



Incumbent-led transitions and civil society: Autonomous vehicle policy and consumer organizations in the United States

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ABSTRACT

The transition to connected and autonomous (or automated) vehicles (CAVs) in the United States is used to explore the role of civil society in the acceleration and deceleration of sociotechnical transitions. This is an “incumbent-led transition,” which occurs when large industrial corporations in one or more industries lead a systemic technological change. This type of transition may generate public concerns about risk and uncertainty, which can be expressed and mobilized by civil society organizations (CSOs). In turn, CSOs may also attempt to decelerate the transition process in order to develop better regulation and to change technology design. Based on an analysis of CSO statements in the public sphere and media reports on CAVs in the U.S., the political strategy of CSOs is examined to improve understanding of the role of civil society in incumbent-led transitions. The analysis indicates that the strategy includes four main aspects: articulating an alternative political goal (slower introduction of advanced autonomous vehicles and more rapid introduction of existing driver-assisted technology), engaging multiple targets or venues of action (different government units and the private sector), forming and expanding a broad coalition, and selecting effective tactics of influence (lobbying, media outreach, and research involving public opinion polls).

1. Introduction

Industry incumbents play diverse roles in technological transitions: they may originate and lead a transition; they may at first be indifferent to a transition but later implement it when directed by governments to do so; or they may mobilize opposition to transition policies and to industry challengers. In the field of sustainability transitions research, increasing attention has been paid to the politics of transitions and to conflicts between coalitions both for and against transition policies (Haukkala, 2018; Hess, 2014; Markard et al., 2016; Rosenbloom et al., 2016). For example, with respect to decarbonization, there is broad recognition that in some countries industry incumbents, consumers, and some policymakers have slowed or weakened transition policies for sustainable energy. Thus, one of the emerging problems in transition studies is achieving a better understanding of the conditions under which the pace of a transition is accelerated (e.g., Roberts et al., 2018; Roberts and Geels, 2018).

This study will develop an analysis of the corresponding but inverse

situation of a transition that is led by, rather than resisted by, industry incumbents, coupled with substantial public concern that the change poses significant risks to the public rather than benefits. The term “risk” is used here less in a technical sense (probability of harm and magnitude of exposure) and more in the sense of the general uncertainties and problems that the innovations of industrial society pose (Beck, 1992). In the case of an incumbent-led transition that generates substantial public concern with risk, organizations that claim to represent the public interest will tend to mobilize in order to modify or slow the course of technological and industrial change. To be clear, not all incumbent-led transitions generate a high level of public concern or mobilized opposition; indeed, transitions led by industry incumbents, such as those in the public health or medical fields, can have widespread acceptance and support. But in some cases incumbent-led transitions create public perceptions of substantial risk and uncertainty, and the technological changes may become targets of calls for deceleration.

Multiple examples of incumbent-led transitions with public opposition can be identified. A few examples include genetically modified

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foods, new hydraulic fracturing technologies for natural gas extraction, and connected and autonomous (or automated) vehicles (CAVs). In each case, advocates of the transition defend it as environmentally and/or societally beneficial because it could ameliorate substantial problems, respectively pesticide use, emissions from coal, and traffic fatalities. However, substantial segments of the public may remain unconvinced by the claimed benefits and the assurances of relatively low risk. Where industrial corporations and governments are aligned in support of transition policy, but substantial segments of public opinion are skeptical or opposed to the transition, the role of the third sector of civil society is especially important because it expresses and defines public opposition to the industrial change. These civil society organizations (CSOs) organize campaigns for decelerating and redesigning the sociotechnical transition, or what might be termed the “braking and steering” of the transition.

From a broader theoretical perspective, incumbent-led transitions that generate substantial public concern with risk can provide particularly good sources of empirical data for the development of general knowledge about the role of civil society organizations (CSOs) in sociotechnical transitions and their role in the policy processes that affect the pace of the changes. The topic of civil society has received some attention in review essays in the sustainability transitions literature (e.g., [Frantzeskaki et al., 2016](#); [Smith, 2012](#)), and an overview of the research field has included civil society as one of the emergent topics ([Köhler et al., 2019](#)). In this literature, CSOs are generally depicted as facilitators of sustainability transitions or as advocacy groups that participate in or lead transition coalitions. In contrast, in incumbent-led transitions with high levels of public concern and opposition, CSOs have a more oppositional posture. This study uses the case of the CAV transition in the United States to develop an analysis of civil society in this second type of transition. In the process, the study contributes to the general theoretical problem in the transition studies literature of achieving a better understanding of how to influence policies that govern the pace of sociotechnical transitions, either with the goal of acceleration or deceleration.

2. Background

2.1. Theoretical background

This study draws on interdisciplinary research that has developed a “sociotechnical” perspective on industrial and technological change (e.g., [Geels, 2004](#); [Hughes, 1987](#)). The sociotechnical perspective understands a technological system as a network of relations among natural resources, landscapes, and ecologies; technologies, actors, and organizations; and cognitive and normative structures. The spatial scale at which the network is analyzed is selected by the researcher, and it can vary from a local or metropolitan scale to a continental or even global scale. Usually, a fundamental change or sociotechnical transition of a technological system involves a time scale of one or more decades; however, with appropriate policy guidance, transitions can be achieved more rapidly ([Geels and Schot, 2007](#); [Sovacool, 2016](#)). The term “regime” is used in various ways in the literature, and it will be understood here as a “sociotechnical configuration” that represents a stable set of relationships among all three dimensions ([Rosenbloom and Meadowcroft, 2014](#)).

The explanation of how and why transitions occur usually focuses on market dynamics and government policy. Because changes in the relations among actors in the private and public sectors provide adequate explanatory resources for many studies of transitions, the role of the third sector of civil society has tended to receive less analytical attention. The term “civil society” refers to associational organizations and groups that, when formally incorporated, often have a special legal status as nonprofit organizations. One standard definition of CSOs is “non-state, not-for-profit, voluntary entities formed by people in the social sphere that are separate from the state and the market”

([United Nations, 2018](#)). The range of social interests includes charity, community, leisure, religion, social difference (ethnicity, gender, sexuality, etc.), political and economic interests, and societal improvement. This study will focus on political civil society organizations that represent the public interest on policy matters. CSOs can become mobilized into coalitions that affect sociotechnical transitions, and these coalitions may also include actors from the public and private sectors ([Haukkala, 2018](#); [Hess, 2014](#); [Markard et al., 2016](#); [Rosenbloom et al., 2016](#)).

Research on civil society to date in the transitions literature can be divided into two main groups. The first group of studies recognizes the direct role of CSOs in facilitating the development of innovations and in contributing to the governance or management of transition initiatives. For example, CSOs can provide protective spaces for the development of technological innovation where it is not yet ready to be introduced into markets ([Smith and Raven, 2012](#); [Truffer, 2003](#)). Although protective spaces are often provided by the government or the private sector, the funding may not be adequate, and the protections may be limited. Consequently, support from CSOs may be crucial, especially at early stages and for first adopters. For example, early initiatives and experiments in sustainable energy, food, and housing in some countries had significant participation from environmentalists, community groups, and other CSOs ([Smith, 2007](#); [Smith et al., 2014](#)). CSOs have also played a significant role in “grassroots innovation” projects directed at addressing problems of global poverty and inequality that tend to receive less attention from for-profit actors ([Ornetzeder and Rohrer, 2013](#); [Seyfang and Haxeltine, 2012](#); [Smith et al., 2016](#)). CSOs can also help to educate and motivate the public about innovations, contribute to early adoption by consumers, and encourage entrepreneurial activity in the private sector. For example, in the wind industry, greater levels of environmental organization activity have been associated with more entrepreneurial start-ups ([Sine and Lee, 2009](#)).

Another aspect of the facilitative role of CSOs in transitions is in the governance and management of transition programs. Most of the attention in this literature has focused on public participation in sustainability initiatives from local governments. The diverse approaches to the initiatives can be conceptualized under the broad rubric of experiments that enable program development, public participation, and policy learning ([Sengers et al., 2016](#); [2019](#)). Examples of experimentation strategies include visioning exercises in the transition management approach, hands-on experimentation emphasized in the strategic niche management approach, and engagement of local communities in the grassroots innovation approach. CSOs can be important participants in these initiatives, particularly because of their connections with local communities and their capacity to mobilize and engage the public ([Frantzeskaki and Rok, 2018](#)). However, CSOs can also face disempowerment when the processes are controlled by the city government or local business interests, or when a local government’s policy priorities change after elections ([Hölscher et al., 2019](#)).

The second main group of studies of CSOs in transition studies, and the approach most relevant for this study, focuses more on policy advocacy. Although advocacy can be distinguished analytically from facilitation, the two are often connected. For example, efforts to provide protected spaces for niche innovations can become associated with “stretch and transform” advocacy strategies that involve CSOs, and participation in local sustainability experiments and initiatives can contribute to the development of networks that in turn can be mobilized for policy advocacy ([Raven et al., 2016](#); [Smith and Raven, 2012](#)). Likewise, successful advocacy can lead to government policy initiatives that seek ongoing participation from CSOs, where their role changes from advocacy to the facilitation of implementation. Advocacy can occur at various levels of spatial scale, and frequently the literature on CSOs, advocacy, and transitions has focused on higher levels of spatial scale than local governments. Advocacy can be focused on gaining policy reforms from a government, but it can also affect consumer

preferences. In turn, changes in consumer preferences can affect corporate strategy, especially when corporations are in brand-conscious, consumer-facing industries.

Advocacy generally involves both support for emerging technologies and innovations and for the sunset of an existing sociotechnical configuration. CSOs can form to mobilize discontent and public awareness of problems with an existing sociotechnical configuration, and they can contribute to its destabilization. For example, in the study of sociotechnical transitions in the late nineteenth and early twentieth centuries, the hygiene movement played a role in drawing public attention to the problem of animal feces associated with horse-drawn transportation (Geels, 2005). As the transition to automobile transportation in the U.S. deepened, a different type of CSO emerged that was less concerned with destabilization and more concerned with supporting the emerging automotive regime. In this case, CSOs also supported recreational uses such as touring and racing, and automobile clubs advocated for legislation that supported the integration of personal automobiles into the transportation system (Geels, 2005). Later, industry trade associations joined with the consumer-based American Automobile Association to advocate for more road construction and highways.

CSOs have also played a significant advocacy role in energy transitions. In the transition from coal-power for building heat and industrial production in the U.K., smoke abatement organizations had formed by the 1880s, and these groups joined with experts and the gas industry to encourage greater regulation of smoke and a transition to natural gas (Turnheim and Geels, 2013). During the 1970s, CSOs mobilized to support the anti-nuclear energy movement, which also supported transition policies toward renewable energy (Kitschelt, 1986). In Germany, the Green Party and environmental and anti-nuclear groups played an important role not only in limiting the development of nuclear energy but also in developing policy support for feed-in tariffs for solar energy and for the Renewable Energy Act of 2000 (Lauber and Jacobsson, 2016). Comparative analysis of the variation in the level of civil society activity and support for sustainability transition policies, such as between Germany and the U.K., shows that the level of CSO mobilization is a contributing factor to the type and pace of a sustainable energy transition (Geels et al., 2016). CSOs can also play an important role in coalitions that emerge to protect energy-transition policies from roll-back attempts organized by coalitions of incumbent organizations, such as opposition to distributed solar energy policies in the U.S. (Hess, 2016).

Although CSOs can play a significant role in transition advocacy coalitions, their political power is often limited in comparison with state and industry actors. Because CSOs generally have much lower levels of economic and political capital that they can mobilize to affect public opinion and government policy, they are at a disadvantage in comparison with coalitions supported by large corporations. However, to some degree CSOs can compensate for this weakness, not only by recruiting a segment of the private sector to support them but also by claiming to represent the public interest against a sectional interest articulated by a coalition of incumbent actors. The term "public interest" is a normative category that actors invoke to claim that their policy represents the best interests of the broad population or society, whereas the position of opponents represents a sectional or "special" interest. Because all parties in a policy debate will claim that their position is aligned with the public interest, framing contests emerge as different parties articulate their positions in the public sphere.

One of the advantages that CSOs have in these contests is that they can claim that their position reflects not only the public interest but also public opinion. The latter is an empirical category based on polling individuals about their opinions on an issue. Public opinion is formulated and influenced through a variety of mechanisms, but having credibility as an actor untainted by special interests is central to the process of influencing public opinion in debates that occur in the public sphere. The term "public sphere" is best known for its use in a

normative project to elucidate ideal conditions for public opinion formation (Habermas 1989, 1992), but the term will be used in this study in a more descriptive sense as a social field where participants compete for favorable public opinion for a policy position by framing their arguments as aligned with the public interest. These arguments are both empirical (about the effects or implications of policy positions) and normative (about what the goals of the policy should be). The media play a central role in representing the debates and discussions of the public sphere to the public, but the public sphere is understood here also to include publicly accessible regulatory, judicial, and legislative venues.

This study contributes to the literature on the role of CSOs in the politics of industrial transitions by asking the following research question: what general strategy is used by CSOs to gain influence on transition policy? Much previous research in transition studies has drawn attention to the role of coalitions (e.g., Hess, 2014; Markard et al., 2016; Raven et al., 2016). Although the analysis will include this crucial factor, it will also identify several other less obvious pathways to policy influence that are part of the general strategy of CSOs. In the process, the study will contribute to the general problem of understanding the role of CSOs in affecting the pace of an industrial transition.

2.2. The policy and societal context

Governments and automobile manufacturers across the world have shown increasing interest in CAVs. There are differences in the interpretation of the "A" to mean autonomous or automated. Although "autonomous" is more common in the media, the term "automated" may be more accurate, and CAVs are only autonomous in the sense that the higher levels do not require a human driver (Nowakowski et al., 2015). The following standard classification of three levels of driver support (0, 1, 2) and three levels of automated driving (3, 4, 5) is widely used: 0, warnings and limited assistance such as automatic emergency braking; 1, driver assistance for either steering or braking acceleration such as lane centering or adaptive cruise control; 2, driver assistance for both steering and braking acceleration; 3, limited driving such as traffic jam assist, but the driver must be ready to take over when requested; 4, no steering wheel or driver's seat required, such as for a local driverless taxi; and 5, same as 4 but for all driving conditions (SAE International, 2019). The incipient phase of the transition involves the growing implementation of driver-assisted technology (e.g., adaptive cruise control, automatic parking, lane control, and assisted braking) with on-road testing of vehicles operating at higher levels under specified conditions. The higher levels of the CAV transition require the unprecedented integration of software, machines, telecommunications, humans, and the sociotechnical environment. When human drivers, bicyclists, and pedestrians interact in real-world conditions with CAVs at level 3 and above, new complexities emerge that present enormous challenges for software engineering and road infrastructure.

The CAV future is uncertain, and it may not involve a complete transition of the transportation system in which all vehicles operate at level 5. Variations in the mobilization of policy support by different industrial actors may result in outcomes in which there is only a partial transition (Marletto, 2019). Scenarios include evolution of the personal automobile, a revolution in personal mobility through integration of information technology, and a transformation in the broader transportation system (Fraedrich et al., 2015). Advocates of the CAV transition argue that a full transition offers substantial societal benefits, but the benefits are also accompanied by questions and concerns that may prevent or delay a full transition (Maurer et al., 2017). For example, one of the potential benefits is improved environmental sustainability with the more efficient use of roads and the repurposing of space currently used for parking garages and lots; however, people may use CAVs to have longer and more energy-intensive commutes, and they may use

them instead of more energy-efficient public transportation. Thus, one of the risks of this envisioned transition is that it could increase energy consumption and exurban sprawl. Likewise, the transition could provide significant social equity benefits by creating opportunities for personal transportation for people who are unable or ineligible to drive (e.g., the young, the old, the poor, and the differently abled), but the change would also cause significant job loss for people whose work entails delivery and transportation services. A third area of benefits and risks is that CAVs promise new conveniences and the possibility of avoiding car ownership, but they will also increase the level of surveillance of personal mobility and threats to security and privacy. Perceptions of the relative benefits versus anxiety over the transition predict consumers' willingness to use CAVs (Hohenberger et al., 2017).

Companies in the ride-sharing, automobile manufacturing, and information technology sectors are investing in the autonomous vehicle future, and they have initiated on-road testing in several countries, usually with a human driver-supervisor at the steering wheel. Large technology companies see new market opportunities in expanding the Internet of things to vehicles, ride-sharing firms see opportunities to eliminate labor costs, and automobile manufacturers are making investments into CAVs in order not to be left out of future competition. The substantial investments made by large companies in these three industrial sectors have resulted in a rapid introduction of test vehicles in some countries, notably in the U.S.

In the U.S., the beginning of this significant transition has occurred largely without participation from the public and with minimal policy guidance. The view of industry with respect to public opinion is consistent with the statement that is frequently attributed (albeit without any evidence) to Henry Ford: "If I asked people what they wanted, they would have said faster horses." Fortunately for Ford, consumers embraced the automobile transition in the early twentieth century. In the early twenty-first century, both consumers and consumer organizations in the U.S. have shown substantial concern with the rapid introduction of CAV vehicles for on-road testing. After some highly publicized accidents, industry leaders have also dialed back their initial hype. For example, Bill Ford, Executive Chairman of Ford Motor Company and great-grandson of Henry Ford, noted that there was "a lot of over-promising" regarding CAVs and that it was important to "get it right, rather than get it quickly" (CBS News, 2018). There is growing recognition that public safety must be integrated more carefully into CAV testing and policy guidance, and CSOs have articulated in some detail what the priorities should be for consumers. More generally, it is increasingly recognized that transportation policy must undergo substantial changes in order to solve long-term problems of safety, liability, coordination, and infrastructure that will occur with widespread adoption of higher levels of automation (Skeete, 2018).

In the U.S., many states have enabled on-road testing of vehicles. In response, consumer and other organizations have sought to mobilize policymakers and public opinion in support of higher levels of regulatory oversight, a slower pace for the transition, and the prioritization of driver-assisted technology rather than driverless technology. One reason for the high mobilization of CSOs on this issue is the country's "political opportunity structure," which in this context refers to the openness of government to the CSOs' calls for policy changes (Kitschelt 1986; Van Der Heijden, 1997). In the U.S. since the 1980s, the political opportunity structure for government regulation of industry in general was relatively closed because both of the major political parties have favored a neoliberal approach to the government-industry relationship. The lack of willingness to direct the economy to the same degree that is found in continental Europe or in countries with state capitalism tends to strengthen policy development favored by powerful industrial corporations but not always supported by general public opinion. The relatively laissez-faire approach to industrial innovation in the U.S. also tends to result in regulatory "push down," or the shift of governmental regulation to the fifty state governments. In turn, there is evidence of inter-state competition to welcome CAV

testing, a development that can also lead to closed opportunities for stronger regulatory guidance. Under these political conditions, the existing governmental processes may become misaligned with public sentiment about industrial and technological change.

Although a situation of closed political opportunities is not an ideal environment for the generation of policy guidance in the public interest, it can motivate high levels of CSO activity that is aimed at representing the public interest in support of better or more comprehensive regulation. By studying how CSOs attempt to brake and steer an incumbent-led transition, this study will contribute not only to the general theoretical problem of understanding how policy support for the acceleration or deceleration of transitions can be achieved but also to the more specific policy problem of how to guide the CAV transition in ways that enhance the public interest.

3. Method

The dataset was developed by reviewing the news-related web pages of the active CSOs on CAV policy issues in the U.S. to identify statements issued by the organizations intended for circulation in the public sphere. Two types of statements were included based on the definition of the public sphere given above: communication to governmental organizations and communication to the media. Because the focus was on more advanced levels of automated vehicles, statements regarding only driver-assisted technology and other automotive safety issues were not included. Other exclusions were as follows: general auto safety reports or discussions of infrastructure, copies of news media articles posted on the CSO's web site, duplicates across different organizations' web sites, and blog posts or informational postings. A press release and press packet were counted as one statement. The date range for this data set was January 2015 through October 2018, when data collection stopped and just before the November 2018 election. Only one statement was from 2015, when the issue was just beginning to achieve public attention from the CSOs.

The scope of CSOs included in the dataset was limited to consumer and privacy organizations in the United States that were actively involved in the CAV policy and media fields. This definition of the scope of CSOs resulted in 13 active organizations (See Table 1). Additional organizations signed coalition statements, but they were not active participants in the debates in the public sphere. Consumer organizations include general consumer organizations (the Consumers Union, Consumer Watchdog, and Consumer Federation of America) that have entered into the public sphere on this topic as one issue among a much larger portfolio, and consumer organizations associated specifically with the automotive industry that again have a larger portfolio of issues involving vehicle safety (Advocates for Highway and Automotive Safety, American Automobile Association, Center for Auto Safety, and the Truck Safety Coalition). Some of the privacy advocacy

Table 1
Frequency counts of CSO statements on CAVs.

Organization	Statements on web sites
Advocates for Highway and Automotive Safety	31
American Automobile Association	5
Center for Auto Safety	22
Center for Democracy and Technology	4
Consumer Federation of America	10
Consumers for Auto Reliability and Safety	2
Consumers Union/Consumer Reports	7
Consumer Watchdog	26
Electronic Privacy Information Center	6
Insurance Institute for Highway Safety	6
National Consumers League	4
Public Citizen	0
Truck Safety Coalition	1
Total	124

Table 2
Characteristics of reports with representation of CSOs in leading media sources.

Sources of news reports	N	Total mentions of CSOs in all reports	N
Detroit Free Press	4	Advocates for Highway and Automotive Safety	6
Los Angeles Times	16	American Automobile Association	5
New York Times	3	Center for Auto Safety	4
Pittsburgh Post	4	Consumer Federation of America	3
San Jose Mercury News	9	Consumers for Auto Reliability and Safety	3
USA Today	3	Consumers Union/Consumer Reports	6
Wall Street Journal	9	Consumer Watchdog	41
Washington Post	7		
Other	5		
Total media reports	60	Total Mentions of CSOs	68

organizations have also weighed in on CAVs as one of the many issues with which they are engaged (e.g., the Center for Democracy and Technology, Electronic Privacy Information Center). The Insurance Institute for Highway Safety is an industry-sponsored CSO, but it is included here because it has also called attention to the need for better safety guidance for the CAV transition. Using this set of organizations and the inclusion and exclusion criteria described above, 124 statements were identified (66 statements for the media and 58 for the government), with frequencies shown in Table 1.

A second data set was developed based on a search in Proquest News and Newspapers for “autonomous vehicles” combined with the name of each of the organizations in separate searches (See Table 2). (The search term “automated vehicles” produced no results for the U.S. with these organizations.) The earliest reports appeared in 2014, and the data collected ended in November 2018, with the resulting total of 432 news reports. Of these reports, 222 were wire service reports, 41 were in non-U.S. publications, and 69 were in small or other media outlets. A decision was made to focus on the remaining 100 news reports, which appeared in large, traditional media outlets. After reading each of the reports, 40 were excluded because they were either duplicates or did not portray a CSO's position on the CAV issue. Because the database covers only traditional news media sources, it should be viewed as a sample of the CSO participation in the media representation of the CAV issue during this period ($N = 60$).

Although these media are classified as “print,” they are influential because they often break the news stories; their reports are read online; and their reports are disseminated by broadcast, cable, and social media. *The Los Angeles Times*, *New York Times*, *USA Today*, *Wall Street Journal*, and *Washington Post* are considered part of the national press, and their articles are frequently syndicated in other news media sources. Three other news media publications were prominent in the data set because of the location of the automotive industry (*Detroit Free Press*), the technology industry (*San Jose Mercury News*), and testing sites (*Pittsburgh Gazette* and *San Jose Mercury News*). With respect to the CSOs in the media, Consumer Watchdog appeared most frequently, probably because of its location in California and its high volume of press releases. Because more than one topic and more than one CSO appeared in some of the news reports, the total for the CSOs in Table 2 is greater than 60.

The analytic goal was to develop a description of the main categories of political strategy that the CSOs used to influence the policy process. A review of energy reform politics and political strategy identified five main elements of political strategy—goal, targets, agents, means, and context—and defined it as follows: “a plan of action by collective or individual agents that includes the means or tactics envisioned to reach a goal of political and/or societal change by targeting collective or individual actors in a specific historical and societal situation” (Hess, 2019). Because the present study mapped out the context in the previous section, it will focus on the other four elements of political strategy in the results section.

4. Results

Results are organized by the four main elements of political strategy described above: articulating goals, selecting targets, forming coalitions with other agents, and selecting tactics.

4.1. Articulation of political goals

Central to the political strategy of CSOs was constructing a political goal to slow down the CAV transition to ensure that it better serves the public interest. CSOs generally framed their communications in terms of the value of consumer safety. By focusing on safety, the CSOs were building on their longstanding position in the public sphere as guardians of public safety with respect to the automotive industry and the broader transportation sector. This tradition goes back decades to the defense of now-standard safety features such as seat belts. They also referred to privacy in some communications, but privacy was not salient because during this period the CAV transition was only in an incipient phase. However, as CAVs become institutionalized, the amount of data collected on personal trips and behavior will raise the level of concern with privacy. Other values such as sustainability and equity also were not salient probably because, like privacy, their importance is largely hypothetical at present. In contrast, fatalities have made safety a much more salient issue, and safety remained the primary orienting value for the CSOs' political goal.

In general, CSOs supported the long-term goal of a CAV transition because they agreed that it has potential to reduce fatalities and economic loss from accidents, which are believed to be mostly caused by human error. This approach allowed them to have a less oppositional posture with respect to powerful industry organizations than would have occurred had they adopted a position of complete opposition or a demand for a full moratorium. For example, Henry Jasny, vice president and general counsel for Advocates for Highway and Auto Safety, stated, “We're not interested in stopping this. We think the honeypot at the end of the rainbow will be all vehicles being fully automated. We want to get there, but we want to do no harm on the road to getting to that goal” (Sturgis, 2016). However, some of the other CSOs, such as Consumer Watchdog, had a more skeptical view of the transition.

In addition to stating their primary goal as accepting the positive potential benefit of a long-term transition to CAV mobility, CSOs argued that the benefits of CAVs could only be realized by the gradual and safe introduction of the technology. Thus, their more immediate goal was “braking and steering” the transition. They opposed the lack of strong government oversight of testing and the rushed introduction of on-road testing without first resolving safety issues. CSOs also voiced their support for the development of existing driver-assisted technologies and sought to have better communication to consumers about the limits and proper uses of these technologies. For example, the Center for Auto Safety argued that automated emergency braking and forward collision warning should be federally mandated features on all vehicles (Gibson, 2017). Thus, they attempted to steer the CAV policy discussion in the public sphere toward support for more readily available and proven technologies that provided driver assistance with potentially significant and immediate safety benefits.

In summary, their political goal had the following elements: supporting the transition as having long-term potential to reduce fatalities, pointing to immediate safety and other consumer-related concerns that should be addressed with on-road testing, and calling for the prioritization of driver-assisted technologies before investing in higher levels of autonomy. In addition, many of the statements had more specific policy goals that addressed detailed aspects of regulatory arrangements at both the state and federal government levels.

4.2. Targets or venues for influence

With respect to the targets (or venues) for the political strategy,

CSOs articulated their goals in three main government policy arenas: the legislative policy of the U.S. Congress; regulatory agencies, especially the National Highway Traffic Safety Administration (NHTSA) of the U.S. Department of Transportation; and the state governments. They also targeted corporations directly through discussions of liability and ethics. As noted above, statements by CSOs were divided into two groups: statements made for the press (press releases, research reports, guest editorials, and public letters to CAV companies asking for better safety practices) and statements made for the government. In both cases, CSOs focused the majority of their statements on the federal government as their primary target for influence, with less attention to state governments and corporations.

The primary policy arena at the federal government level during this period was legislation pending in the U.S. Congress. In September 2017, the U.S. House of Representatives passed the Self-Drive Act (H.R. 3388), which included safety exemptions for CAVs and provisions to block states from banning self-driving vehicles. Response from CSOs to the bill was quite negative, especially for the provision of the pre-emption of state-level safety regulations (Simpson, 2017). After passage of the House bill, attention shifted to the U.S. Senate, which considered the sibling bill “American Vision for Safer Transportation through Advancement of Revolutionary Technologies Act,” or AV Start Act (S. 1885). In October 2017, a group of consumer organizations urged the Senate to make significant modifications in the bill, including elimination of the high number of exemptions of CAVs from safety standards, the development of cybersecurity standards, a public database of vehicle capabilities, and sufficient funding for NHTSA (Advocates for Highway and Auto Safety, 2017).

The second policy arena was regulatory policy in the federal government. During this period NHTSA developed various policy guidance documents and statements, culminating in 2018 with *Preparing for the Future of Transportation: Automated Vehicles 3.0* (National Highway Transportation Safety Administration, 2018). NHTSA’s approach of voluntary guidance to state governments and industry represented a continuation of the Obama administration’s approach to CAV policy, and consumer organizations were critical of the absence of a stronger regulatory hand (Advocates for Highway Safety, 2018a; Friedman and Wallace, 2017; Levine, 2017).

The third policy field was the state government level, which was important for CAV policy because of the lack of legislation from the U.S. Congress. As of mid-2018, 29 states had enacted enabling legislation, and 10 governors had issued executive orders (National Conference of State Legislatures, 2018). In our data set, most of the attention of CSOs focused on California, which is the most populous state, the center of information technology development, and a leading site for on-road testing of CAVs. By 2017, 42 manufacturers had permits for AVs in the state. The original approach of the California government was to require human driver-supervisors behind the wheel for all CAV testing; however, in February 2018, the California Department of Motor Vehicles issued new rules that allowed remote supervisors for cars with advanced AV technology. Consumer Watchdog, a California-based CSO, argued that the disengagement reports that the companies must file with the Department of Motor Vehicles showed that the cars were not ready for remote control and that the provision to allow remote monitors created a “deadly video game” (Simpson, 2018). A disengagement occurs when the technology fails and the human driver must take over.

The fourth main target was the private sector. In several cases, companies were facing litigation by accident victims and exposure to financial and reputational risk. Although CSOs were generally not involved directly in the litigation and settlements associated with the accidents, they participated in the construction of liability and risk in the public sphere. For example, in 2017, a group of consumer organizations emphasized the need for the companies to communicate more clearly the limitations of assisted and automated technology (Consumers Union, 2017). The news media organization associated

with the Consumers Union, Consumer Reports, called on all automotive companies to use descriptive, not exaggerated, terms for the new CAV technologies and to address the “hand-off” problem, which required giving adequate time to a human driver to take over when a disengagement event occurred (Consumer Reports, 2016). Consumer Reports also issued a 44-page report on CAV technology in which it urged automakers to work with consumer groups to make various changes in their advanced driver assistance systems and how they are communicated to drivers (Consumer Reports, 2017). The approach developed by Consumer Reports placed responsibility directly on automobile manufacturers to change their policies for CAV technologies by giving much more attention to consumer use patterns, consumer understanding, the simplicity of labeling, and the consistency of technology across vehicles and companies.

CSOs also constructed corporate liability by making comparisons between the technologies and the consumer interfaces of different companies. For example, there were ways to improve monitoring of human drivers, such as facial recognition software, to detect signs of fatigue and distraction and to warn drivers if they do not respond. A legal expert noted that differences in the design of the systems across manufacturers could open some manufacturers to product liability claims in the event of an accident (Bellon, 2018). Consumer groups also urged government agencies such as the Federal Trade Commission to conduct investigations into claimed deceptive advertising associated with automated technology (Beene, 2018).

In summary, CSOs selected multiple venues as targets for influence, including different branches of the federal government, some state governments, and private-sector organizations. However, they were operating in the context of a country with a policy of self-certification for automotive manufacturers and a political opportunity structure that was generally closed to strong government mandates on industry. Because mandatory regulations are difficult and slow to develop (often requiring years), NHTSA defended voluntary agreements with the automotive industry as a mechanism for producing more rapid and effective safety outcomes. The reluctance of the federal and state governments to regulate in the U.S. context tended to make private-governance influence a more important target than might be found in other countries.

4.3. Coalition formation

In addition to establishing a goal and selecting appropriate targets, a political strategy must also include the development of coalitions that can show broad support for an issue. Because the introduction of on-road testing was a relatively recent phenomenon, by 2018 coalitions were only beginning to form. In the dataset of public sphere statements by CSOs, 25 were joint statements of two or more organizations, and the statements with multiple organizations were made mostly in 2018. (See Table 3.) The two privacy organizations and the Insurance Institute for Highway Safety did not participate in the coalition statements, but the other organizations did. This method of counting cosignatories to coalition statements provides empirical evidence of coalition formation, but it does not capture the dynamic growth of the coalitions over time, and the remainder of this section will describe the growth.

One of the earliest coalition statements, written in 2016 by three CSOs and sent to the White House of President Obama, called on the president and the secretary of transportation to stop the influence of technology companies on CAV policy and to end the revolving door of administration officials joining technology companies to support the CAV transition. The CSOs also requested that the president enable public commentary in a federal rulemaking process that would enable a more public debate of the needed regulatory guidance (Consumer Watchdog, 2016). However, a full coalition did not form until legislation in Congress proceeded in 2017 and 2018. By March 2018, signatories of a letter to the U.S. Senate leaders included over two dozen CSO groups, including those representing drivers, bicyclists,

Table 3
Frequency of participation in coalition statements.

Organization	Number of coalition statements signed
Advocates for Highway and Automotive Safety	15
American Automobile Association	0
Center for Auto Safety	18
Center for Democracy and Technology	0
Consumer Federation of America	17
Consumers for Auto Reliability and Safety	9
Consumers Union/Consumer Reports	8
Consumer Watchdog	12
Electronic Privacy Information Center	0
Insurance Institute for Highway Safety	0
National Consumers League	7
Public Citizen	11
Truck Safety Coalition	12

pedestrians, the disabled community, trauma victims, emergency nurses, and the public health profession. The petition conveyed “strong objections to the lack of safety protections” in the bill and argued that it “significantly strips the current federal regulatory system of its appropriate authority and oversight” (*Advocates for Highway and Auto Safety, 2018b*). Citing a survey of auto executives who indicated that level-5 vehicles would not be ready until at least 2030, the coalition stated that the bill “solve[d] a ‘problem’ that does not exist” because regulatory standards were not impeding the developing of CAV technology. They called on the Senate to reduce the number of exemptions for CAVs “to prevent public roads from being turned into corporate proving grounds”; to remove section 7 of the bill, which allowed automakers to turn off manual control of steering and brakes; to establish minimum performance standards and consumer information; to provide NHTSA with the resources that it needed to fulfill its public mission; to include level-2 vehicles in the safety provisions; to address the needs of members of disability communities; and to end preemptions of state and local government policy. The same coalition followed up with a petition to the secretary of transportation that urged her to issue minimum performance standards instead of voluntary guidelines (*Consumer Federation of America, 2018*).

The coalition continued to grow throughout the spring and summer of 2018. By May 2018, it included 44 representatives of an even larger group of CSOs that called on the Senate to delay passage of the bill until the National Transportation Safety Board had completed investigations of the CAV-related deaths that had occurred during the previous months (*Advocates for Highway and Auto Safety, 2018d*). On July 16, 2018, the group of CSOs opposed the pending parliamentary maneuver to attach the Senate’s AV Start Act to the Federal Aviation Administration Reauthorization Act (S. 1405). They noted that attaching the AV Start Act to a must-pass bill would “circumvent the regular legislative process and cut it off from full debate, discussion, transparent consideration, and the offering of amendments” (*Advocates for Highway and Auto Safety 2018c*).

By July 2018, the coalition had grown to include over 70 organizations with added support from city governments, law enforcement groups, and other first responders. In addition to representing a growing number and diversity of constituencies, the coalition also claimed to speak not just *in* the public interest but *for* the public. For example, in July 2018, the coalition released new polling data in a fact sheet titled “Public to U.S. Senate: Pump the Brakes on Driverless Car Bill” (*Advocates for Highway and Auto Safety 2018e*). The poll showed that 69% of the public was concerned with driverless vehicles and that 84% believed that the U.S. Congress should delay a vote on the AV Start Act until the *National Transportation Safety Board (2018)* had completed its investigation of recent accidents.

Although CSOs faced a relatively unreceptive Congress and

presidential administration, their mobilization contributed to the high number of amendments to the U.S. Senate bill in the summer of 2018, opposition from some U.S. senators from the Democratic Party, and the failure of the bill to go to a floor vote during the summer and fall of 2018. In this sense the CSOs could claim that their mobilization produced a policy victory of at least braking the CAV transition. The delay shifted the bill to the next Congress, but the Senate’s attention in 2019 focused on other issues.

4.4. Tactics

The fourth main dimension of political strategy is to develop appropriate tactics that can help the coalitions to convince the targets to shift their views to closer alignment with the coalition’s goals. A review of tactics in the sustainability transitions and energy reform literatures identified eight main groups of tactics for institutional (as opposed to extra-institutional) action: lobbying and educating the targets of action, media outreach, generating research and providing expertise, orchestrating and facilitating public participation, supporting innovation and enterprise development, litigation, participation in elections and ballot initiatives, and gaining procedural change (*Hess, 2019*). Of these tactics, the CSOs focused on the first three.

Lobbying and educating the targets included participating in government hearings by providing testimony and submitting reports and statements to government actors. As described in the previous section, this work also included signing petitions or letters by an increasingly broad coalition of organizations. As indicated above, the CSOs relied extensively on government communication as part of their attempt to educate policymakers and regulators. The CSOs located in Washington, D.C., had leaders with longstanding experience and credibility regarding transportation safety policy. Thus, they could draw on pre-existing networks to attempt to enhance their effectiveness.

Parallel with direct engagement with policymakers and regulators, CSOs also had an extensive engagement with the media. However, the media emphasized issues differently from the CSOs. The media focused more on state policy and technology news, and less on federal government policy (See *Table 4*).

One of the pathways to gaining media attention can involve jumping into an ongoing news story, such as a disaster or accident, by providing a consumer perspective. In the context of CAV policy, there were several prominent accidents in the U.S.: in 2016, a self-driving Google vehicle hit a bus; in 2018, a pedestrian in Arizona was killed by a vehicle that had a human driver-supervisor who was not paying attention; and beginning in 2016, there were several accidents involving Tesla vehicles with Autopilot technology. Consumer groups responded to the Arizona event and to a fatality in a Tesla vehicle during the same month by claiming that the accidents supported their assessment of the safety risks of the existing policy frameworks for CAV testing. For example, the Consumers Union warned about the safety risks of on-road testing and stated that the type of CAV was “far too dangerous to be tested off a closed track” (*Consumers Union, 2018*). John Simpson of Consumer Watchdog called Arizona “the Wild West of robot car testing

Table 4
Emphasis of topics.

Topic	Frequency in media reports	Frequency in CSO media statements
Federal Legislation	10 (15%)	30 (38%)
Other Federal Policy	9 (13%)	20 (25%)
State Policy	20 (29%)	2 (3%)
Research	12 (18%)	13 (16%)
Accidents and Liability	7 (10%)	12 (15%)
Technology News	10 (15%)	2 (3%)
Total topics	68 (100%)	79 (100%)
Total articles	60	66

with virtually no regulations in place,” and he noted that “with no sheriff in town, people get killed” (Laing, 2018). Governor Ducey, who had welcomed CAV testing in Arizona but was also facing a reelection campaign in November, directed the state’s Department of Transportation to suspend Uber’s self-driving CAV program in the state although other companies (including Waymo, General Motors, and Intel) were allowed to proceed (Davies, 2018). After ceasing its testing operations in order to review procedures, Uber began testing again in late 2018 in the state of Pennsylvania but with more stringent safety procedures in place.

Another tactic used by the CSOs was to produce research, which could also generate media coverage for the CSOs and show that public opinion was in alignment with the CSO goals. This tactic can also help to shape public opinion by educating the public about the CSOs’ alternative goals, and it educated political leaders about voter sentiment. The American Automobile Association, a CSO that represents and serves the interests of drivers, was a leader in conducting and publicizing polls on CAV technology. In 2016, the organization reported on survey results that indicated that three-quarters of Americans were afraid to ride in self-driving vehicles (Edmonds, 2016). However, rather than frame the research as merely opposed to new technology, the organization also noted that 61% of drivers wanted at least one advanced driver-assistance feature, such as automatic emergency braking, adaptive cruise control, self-parking, or lane assistance. Thus, the polls were used to show that the CSOs’ political goal was consistent with public opinion, an alignment that strengthened the legitimacy of the CSOs in their effort to claim that their goals represented the public interest more than those of the companies that had rushed into on-road testing without full safety provisions in place. An additional poll indicated that pedestrians and bicyclists also were concerned with safety issues (Edmonds, 2018). In May 2018, Consumer Watchdog supported a poll of voters in four states that were the home to senators who were important in the pending federal government legislation on autonomous vehicles (Consumer Watchdog 2018). This shift of the focus of polling to voters in specific states provided a signal to policymakers that they needed to contend with public opinion from their own constituents that indicated high concern with the risk of CAVs. Referring to the pending legislation in the senate, the privacy and technology director of Consumer Watchdog, John Simpson, urged Congress to “put the brakes” on the law and listen “to the people” (Consumer Watchdog 2018).

In summary, the CSOs focused largely on three main tactics of political influence: lobbying and educating political officials, media outreach and participation in the public sphere, and empirical research (which in turn generated media attention). As of late 2018, the CSOs were not engaged in extra-institutional strategies such as boycott campaigns, street protest, or civil disobedience. Consumer and privacy organizations generally do not include extra-institutional action in their repertoires of tactics, and the issue was not yet developed enough to make mass mobilization realistic. However, there were signs of emerging public hostility to the CAVs in use in Arizona, and these signs included sporadic, unorganized extra-institutional protest. Incidents included people throwing rocks at the vehicles, a person who slashed the tires of one vehicle while stopped in traffic, the use of a human-driven car to force CAV vehicles off the road, standing in front of the CAVs to stop them in traffic, and aiming a gun at a human driver-supervisor of a CAV vehicle (Randazzo, 2018). These incidents suggested the potential for extra-institutional action if policymakers continue to fail to respond to the safety goals articulated by the CSOs and public outrage.

5. Conclusion

With respect to the general theoretical problem of transition acceleration and deceleration, the study of incumbent-led transitions that are characterized by high levels of public concern with risk is particularly valuable as a site for understanding the role of civil society in

affecting the pace of transitions. This study examined the political strategy of CSOs that have mobilized in the U.S. to seek a slower, more deliberate, and safer transition to widespread CAV use on the roads. The strategy included four elements. First, the CSOs articulated a different goal from that of the technology, ride-sharing, and automotive companies, which sought rapid introduction and a minimum of new rules and safety provisions. Second, the CSOs selected various targets or venues for achieving their goal, including the U.S. Congress, federal regulators, and state governments. They also targeted corporations by contributing to the construction of potential liability due to differences in the safety features across companies and the failure to communicate safety limits effectively to users. Third, the strategy also included building coalitions that expanded support from safety and consumer organizations to other groups, such as bicyclists, first responders, and organizations in the health-related professions. Fourth, the strategy included selecting a set of tactics for educating the public and policymakers, and the tactics included sponsoring research to show how public opinion was in alignment with the goals of the CSOs.

Although the CSOs had a coherent political strategy, many of their proposals were ignored. In other words, in this case the effectiveness of CSOs at braking and steering an incumbent-led transition that has generated public concern with risk was relatively low. The CSOs could claim a victory in the sense that their actions helped to delay the implementation of highly criticized federal legislation and helped to provide more time to build better safety and privacy guidance into federal policy. However, the companies have continued to invest in the transition and in on-road testing, and under the Trump administration, which began in 2017, the federal government’s approach was to unwind regulations and to minimize government steering of the economy.

To have an effect on transition policy, CSOs must have a coherent political strategy, but the effectiveness of their strategy can be limited by the political opportunity structure. Thus, attention is needed to both the agency of civil society strategy and to the structural conditions. For some issues, the political opportunity structure can change significantly when there is a change of political parties, but on this issue the prior Obama administration (Democratic Party, 2009–2016) had not backed a strong set of new safety guidelines for CAV testing. Likewise, when the Democrats regained control of the House of Representatives in January 2019, the shift in party control did not open political opportunities significantly for CSOs. The lack of a change in political opportunities is not only because of the general, bipartisan support in the U.S. for a relatively low level of government regulation of industry; it is also because of the deep and longstanding connections between the automotive, technology, and defense sectors in the U.S. that tends to position this transition as consistent with bipartisan “reasons of the state” related to global economic and military competitiveness. Given the economic power and political influence of the three industrial sectors in the United States, one might expect that no matter what party controls the government, a relatively laissez-faire approach to regulating the CAV transition will tend to receive ongoing support. Thus, there is an additional political economy or landscape dimension to this policy issue that tends to keep political opportunities for CSO effectiveness relatively closed across changes in party control (Johnstone and Newell, 2018).

One can generalize that in similar situations where a confluence of powerful state and private-sector actors support risky transitions in spite of contrary public opinion, CSOs will have an ineffective role in influencing policy that could guide, slow, or steer design changes in the transition. Although there are cases where sustained, disruptive public mobilizations have affected technological transitions (such as the development of the nuclear industry and the diffusion of genetically modified food in various countries), the CAV policy issue does not yet have this level of salience. It remains to be seen how strongly public opinion will respond to CAVs if there are continued examples of high-profile accidents. One only needs a few nationally televised scenes of mothers claiming that a “robot car killed my child,” and public opinion

could quickly turn from unmobilized skepticism to mobilized opposition. If high-profile accidents continue to occur, it is possible that CSOs could begin to gain more policy effectiveness for their modest political goal of a slower transition with a greater focus on the development of CAV safety rules and the prioritization of driver-assisted technologies.

In summary, during this initial period of the CAV transition in the U.S., CSOs were adopting a sensible approach that would likely result in greater public acceptance for the limited use of CAVs in test situations and for the future of more widespread adoption. It is possible that industrial incumbents may come to realize that their long-term interests are best served by pursuing the more cautious and deliberate approach as outlined by the CSOs, which suggest that the public interest is best served by having better braking and steering for this transition.

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