage with the public to understand perceptions and acceptance of AVs in a complex urban environment when providing such services • Qualitative public feedback to enhance research data already collected in WP3 • Stakeholder engagement with key groups
Digital Greenwich	<ul style="list-style-type: none"> • Smart Cities demonstration • Showcase Greenwich as a location for AV trials that engage with the public in complex urban environments
University of Greenwich	<ul style="list-style-type: none"> • Public perception surveys of risk acceptance • Video data collection of crossing behaviour and gap acceptance for public interactions with automated vehicles
CommonPlace	<ul style="list-style-type: none"> • Sentiment mapping updates to track how the local population responds to automated vehicle services
Telefonica	<ul style="list-style-type: none"> • Exploration of communication demands of hosting multiple vehicles in a single site • Exploration of communication demands associated with monitoring of multiple vehicles performing passenger-carrying services as a fleet
Westfield/Heathrow	<ul style="list-style-type: none"> • Demonstrate public deployment of an automated shuttle vehicle in a complex urban environment

B3. The Marshall Scripts



12. Be prepared to give an answer if the prospective participant asks if you personally would enrol in the trial or if you would advise one of your family members to enrol – the answer is “yes”.
13. Please do not give members of the public detailed accounts of the PODs, sensors, our trial management, training or the surveys. Some of this information, particularly that relating to the sensors and how they operate is protected information.
 - a. In addition, we want to avoid inconsistencies in the amount of detail members of the public have as this would impact on their responses to our surveys.
14. General information marshals/ stewards can provide can be found in the FAQs on the gateway project website
15. If a participant asks how the PODs work? Simply say that they operate using a range of sensors and GPS that allow them to navigate the trial route.
16. If any passers-by or participants are particularly negative about their experience or the PODs:
 - a. Take a brief moment to listen to their views, and apologise if they feel they've had a particularly negative experience
 - b. Do not get overly involved in the discussion, and do not allow it to escalate
 - c. Remind participants that part of the reason for doing the trials is to gather their views and the survey we will be sending them shortly will provide them with the opportunity to provide their feedback
 - d. If a participant continues to labour a point or is becoming more aggravated,
 - i. Please ask them to log any complaints/ issues to TRL on gateway@trl.co.uk
 - ii. Log the incident – this can help provide context should any issues arise in future

3 Managing people at pod stops (marshals)

There are two ways that members of the public can access the pods:

- Via the booking system – this was open to people who expressed an interest in taking part using the gateway website (this sign-up sheet is now closed)
- As passers-by – people who have either passed by and seen the trials occurring or who may have received information that this was the case

When marshalling a pod stop, you will need to follow a general protocol:

1. Welcome people who arrive at your stop
2. Ask if they have booked and for what time
 - a. Bookings will be instructed to attend the ICH stop
 - b. If lost at another pod stop, please advise them on how to get to the ICH
 - c. They should have a record of the booking, if you are unsure, you can ask them to show you the details

3. If they have **not** booked,
 - a. Give them a brief overview of the trials (see info in section below)
 - b. Ask for their email address
 - c. Ask them to read the information provided in the pod stop sign, particularly referring to the terms of use
 - d. If at ICH and expecting booked participants, inform them that there are XX people booked for the next journey. You will need to communicate with the TM to understand if additional PODs will be put in play during any particular time slot.
4. If they **have** booked,
 - a. Ask to see their booking details (a print or on their phone screen is fine)
 - b. Ensure they are in the correct location (if not at ICH, send them to this stop)
 - c. Ask for their email address and let them know that this is to allow us to easily access their details in order to send the survey
5. Inform them of an average waiting time (particularly for passers-by) and if they arrive shortly after PODs have left that particular stop.
 - a. For reference: a full return journey takes around 45 minutes – 1 hour (including stops/ allowing people to board and alight)
6. When the vehicle arrives, check that you are clear to open the doors
 - a. The steward might advise that he has a full pod (and no one wishing to alight), in which case check the route is clear – moving people away or out of the POD route
 - b. Give steward the all clear
7. Help participants board
 - a. Allow participants alighting out first
 - b. Then assess how many spaces are available and call over the next participants in the cue
 - c. Do not allow members of the public to congregate around the POD when it has stopped

When participants alight the vehicle:

1. As above (re. alighting and allowing further participants on board)
2. For those who alight – ask if they have provided their email address, and if they haven't, please encourage them to do so again. We need their views!
3. Remind them to complete the survey when they receive it.
4. Thank them for their participation

4 Marshal introductory information

Welcome and thank you for participating in GATEway's latest research project.

The aim of this trial is to explore the public's perceptions and experiences of driverless vehicles. You experience a journey in an autonomous Pod along the Thames Path to <enter destination>, you will then be asked to complete a survey about your experiences. To book in for your slot please pass or show me your booking confirmation and enter your name and email address into the tablet being circulated (circulate tab to group). Your details are being collected to allow us to send you a survey of your experience following your ride.

GATEway is the first of its kind, providing the public with an opportunity to engage with automated technology at a very early stage, provide feedback on your experiences and perceptions which will inform future thinking and decision making. As such, the vehicles you are boarding today are prototype vehicles (e.g. they are not yet mass produced).

As a prototype vehicle you may experience some technical issues on your journey. Each Pod has on-board steward who is highly trained at ensuring passenger safety and will be able to intervene with the automated system should it be required. The steward will provide you with direction as to when to board and alight the Pod and will provide explanation of Pod movement throughout the route. Please refrain from talking to or distracting the steward in any way during your journey, there will be an opportunity to ask questions once the Pod has stopped.

Please ensure you have read the terms of use on the Pod stop and you have notified myself of any access requirements.

Your journey will take between 15 – 45 minutes, if you need to alight the Pod early or you feel unwell please notify the steward and they will stop at the earliest available opportunity.

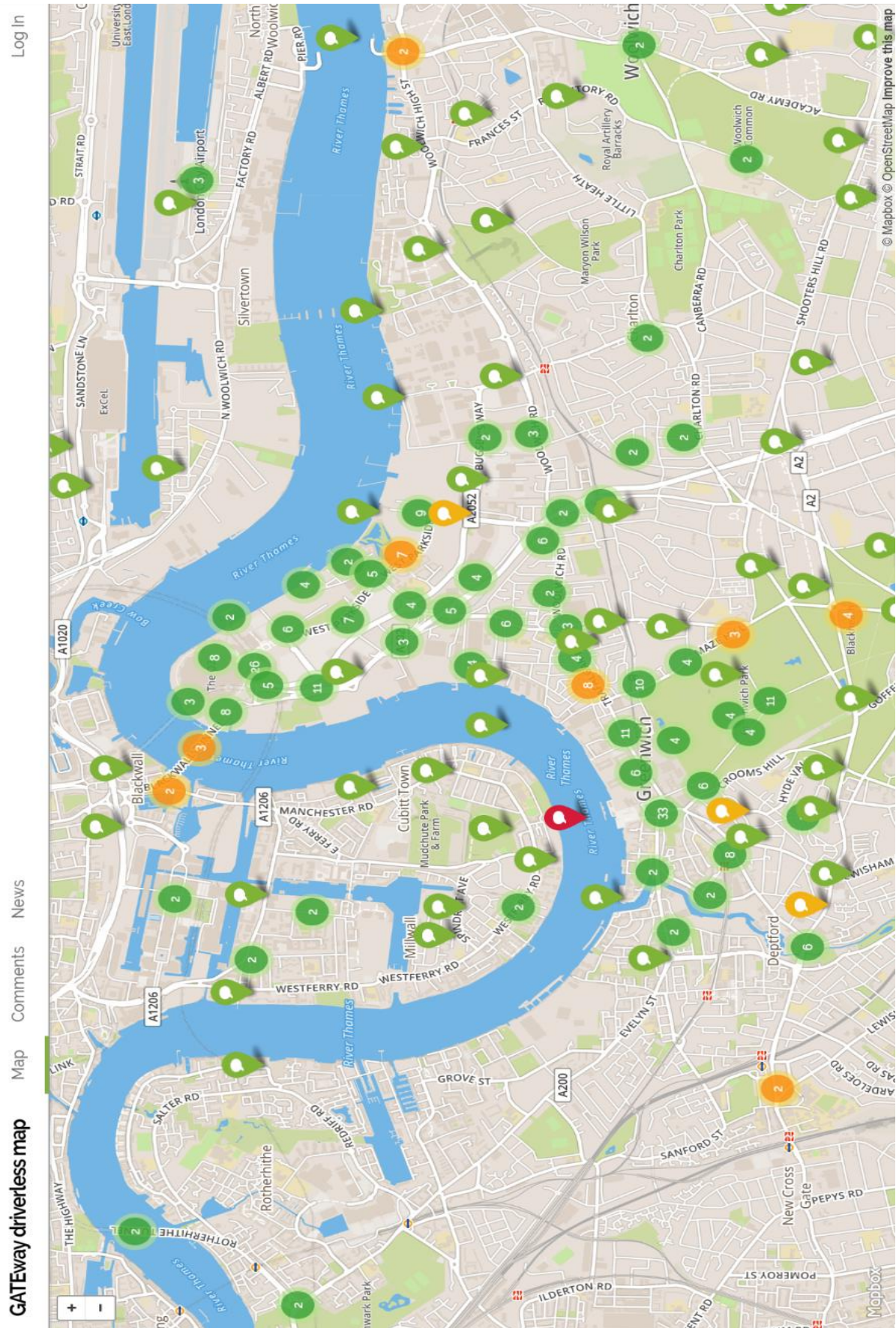
Finally, thank you for your participation and enjoy your ride!

5 Additional questions

Ensure you have considered answers to the following questions:

- Why do I have to give my email address?
- What are they (in reference to the Pods)?
- Can I sign up to participate?
- How long will the journey last?
- How fast do they go?
- Why is there a 'steward' (or driver) if it's self-driving?
- Can we interview you for an article/news item?
- How can I find out about the outcomes of this research?



B4. The GATEway Project's 'Commonplace'



B5. A prompt to use a digital tool

B6. 'Rate My Ride'

1 → How does/did riding in the driverless vehicle compare to your expectation?

 A Worse than expected	 B Better than expected
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2 → Why do/did you feel this way?

Choose as many as you like

A Quick	B Slow
C Less convenient	D Better than drivers
E Less safe	F Worse than drivers
G More convenient	H Safer
I Other	

3 → Any comments, ideas or feedback?

B7. A Database of recorded media coverage