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**Digital activism to achieve meaningful institutional change:
A bricolage of crowdsourcing, social media, and data analytics**

ABSTRACT

Researchers have examined the impact of information and communication technology (ICT) on activism, finding that ICT improves connectivity, mobilization, and identity formation. However, such digital activism has been criticized for often failing to move beyond venting anger during the initial mobilization efforts. To better understand what makes digital activism more likely to generate meaningful institutional change, we examine the case of the Swedish *Cabotagestudien*, an example of effective and sustained digital activism that generated institutional field-level industry and policy changes. We examine the institutional work underlying a bricolage of crowdsourcing, social media, and data analytics through a longitudinal case study of *Cabotagestudien*, contributing to research on institutional change, innovation, and technology. Our case analysis reveals three mutually reinforcing forms of institutional work: *infrastructure work*, *crowd work*, and *data work*. As a result, we contribute a novel theoretical explanation of how these interrelated forms of institutional work can mobilize low-power actors into effective and sustained digital activism in the face of institutional resistance.

1. Introduction

Digital activism, the “organized public effort, making collective claim(s) on a target authority(s), in which civic initiators or supporters use digital media” (Edwards et al., 2013, p. 4), often fails to achieve substantial gains because of institutional resilience. Most social activism depends upon information and communications technology (ICT) with the application of various tools and platforms that make activism easier (Milan, 2013); however, robust institutional structures often defeat activists (Fuenfschilling and Truffer, 2014; Powell and DiMaggio, 1991; Selviaridis et al., 2023; Suddaby and Foster, 2017). In fact, research has shown that when activists create pressure for change, institutions typically can weather the storm and wait for it to pass (Phelps et al., 2021; White, 2017).

Digital activism supports causes such as economic and racial inequalities (Giugni and Grasso, 2019), sustainable environmentalism (Pacheco and Khoury, 2023), exploitation of women and children (De Rond et al., 2022), gender-based violence (Peterson, 2022), and regime change (Ghonim, 2012). Although digital activism may raise awareness of such social and political causes, scholars concede it is generally short-lived (Selander and Jarvenpaa, 2016). Thus, there is growing interest in better understanding how social causes championed by low-power actors—those who are relatively weak or in low-status positions vis-à-vis others—can use ICT to effect meaningful institutional change (i.e., activism carried out over a prolonged period consistent with the underlying cause resulting in change) (Bouquet and Birkinshaw, 2008; Majchrzak et al., 2016; Selander and Jarvenpaa, 2016; Wickert et al., 2021).

To better understand how low-power actors can achieve meaningful institutional change in the face of institutional resilience, we examine *Cabotagestudien*, a decade-long research project

examining the environmental and social impact of European Union (EU) cross-border haulage policies that led to meaningful institutional change. The origin, implementation, and eventual influence of *Cabotagestudien* render it a “transparently observable” (Eisenhardt, 1989, p. 537) case of effective and sustained digital activism. As such, our case study of *Cabotagestudien* offers valuable theoretical and practical insights into the future of digital activism by revealing how the involved actors engaged in a systems-building approach through a bricolage of crowdsourcing, social media, and data analytics (Garud and Karnøe, 2003; Kukk et al., 2016). As such, the actors made “do with the materials at hand” to create a mobile application that allowed them to collect relevant data and develop visuals that were distributed to stakeholders, ultimately leading to meaningful institutional change (Miner et al., 2001, p. 314).

Drawing on the theoretical perspectives of crowdsourcing, institutional work, the purposive actions aimed at creating, maintaining, and disrupting institutions (Lawrence and Suddaby, 2006), and bricolage, the creative tinkering with and fusion of existing tools, processes, and ideas (Desa, 2012; Garud and Karnøe, 2003), we specifically investigate the following research question: *How can low-power actors use a bricolage of ICT-based tools, processes, and ideas to bring about meaningful institutional change?* Our integrated theoretical perspective allows us to investigate the question by exploring the distributed agency of a diverse group of actors and how their “micro-level activities” led to institutional change that countered a dominant deregulation focus (Kukk et al., 2016, p. 1,558). In doing so, we address the call by researchers to examine other “sectors or places” and “how resistance to institutional change can be overcome” (Selviaridis et al., 2023, p. 17).

2. Literature background

Our *Cabotagestudien* case study is grounded in the literatures on crowdsourcing, institutional work, and bricolage. As background, we present and integrate these literatures in the following.

2.1. Crowdsourcing

Crowdsourcing has become increasingly popular and is defined as “an online, distributed problem-solving and production model that leverages the collective intelligence of online communities to meet specific organizational goals” (Brabham, 2013, p. xix). As the benefits of crowdsourcing became evident, researchers in the public sector, including government research agencies and academia, started turning to social media and other online technologies to recruit crowds of volunteers to help with scientific discovery projects (Brabham, 2015; Franzoni and Sauermann, 2014). Several published systematic literature reviews on crowdsourcing provide comprehensive reviews (Ghezzi et al., 2018; Hossain and Kauranen, 2015; Pavlidou et al., 2020; Zhen et al., 2021).

Crowd science, also known as citizen science, is a burgeoning interdisciplinary field that leverages the collective intelligence and contributions of a diverse group of volunteers to address complex research questions across various domains (Bonney et al., 2009; Silvertown, 2009). Crowd science is generally considered a viable, practical method for supporting scientific research across many disciplines and research objectives (Prpic and Shukla, 2016). Franzoni et al. (2022) helped clarify the overlapping research domains of citizen science and crowd science.

To the extent crowd science is applied in and around government, it is typically not science-related but geared toward soliciting ideas and performing various tasks, for example, mapping public restrooms (Albino et al., 2015; Cappa et al., 2022; Kornberger et al., 2017; Nam, 2012). These tasks are generally unrelated to data-driven policymaking. Moreover, almost all crowd science initiatives offer little in return to the crowd of volunteers (Franzoni et al., 2022; Jeppesen,

2021). We have limited knowledge of what it takes to organize, mobilize, and sustain activists when offering little more than the “feel good” factor that results from participating in a worthwhile social cause (Brabham, 2013). However, as crowd science increasingly touches on political and societal issues, whether and how this novel approach could be strategically leveraged for meaningful institutional change remains open.

2.2. Institutional work

The concept of institutional work connects disparate ideas within institutional theory to establish “a broader vision of agency in relationship to institutions” (Lawrence et al., 2009, p. 1). That is, there is less emphasis on the actions of a few “heroic-like” institutional entrepreneurs and a broader focus on the everyday, practically mundane work carried out by a plurality of low-power actors supported by others. Research has found that institutional change does not result from a simple, linear process but from a “collective, iterative, gradual, and experimental process” of low-power actors and their allies that may go largely unnoticed (Canales, 2016, p. 1,571).

Institutional work draws from early research on the role of agents in changing institutions (DiMaggio, 1988; Oliver, 1991) to emphasize “the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions” (Lawrence and Suddaby, 2006, p. 215). Bertels et al. (2014, p. 1,199) expanded the institutional work concept to include the “purposeful efforts to coordinate, support, and amplify the work of other actors,” which focuses on creating the capacity for future change. Thus, institutional change involves the visible work of individual actors (e.g., social activists) that suspends existing institutions, allowing for experimentation with new practices, and the invisible work of recruiting allies and building political capital. Many published articles reveal myriad forms of institutional work (Herepath and Kitchener, 2016; Hota et al., 2023; Pas et al., 2021; Uyarra et al., 2020).

While institutional work research primarily focuses on the vital role of social agency, institutional scholars increasingly recognize the role of technology within institutions (Murray et al., 2021; Raviola and Norbäck, 2013; Van Dijk et al., 2011). Technology diminishes people's willingness to accept the institutional status quo by making change seem more probable (Phillips and Lawrence, 2012). Specifically, technology has played an instrumental role in low-power actors and their allies successfully engaging in institutional work (Lingo and Elmes, 2019). However, studies have shown that heightened engagement has not resulted in the desired changes (Phelps et al., 2021; White, 2017). Thus, more research is needed to understand how technology supporting institutional work can lead to meaningful institutional change.

2.3. Bricolage

Bricolage is the experimentation with new practices based on creative tinkering with and fusion of existing tools, processes, and ideas, which is at the heart of institutional work (Baker and Nelson, 2005; Desmarchelier et al., 2021; Tracey et al., 2011). Bricolage can be viewed as both resourcefulness and a form of resource mobilization (Desa, 2012), as well as improvisation (Garud and Karnøe, 2003), that allows embedded change agents to experiment. Because it focuses on reinventing the familiar and accepted, resulting changes will likely be perceived as legitimate by a broader base of institutional actors, increasing its odds of success (Desa, 2012). Bricolage is particularly important for low-power actors and their allies as it allows them to leverage readily available tools, processes, and ideas at no or low cost and combine them into bundles of resources that can effectively support their cause.

Scholars call for a richer understanding of technology's role as a structuring mechanism inseparable from the crowd of social actors themselves (Gawer and Phillips, 2013; Lingo and Elmes, 2019; Van Dijk et al., 2011). Part of the challenge of focusing on technology is caused by

our tendency to view it as a uniform, abstract entity when, in fact, it is incredibly diverse, fast-changing, and, more often than not, material. To truly advance our understanding of how we can configure technologies to affect institutional change, we must examine the mundane, everyday practices carried out by low-power actors and their allies as they bring together tools, processes, and ideas through bricolage to achieve meaningful institutional change.

2.4. Literature integration

Integrating these diverse literatures helps us to conceptualize the complex links between digital activism and meaningful institutional change. Specifically, we build on the Sauermaun et al. (2020) argument that crowdsourced volunteers, including scientists and ordinary citizens, can work to solve problems while addressing the technical and social aspects of complex issues. The literature on institutional work explains how these volunteers' purposive actions create, maintain, and disrupt institutions, supported by other actors needed to coordinate, facilitate, and amplify that work (Bertels et al., 2014; Lawrence and Suddaby, 2006). At the same time, the literature on bricolage provides an understanding of how the work of the volunteers must be coordinated by utilizing the tools at hand or when needed, improvising and creating an effective bricolage of available resources (Desa, 2012; Garud and Karnøe, 2003). Hence, we seek to answer our research question based on the integration of crowdsourcing, institutional work, and bricolage literatures.

3. Investigative context

In most countries, only domestic motor carriers can perform road freight transportation in their own country. However, inside the EU, traffic between countries was deregulated in the 1990s (European Commission, 1992, 1996), resulting in poor working conditions for many drivers, including extremely long hours with low hourly pay (Hilal, 2008). Further, in the early

2010s, the EU marketplace for services (it was already open for goods), such as domestic freight transportation, opened to the newly admitted member countries—EU-13 (mainly from Eastern Europe)—causing extensive debate as it enabled low-cost motor carriers from EU-13 countries to haul domestic freight within other countries (Richardson and Mazey, 2015).

In an attempt to protect the domestic freight transportation markets in the “old” member countries (known as the EU-15 and EU-14 after Brexit) from being disrupted by an influx of cheap labor, the EU adopted Directive 1072/2009, known as the “cabotage directive.” It granted the right to foreign motor carriers to do cabotage, described as the ability to execute a maximum of three domestic freight transports in a country different from the country of the truck’s registration, within seven days before having to exit that country. The cabotage directive was motivated by the potential to increase efficiency and reduce the environmental impact of empty trucks, as stated: “Overall, this has an important impact on the economic efficiency of road freight transport but also on its energy/environmental efficiency” (*European Commission, 2012, p. 2*). However, it became a significant loophole and source of unintended consequences. Sweden and other EU-15 member countries experienced an influx of EU-13 trucks (Kummer et al., 2014), and the Swedish Transport Workers Union (STWU) began receiving reports from its members and contacts indicating that EU-13 motor carriers were not complying with the cabotage directive.

The substantial wage difference between EU-13 and EU-15 countries created an imbalance in the domestic freight transportation market. A driver from the new member countries typically works for around 30% of the wages paid in the old member countries (Sternberg et al., 2020). As one former owner of a Swedish motor carrier explained, “*Suddenly everyone [Swedish shippers (i.e., companies buying transportation services)] started contracting them [motor carriers from*

new member countries] because you could get four [new members] for the price of one [Swedish].” He said the influx of low-cost drivers started a race to the bottom where shippers and logistics service providers pressured motor carriers to lower their prices. There was an increasing shift from Swedish drivers to drivers from the new member countries, who, while underpaid by Western standards, earned more money in Sweden than back in their home countries. Loss of work opportunities was not the only negative consequence. Unlike Swedish drivers, who had to adhere to strict safety standards that included mandatory rest hours, extensive training, and maintenance requirements, drivers from the new member countries did not. Consequently, as shown in Norwegian studies, motor carriers from EU-13 countries were involved in significantly more accidents (Nævestad et al., 2014).

The STWU repeatedly raised the issue in policymaking circles and public debates, asserting that the growing number of trucks from EU-13 countries driving across Sweden caused more traffic and worsened social conditions in the industry. The political establishment in Sweden and the EU, vested in the success of the EU expansion, repeatedly cited Eurostat¹ data indicating that foreign motor carriers were a tiny portion of the total number of trucks on the road and that, in comparison to the past, fewer empty trucks were operating across the EU. However, in practice, Eurostat relied exclusively on data from the national statistic bureaus of the EU member countries. These institutions used different data collection methods, and most relied on unaudited self-reporting by motor carriers registered in each member state (some EU-13 countries did not collect data at all). The problem was that EU-13 motor carriers benefitted financially from dispatching trucks to EU-15 countries, where shippers benefited from lower rates. Because of the

¹ Eurostat is the Luxemburg-based EU administration branch dedicated to compiling statistical data.

financial benefits, the EU-13 countries (with no history of statistics bureaus collecting data) had no incentive to report the operations and related truck fill rates.

The STWU suspected that Eurostat data were inaccurate. Still, the Swedish government and the EU dismissed the STWU opinion as self-serving and misaligned with the official data supporting the dominant institutional narrative of successful integration and positive environmental net effects. Despite being a well-established organization and one of the oldest unions in the world (formed in 1897), the EU largely excluded STWU from the discourse over cross-border haulage policies affecting thousands of Swedish drivers. Neither its historical clout, strong political connections to Sweden's largest political party, nor any other available resource helped STWU in the face of institutional resistance. The union and its members lacked the requisite legitimacy and resources to influence much larger institutional forces set in motion and, as such, should be viewed as low-power actors.²

For approximately two years, the union leadership searched for a researcher willing to examine the impact of Directive 1072/2009, eventually partnering with a logistics researcher (LR) at Lund University. The union leadership hoped that an independent academic study would reveal the unintended adverse impacts of the directive and give it the credibility needed to be part of the discussion over cross-border haulage policies.

The LR initially contacted various motor carriers and retailers to request access to their transportation assignment data; however, not a single company agreed to release its data despite assurances of anonymity. Having been denied access to institutional data, the LR suggested creating a web portal for Swedish motor carriers to report lost contracts to EU-13 motor carriers.

² While it is also possible to conceptualize truck drivers and motor carriers from the new member countries as low-power actors as well, it should be pointed out that it is possible to have a multitude of low-power actors in any given institutional situation. Moreover, the circumstances of EU-13 drivers have significantly improved with the expansion of the EU, largely at the expense of their Western counterparts, whose situation significantly worsened.

The LR also suggested creating a smartphone application (app) to record observations (i.e., tag) foreign trucks on Swedish roads. The STWU agreed to fund both. However, the web portal failed to get any reports from motor carriers after its launch. Now that all other avenues of gaining data from actors in the institutional field of haulage and transport were exhausted, the mobile app was the last hope to salvage the research.

In Fig. 1, we present a timeline of the resulting *Cabotagestudien*. To the surprise of everyone involved, this project effectively generated scientific data on the impact of cross-border haulage policy deregulation on the environment and rampant cabotage infringement. Further, the STWU used its political connections and know-how to leverage the study to impact new legislation on cross-border haulage in Sweden and push for halting scheduled EU transport market deregulation. The subsequent political push eventually culminated in adopting and enacting a widespread EU-level legislation called the “Mobility Package” in 2020, which set new driver safety standards, fair competition provisions, sustainable business practices, and other regulations of the motor carrier industry throughout the EU. Given its impact and unconventional method, we assert that it is essential to examine *Cabotagestudien* to understand better this case of effective and sustained digital activism, including its advantages, disadvantages, and unintended consequences.

In line with the work of Franzoni et al. (2022) and following the examples of Franzoni and Sauermann (2014) and Beck et al. (2022), we use crowd science to describe the type of crowdsourcing done for *Cabotagestudien* for several reasons. First, *Cabotagestudien* addresses real-world political, logistical, and societal challenges through data collection and analysis completed by activists and made visible through a transparent online project. Second, the project

involves a large, diverse, unpaid crowd of professionals and non-professionals. Finally, the crowd is constantly updated to include intermediate results.

[INSERT FIGURE 1 APPROXIMATELY HERE]

4. Method

4.1. Research design

We followed a qualitative research design that included extensive fieldwork to engage the actors involved in *Cabotagestudien*. We greatly benefited from exclusive access to them through the LR, who initiated *Cabotagestudien* and is the third author of this paper. These connections gave us rich access to available documentation and the ability to interview key informants, including multiple interviews with the LR. To mitigate bias, the other authors conducted all data collection and analysis activities without the LR's involvement.

4.2. Data collection

Our data sources are summarized in Table 1 and cover the period from early 2012, before the initiation of *Cabotagestudien*, to the latest impact of the information on EU road haulage legislation—the adoption of the Mobility Package (European Commission, 2020). We focused on understanding the institutional work needed to bricolage ICT-based tools, processes, and ideas to achieve an overarching institutional objective. Having someone on the inside who was part of the observed group or phenomenon of interest is rare in organization studies, which brings a “greater depth and breadth of practical knowledge” to understand and address problems (Jones and Bartunek, 2021, p. 339; Tracey et al., 2011).

We took several measures to reduce self-serving and retrospective bias. In particular, we interviewed actors involved with *Cabotagestudien* on different levels and included some of its staunchest critics. Where possible, we checked the accounts given to us against contemporaneous

records and other archival data. The LR was not involved at any stage of the data analysis except for providing clarifications and feedback on the final result of the coding.

[INSERT TABLE 1 APPROXIMATELY HERE]

4.3. Data analysis

Our data analysis was inductive and consisted of four steps. These steps allowed us to derive the theoretical themes and aggregate dimensions we used to structure our analysis.

Step 1. To establish a detailed timeline of the emergence of *Cabotagestudien*, we created a database of ordered chronological events. We deliberately focused on data concerning the organizing of *Cabotagestudien*.

Step 2. Next, we performed open coding and first-order data analysis (Van Maanen, 1979). We labeled textual segments as coding units consistent with prior research (Patton, 2014). We then compared the data across sources to identify actions performed in organizing *Cabotagestudien*. We analyzed the interviews, messenger messages, Facebook posts, media stories, and official reports to mark patterns and similarities. Drawing on the institutional work perspective, we focused on identifying *actions* taken by actors in creating the data crowdsourcing system and engaging drivers in providing data. We identified 25 first-order concepts representing actions most relevant to organizing *Cabotagestudien*.

Step 3. We then used axial coding (Gioia et al., 2013; Strauss and Corbin, 1998) to cluster the identified first-order concepts into nine second-order themes (Locke, 2001), constituting practices enacted in the orchestrating of data crowdsourcing. The clustering of first-order concepts resulted in a concise perspective of the case, encompassing key actions and practices to organize the initiative.

Step 4. Finally, we collapsed the second-order themes into three aggregate dimensions representing the overarching forms of institutional work carried out in organizing *Cabotagestudien* as a data crowdsourcing initiative. Fig. 2 illustrates our data structure from first-order concepts to aggregate dimensions (Gioia et al., 2013).

[INSERT FIGURE 2 APPROXIMATELY HERE]

5. Findings

Our research examines the institutional work underlying a bricolage of crowdsourcing, social media, and data analytics that facilitated effective and sustained digital activism. We find that this entailed three distinct types of institutional work: *infrastructure work*, *crowd work*, and *data work*.

5.1. Infrastructure work

Infrastructure work refers to generating the essential technological capability to promote the overarching institutional change objective. We identified three infrastructure practices: designing, constructing, and calibrating the technological infrastructure.

5.1.1. Designing

Designing the technological infrastructure refers to transforming an abstract idea into a concrete plan in relation to an institutional objective. As the objective of *Cabotagestudien* was to collect accurate data to inform policymakers, the designing practice involved conceptualizing the needed data acquisition system.

Throughout 2012, the LR contacted approximately 40 organizations and companies, asking them to share transport orders and cloud-stored GPS logs data. Not a single organization was willing to assist him. The typical company response was, “*We think this kind of information is*

very confidential and would rather not share it. We do not use cabotage as part of our business.”

The LR knew the research project was going nowhere without access to cabotage data.

By the end of 2012, the LR was ready to quit, illustrating the power of institutional resistance. He wrote in his diary, *“It feels like 2012 is completely a failure...Everyone is convinced that I have taken on an impossible project to prove something no one knows anything about.”* He also felt unable to fulfill his obligations to the STWU. Adding to the pressure on the LR was the issue of research funding. The logistics department at Lund University withheld half of the grant money for other purposes, illustrating the institutional resistance of an academic institution following the traditional paradigm for academic research to the union-backed *Cabotagestudien* that was attempting to leverage crowdsourcing, social media, and data analytics to advance political and societal objectives. Toward the end of 2012, the LR recorded in his diary, *“I have spent over [a month’s salary] on paying my own research expenses...I need to bring the funding to another unit at [Lund University] or alternatively not do the project at all.”*

The need for an innovative solution, mounting pressure, and fear of failure pushed him to tinker with potential alternatives to his data collection problems. The popular navigation app Waze, which integrates information submitted by users to optimize traffic routing, inspired the “Aha!” moment. As an avid long-distance biker and traveler, the LR regularly used Waze to plan his travels. He started daydreaming about using it to tag trucks he had seen on the road, leading to a conceptual shift in how he envisioned using technology to *“have the drivers report trucks.”*

Filled with doubt, the LR created a presentation and traveled to Stockholm to present his new idea to the STWU leaders. Though somewhat disappointed with the lack of progress, the STWU leadership welcomed the crowdsourcing idea because of growing pressure from its members to deliver on the union’s mission to protect their interests. The STWU secretary-general (the deputy

of the Union leader) said, “*We had to do something for our members... We had to show that we were active.*” This admission illustrates what some past institutional researchers characterize as STWU being concerned with its pragmatic legitimacy, meaning that it risked losing ground with its fee-paying members if it did not fulfill its mission. The secretary-general also liked the crowdsourcing idea because it directly engaged members in improving their circumstances. He stated, “*Involving our members is a good way to show them we were trying to cause changes, and have them actively participate in it.*”

Functionality and estimated costs were discussed following the pitch. The STWU wanted to ensure that drivers with different devices could participate and committed an additional \$35,000 to accommodate the generation of an app compatible with Apple and Android devices. This confirmed past observations in institutional change research that institutions are most likely receptive to change ideas that align with their underlying institutional logics. The logics underlying crowdsourcing and unions center on collective action, making crowdsourcing a “natural fit” for different kinds of activism seeking meaningful institutional change.

Our *Cabotagestudien* case study reveals how institutional resistance caused the LR to experience a decrease in his perceived self-efficacy and led to concerns among the STWU leadership about the union’s pragmatic legitimacy. This pressure prompted the LR to turn to preexisting templates of crowdsourcing to theorize a design for a novel data collection system, made transparent to us through access to contemporaneous statements recorded in his diary. One unanticipated problem resulted from the institutional work being done by the LR. He felt caught between conflicting institutional loyalties and their clash over the use of grant monies.

5.1.2. Constructing

Constructing the technological infrastructure refers to transforming the plan into a functional system, representing another type of institutional work that generates the means by which activists take action. For *Cabotagestudien*, the constructing practice included managing the release and allocation of resources, building a minimum viable system, testing the system functionality, and scaling the systems architecture.

To move from design and planning to building the system, the LR first had to figure out how to navigate the institutional bureaucracy and release the grant money from Lund University. He came up with the idea of funneling the grant money to a collaboration subsidiary of the university that charged 10% overhead instead of 50% at Lund University. The university, however, refused to release the funds it had already received. After the LR failed to resolve the issue internally, he shared his struggles with the STWU secretary-general, who emailed the logistics department head. The STWU email stated, “*The Swedish Transport [Worker’s] Union is requesting that you immediately make the funds intended for [the LR] available to him...to be used for the purpose the Lindley [the research foundation granting the money] application was granted for.*” Facing pressure from the STWU, Lund University released the remainder of the grant money for its intended purpose.

Although building the mobile app was straightforward, having people test it proved more difficult. The STWU secretary-general provided the LR with a list of names of union members who could help him test the app. Over the first weeks of the testing period, the STWU members used the app only a handful of times, providing just a few sporadic truck tags. This unanticipated apathy on the part of the STWU members may have resulted from the LR’s lack of social capital as perceived by the members, the union’s failure to mobilize its members effectively, or both. What is clear, however, is that relying on STWU members to perform the mundane and

sometimes “boring” work of testing the data infrastructure was more challenging than anyone had expected. At that point, the LR realized he could not rely on the STWU members and turned to his brother-in-law for help.

I bribed him to use it every day for a week, and I saw just from him using it that he was already capturing the same trucks more than once. So, I realized if he can do it, and he's one person, it means that these [foreign] trucks are constantly here [in Sweden], and this [the app] might actually work.

Satisfied with the proof of concept, the LR sought professional developers to create the mobile app he promised to the STWU. He said, “*I did not know anything about making an app... I simply asked everyone, including my neighbor, when I met him in the stairway. It turned out he is a programmer and knew about GPS analysis, and his best friend knew GUI development.*” The LR hired his neighbor and the neighbor’s friend to develop the app. Through a series of emails to coordinate timelines and align expectations, the development team finished a functional version by the end of April 2013.

One advantage was that constructing the technological infrastructure for digital activism could be accomplished relatively quickly and simply once the right know-how is acquired. This starkly contrasted the cost and complexity of constructing organizational infrastructure in the physical realm. A significant disadvantage was that some STWU members did not necessarily value the technological infrastructure’s construction, causing difficulty in motivating them to participate.

5.1.3. Calibrating

Calibrating the technological infrastructure refers to altering the system to serve its institutional objective. The calibrating practice included proactive system improvements and

reactive system adjustments, significantly enhancing the crowdsourcing initiative while simultaneously consolidating the system functionality and securing its legitimacy.

Bricolage research highlights the importance of ongoing trial-and-error tinkering. The development team worked with the LR to improve the mobile app. They scrapped the initial rudimentary version. The programmer enhanced the data capturing and triangulation algorithms and developed a graphic visualization interface to show truck movements on a map. The development team was not necessarily interested in the institutional goal of *Cabotagestudien*. However, their professional commitment to improving the technology played a pivotal role in the early stages, illustrating that technical know-how can be relatively easy to acquire in support of digital activism.

Between March and April of 2013 (Fig. 3), the team created a professionally designed mobile app for Android and Apple devices, improved the inference algorithm and visualization of observations, and created a website where participants could easily access maps. As the LR recalled, “*the [programmer] went above and beyond...and I did not expect him to come up with such amazing visualization.*” Further, they introduced an element of gamification by creating an interactive table of top participants, complete with virtual recognition tokens such as medals and points. In addition to proactive infrastructure improvements, much of the calibrating practice entailed reactive adjustments following unexpected problems arising from using the app. For example, the development team had to adjust the mobile app’s data protocols and registration features in response to the submission of inaccurate data.

[INSERT FIGURE 3 APPROXIMATELY HERE]

5.2. Crowd work

Crowd work refers to the actions of activists and the practices related to their mobilization in pursuit of the overarching institutional change objective. Crowd work focuses on the day-to-day management of the human component, which is crucial to crowd science. Our analyses of *Cabotagestudien* revealed three crowd work practices: recruiting, deploying, and motivating activists.

5.2.1. Recruiting

Because people have to self-select, recruiting activists for crowd science projects is challenging. The STWU underestimated the difficulty of recruiting activists, thinking it would be as easy as passing the word along via its mailing lists and making an official announcement. There was a minimal response when the STWU called for its members to download the mobile app. The secretary-general said, “*We publicized the study on our website and Twitter, but hardly anyone downloaded the app... We had a crowdsourcing app but not a crowd.*” The LR was also concerned and nearly panicked: “*We put a lot of effort into the mobile app, but we did not have a crowd! We published it on Google Play and Apple store, but hardly anyone used it.*”

It was not necessarily the institutional change objective that helped recruit activists but leveraging an established network and interpersonal connections. Many activists joined the project because they sensed a connection to each other, not because of its political objective, suggesting that ideology may be a secondary recruitment consideration.

Crowd science research does not adequately address how tapping into existing networks can boost recruitment efforts,³ but this tactic was crucial for *Cabotagestudien*. The LR stated, “*I could not rely on union activists, so I joined Truckers Paradise, a Facebook group.*” Truckers’ Paradise is an active online community with over 40,000 members, primarily drivers from

³ We do not consider the purchasing of labor on Amazon Mechanical Turk as recruitment of volunteers.

Scandinavian countries, who share pictures of their trucks, memes, jokes, stories, and other content related to the lifestyle. The LR noticed that some posts on Truckers Paradise referenced the STWU call for participation in the study, but most comments were dismissive, such as, “*The entire thing seems like a waste of time*” and “*This [is] never going to work.*” So, just a few days before the launch, the LR personally appealed to the group’s moderators and prominent *Cabotagestudien* critics (example below).

Hi [name withheld]. From my understanding, you are one of the moderators of Truckers’ Paradise. My name is [the LR], and I am a transport researcher at LTH. Before I started as a researcher, I was driving a parcel van, and you might have seen me in Uppdrag Granskning [Sweden’s largest societal investigating TV show]. The reason why I started to study cabotage was that I have seen the negative effect it has on the environment (despite the EU stating the opposite) and the horrible conditions the drivers are facing. That is why I do Cabotagestudien mainly outside my working hours!

Cabotagestudien only runs for two months, during which we would be very thankful for the support from Truckers’ Paradise. The data we are collecting is a part of Cabotagestudien that will be presented at Almedalen to a large media presence. The Transport Worker Union is committing all resources in achieving rule compliance in Sweden before it is too late.

The personal appeal worked. The opinion leaders he contacted said they would personally participate in data collection, and some urged others to do the same. Identifying and recruiting opinion leaders proved effective for snowball recruitment.

The second recruitment phase appears to have been bolstered by interpersonal connections. Peer pressure through Facebook and other personal means of communication played an important role in recruitment. Drivers started influencing each other through word of mouth online and offline in rest stops and terminal dining halls. Some even printed the study flyer and passed it around. One driver said, “*All of us were impacted, so it made sense that we step in and help.*” Other drivers stated, “*We told other drivers about the app so they would get it because if not us, then who?*” and “*When I saw my friends using the app, I downloaded it too.*” While

snowball recruitment was made possible through a bricolage of crowdsourcing and social media, interpersonal connections were the primary conduit for recruiting activists.

An intriguing unintended consequence of using an established network was recruiting non-STWU member activists, many of whom were independent anti-union drivers. In an interview with one such driver, who was also one of the more prolific participants in data collection, he said, *“I have no love for the union, but when I saw my brothers [drivers] unite like this, I was moved...after all, we are all impacted.”*

5.2.2. Deploying

Deploying is the oversight of the project, including communicating the task, managing the activists, and collecting data. The LR launched the first data collection for six weeks in mid-2013. During this period, 1,179 unique activists submitted approximately 151,000 tags of almost 48,000 different trucks. As peer-to-peer recruiting expanded, participation grew exponentially from a few dozen in the first few days to an average of four hundred participants per day, submitting around 5,000 tags daily by the third week. During the second data collection, four weeks in the fall of 2013, 5,245 unique activists submitted close to 167,000 observations of nearly 57,000 different trucks. Many activists were union members, but most motivated activists were not, illustrating that interpersonal connections and a common overarching goal may supersede institutional affiliations. In a short time, these activists generated the data that the STWU had been unsuccessful in getting for over three years.

We see the importance of Facebook as a centralized online communication channel used to deploy activists. In April 2013, the LR created a new Facebook group named *Cabotagestudien*. The page gained over 7,000 members in two months and became the primary communication platform for posting announcements, progress reports, and links to related stories. The LR

recalled, “*I was posting every day and sometimes several times each day...Without Facebook, I do not know if we would have pulled it off.*” Hence, Facebook became an integral part of the technological infrastructure and played an essential role in crowd work; however, it also became a source of adverse unintended consequences that seriously jeopardized the project’s legitimacy.

Before participating in *Cabotagestudien*, drivers knew that the cabotage issue existed, but as one of them recalled, “*It is one thing to see some [EU-13] trucks here and there on the roads, and [another thing] seeing all this evidence.*” Consistent with prior research, as soon as cabotage infringements became evident, instances of hate speech, cyberbullying, and harassment emerged. Some drivers posted derogatory and xenophobic comments targeting EU-13 drivers on their personal Facebook page, the Truckers’ Paradise Facebook page, and the *Cabotagestudien* Facebook page (e.g., “*The [expletive] Poles are stealing our jobs!*”). The LR and his team removed such comments quickly.

Most activists did not engage directly in toxic rhetoric. Many were appalled by this development, and some made counter posts, urging against xenophobic posts (e.g., “*Please stop with this! This is not helping the cause,*” and, “*It is not their [East European drivers] fault. The system is broken.*”). The STWU leadership was concerned that unchecked hate speech might discredit *Cabotagestudien*. The secretary-general messaged the LR: “*We must do something about these posts.*” Based on what critics stated to the LR and the media, the STWU concerns were warranted. Opponents criticized *Cabotagestudien* for being “*overtly xenophobic*” and pointed out it stirred up “*nationalistic sentiments.*” Some activists mercilessly cyberbullied the leading *Cabotagestudien* critic, exacerbating the problem. The critic recalled, “*They were harassing me all the time...I was really concerned about my safety.*”

To be legitimate, scientific research must remain impartial. Unfortunately, the interconnectivity afforded by social media kept spreading the flames of xenophobia. To address the *Cabotagestudien* Facebook page problems, the LR contacted some cool-headed community members who expressed disdain toward xenophobic comments and asked, “*Would you please help...moderate the page? This distracts from what we are really trying to accomplish here.*” These moderators, aided by spontaneous peer-to-peer chastising, eliminated hate speech from the official *Cabotagestudien* Facebook page, maintaining a semblance of moral legitimacy. However, the LR conceded, “*I had no control over what people post on their Facebooks...I did contact [moderators on Truckers’ Paradise Facebook group] and asked him for help...They did help with the worst stuff, but not everything.*” His appeal to the moderators of the Truckers’ Paradise Facebook page helped curb the worst posts. Still, people continued posting memes, jokes, and negative comments about EU-13 drivers.

Cabotagestudien may have unintentionally pitted one group of low-power actors against another. EU-13 motor carriers, most of whom operated in Sweden legally, were villainized because of the rule-breaking of a relatively small subset of motor carriers, which exploited the loopholes generated by what later was acknowledged as a poorly designed and enforced regulation.⁴ Most drivers and STWU leaders we talked to expressed compassion and camaraderie with their EU-13 counterparts. One driver said, “*It was sad seeing them [East European drivers] being exploited like this...Having no proper sanitation conditions.*”⁵ The former STWU president said, “*Our fight was not with them [East European drivers] but with the EU...We just wanted to have rules that are fair for everyone.*” We primarily analyzed *Cabotagestudien* from a

⁴ In the EU Mobility Package (2020).

⁵ Many EU-13 drivers congregated in an unauthorized rest area lacking bathrooms and showers to remain undetected by police.

one-sided perspective; however, we acknowledge that powerful institutional forces impacted multiple groups of low-power actors.

5.2.3. *Motivating*

The LR adapted various motivational tactics to keep participants engaged in data collection. While most digital activism efforts stall due to the lack of a unified direction, the benefit of crowd science is that the LR became a recognized leader who engaged in the institutional work of directing activists toward obtaining a change objective. The motivational tactics included daily calls for action and encouragement through the *Cabotagestudien* Facebook page, introducing gamification elements, sharing data analysis results via visualization, and sending personalized messages to high-volume taggers. While the LR played an essential role as a motivational force, peer-to-peer motivation emerged where activists kept reminding each other that they were working towards something “important.”

In the first crowdsourcing run, the LR posted daily posts to galvanize the crowd, signing them with the “Keep tagging!” call. The Facebook posts were used to update activists on the project’s state, share media coverage, and recognize top taggers. While recognizing activists and encouraging words were helpful, showing activists what their efforts had produced was crucial for motivating them. As the LR became the principal motivator, he spent more time and energy than he envisioned on crowd motivation. However, the positive impact was that it increased his visibility among the activists, elevating his social capital and leadership status from “outsider” to what several drivers expressed as “one of us.”

As tags reached a critical mass by the end of the first week of data collection, the programmer used the inference algorithm to triangulate observation. He had the idea of visualizing observations as maps and worked with the developer to create a simple website

showing the movement patterns of each truck tagged. The LR recalled, “*The visualization was a game changer! As soon as I posted the first map [on the Cabotagestudien Facebook page]...the drivers went nuts.*” Our findings align with crowd science notions on the importance of making intermediate results public, as opposed to a lengthy peer-review process characterizing most traditional scientific research. They also reinforce the importance of data visualization in convincing activists of their effectiveness. The transparency of the work, mainly conducted by drivers in isolation, increased the sense of collective kinship and purpose. One driver said, “*We could see [how] others also tag and participate...it made me feel as if I was part of something bigger.*”

Cabotagestudien had become a significant topic of conversation in rest stops and terminal dining halls where drivers would eat meals before heading back out on the road. One driver said, “*Driving a truck can be lonely and boring...[Cabotagestudien] gave us something to do and something to talk about...It made us feel closer to each other.*” We surmise that mixing crowdsourcing, social media, and data analytics for activism underlined by a common objective helped motivate participants by forming a collective sense of identity. Unlike almost every other crowdsourcing project where volunteers are mostly “exploited,” *Cabotagestudien* shows a rare win-win situation where the crowd knew it could benefit from their effort. We assert that this win-win illustrates a significant paradigm shift in crowdsourcing as an effective collective action tactic that can benefit the crowd equally.

We also see the interconnectedness between infrastructure, crowd, and data work. Activists supplied the data through the infrastructure explicitly developed for this project. The data were analyzed and visualized, which required the proactive infrastructure update to include the website. The visualized data motivated activists, increased participation numbers and intensity,

and culminated in more data and higher fidelity maps. The sheer volume of activist interest in seeing the fruit of their work caused the website to crash, leading to an infrastructure update.

5.3. *Data work*

Data work refers to the internal and external practices primarily related to the preparation and use of data to serve the overarching institutional change objective: cleansing, configuring, and diffusing.

5.3.1. *Cleansing*

Data cleansing is preparing the data for refinement and processing, a type of “preventive” institutional work meant to protect the legitimacy of the evidence collected to support the change objective. Much of the effort of data work was ensuring that the data used were accurate and error-free. Data cleansing identified and removed bad data and adjusted the data infrastructure. The openness characterizing crowdsourcing posed a data quality challenge beyond what we would expect in a more “controlled” empirical setting, illustrating one of the challenges with crowd science.

The programmer visually examined all inputs into the aggregate data pool of license plate tags and time-stamped geographic coordinates. He noticed that many inputs were tainted—consecutive numbers, repeat letters, and values that were either too short or too long to represent a standard EU license plate. He attributed these data to entry errors and “*people trying the app for the first time, or just messing around.*” According to the programmer and the programmer who joined the *Cabotagestudien* team in 2014, bad data were relatively easy to identify.

However, data problems were not all because of normal user error. There was a hostile deliberate manipulation of the data pool by actors objecting to *Cabotagestudien*. While we expect institutional resistance, direct data manipulation illustrates a significant weakness of

crowdsourcing. According to the programmer, he examined the GPS coordinates of suspicious tags, “*Some tags came from areas of Stockholm where no freight trucks get into... We also received some tags that were on open water.*” He concluded that someone deliberately tried to contaminate the data pool “*to reduce the credibility of the study.*”

While we cannot know with certainty all the interests behind the effort to contaminate the data pool, we know the identity of one such actor. The legal counsel for the forwarder’s association, an organization acting as a middleman between motor carriers and shippers, deliberately submitted fake data. In our interview, he admitted, “*I submitted tags of trucks I knew from our contacts to be not in Sweden at the time.*” We also learned that he was not acting alone and that he coordinated a systematic submission of tags of trucks he knew, through his contacts, were in other parts of Europe at the time. As the principal critic of *Cabotagestudien*, he wanted to demonstrate the weakness of the data crowdsourcing method. He argued against it in industry discussion forums and media outlets, stating, “*They [Cabotagestudien] show some maps and claim everyone is breaking the rules! But where is the evidence, I ask? We don’t really know where the trucks go or what they carry!*”

Infrastructure work adjustments supported cleansing data work. After the first data crowdsourcing run, the developer included a registration mechanism that reduced data contamination by 50% during the subsequent data crowdsourcing run. The programmer developed the data cleaning protocol and used it to sift through the data, removing 30% of the tags. The team was reluctant to lose so much data but decided to err on the side of caution to preserve the study’s credibility.

5.3.2. *Configuring*

Configuring data is analyzing the data to present relevant evidence, a type of institutional work of aggregating inputs to generate an information output that can be readily consumed throughout the institutional field. By the end of the first week of data collection, the data contained enough observations to begin exploring the movement patterns of specific trucks. The research team used the modeling algorithm to process observed trucks' GPS coordinates and time stamps to estimate their movement patterns across Sweden and neighboring Scandinavian countries. The team identified hundreds of EU-13 trucks violating cabotage rules through this method. As the programmer stated in an interview with a motor carrier magazine,

For most countries, Eurostat data are much lower than the observation data (except for Poland and Germany, where the proportions are reversed.) During the analysed period, our algorithm classified over 1,500 vehicles as performing cabotage, nearly 400 of which were either systematically observed in Sweden for more than 7 days, or showed a pattern of performing the fourth and subsequent transports, the expert highlights.⁶

Cabotagestudien, via a bricolage of crowdsourcing and data analytics for digital activism, proved that foreign motor carriers exploited the cabotage loophole in Directive 1072/2009. Yet, producing the evidence was only the first step. While the initial plan was to analyze the data and publish the information as an academic report sometime after finishing the data crowdsourcing run in June 2013, the research team decided to release the data as soon as it was analyzed. Releasing the data in a readily consumable format was a crucial decision that helped sustain the study by further motivating participation.

5.3.3. *Diffusing*

Diffusing information is communicating the resulting data to actors in the institutional context. The diffusing activities were mostly external, involving different actors in the broader institutional context, representing a type of institutional work leveraging scientifically generated

⁶ <https://trans.info/swedish-cabotage-research-project-scandinavian-drivers-pick-up-foreign-trucks-202623>.

evidence to prompt change. These activities included diffusing through formal public channels, targeted backroom channels, and self-emerging diffusion.

The early funding application and initial correspondence show that the union and the LR initially intended *Cabotagestudien* to be an independent academic study. As the STWU leader told us, “*We needed a legitimate study to be taken seriously...to [re]start the conversation [on the issue of cabotage violations]...We needed it to be scientific, so to speak.*” The concern with the study’s credibility meant that the STWU was not directly involved in its planning, execution, or funding. The research grant came from an independent research fund with ties to the union. The fund did not transfer the grant to the LR directly but to his academic department. This transparent approach with carefully documented expenses helped preserve the research project’s appearance of objectivity.

While the STWU leadership was not directly involved in research execution, it did a lot of behind-the-scenes work to position itself to use *Cabotagestudien* results. The STWU booked a seminar in Almedalen Week (*Almedalsveckan*) to discuss the state of road haulage in Sweden. Almedalen Week is an annual convention considered the most important event in Swedish politics, featuring seminars, discussion forums, and other political activities. During the week, representatives from the major political parties take turns speaking on various issues in front of industry actors, politicians, and media representatives.

STWU booked the presentation at the beginning of 2013, several months before *Cabotagestudien* began. It was not their confidence in the study that motivated their decision, but desperation and scheduling constraints caused the STWU to book the presentation long before the results were available. The former STWU leader said, “*We did not know [before Cabotagestudien] what we might get [from the study] but were prepared to fight our position.*”

When the study started producing useful evidence, the STWU leadership became more confident about its prospects. We found that the secretary-general was emboldened enough to invite the parliamentary head of the transport committee, the chief of the largest logistics services buyer at the time, and the deputy infrastructure minister. An excerpt from the STWU statement advertising its Almedalen discussion forum:

During the spring, researchers from Lund University of Technology conducted the study with the help of thousands of volunteers who, through a mobile app, collected data on international domestic traffic in Sweden. The results show that illegal traffic dominates Swedish roads [which] has devastating consequences for the Swedish [motor carrier] industry and for our members. The Swedish government's lack of interest in this important industry not only contributes to a social crisis but also to future generations being punished when the climate suffers.

This announcement illustrates the STWU's strategy of challenging the institutional status quo by claiming it causes increasing social unrest and environmental damage.

Past commentary on the possible pitfalls of activist science asserts that the merging of science and politics might blur the lines between the two and damage the reputation of the first. The lines between science and activism were initially distinct but became increasingly blurred following the Almedalen Week presentation. With the official diffusion channels—publishing reports and delivering public presentations—the LR increasingly became entangled with the STWU and the behind-the-scenes activities. The novelty of the data crowdsourcing approach and the findings generated interest among actors in the institutional field, especially the Swedish Social Democratic Party (SAP) politicians and their various allies. The SAP, one of Sweden's two major parties, was in 2013 the major opposition party looking to regain control within the government. In the three years following the Almedalen Week, the STWU arranged multiple formal and off-the-record meetings between the LR and various figures in the SAP, the Green Party, and the Left Party, taking place in coffee shops, hotel lobbies, and even his Lund

University office. According to the LR, the meetings were meant to “*explain the study and its implications.*” He met with the SAP board member responsible for strategizing the party agenda for the upcoming election cycle. The STWU leveraged the academic legitimacy of the LR to convince political allies of the reality of *cabotage* infringement. However, the unintended consequence was that the scientist had become entangled in the political struggle, illustrating a problematic aspect of the merger of science and activism.

The information generated by *Cabotagestudien* diffused further into political circles. As one high-ranking politician from the SAP told us, “*The political consensus [before Cabotagestudien] was that fast [EU] integration was good for everyone, but then, we saw the data...Before, there was no discussion about how policies may affect blue [collar] labor in Sweden.*” Information diffusion was afforded mainly by the ties between the STWU and the SAP and the latter’s political aspirations to regain power. In May 2014, just a few weeks before the EU parliamentary elections and four months prior to Sweden’s parliamentary elections, the SAP introduced new cabotage legislation. Below is an excerpt from their plan for action document dated 14 February 2014.

According to research from Lund University (www.cabotagestudien.com) thousands of foreign registered trucks drive illegally in Sweden. Hence, the Social Democrats present a bill of measures to create order on Swedish roads. The bill of measures aims at providing fair conditions in the Swedish [motor carrier] industry, favors companies that are compliant, and reduces the environmental and climate emissions from the transport sector. The question of order on the roads is an election question for the Social Democrats both in the EU election in May and in the parliament election in September.

Once the data were configured and released, the information rapidly diffused across the institutional field, even without the involvement of the STWU or the LR. This illustrates an advantage of information as a resource in activism—it is non-subtractable in use (unlike tangible

resources) and easily transferable. The mainstream media picked up the *Cabotagestudien* story and featured it on the primetime evening news after the second round of data crowdsourcing.

From our conversation with the manager of a large shipper, we learned that the study was widely discussed behind closed doors in industry circles, as exemplified by suddenly shifting attitudes among industry actors. For instance, one of Sweden's largest retailers, COOP, contacted the LR to provide its transportation data logs. At the same time, COOP launched a media campaign promoting its sustainable sourcing practices. COOP's transportation manager repeatedly praised *Cabotagestudien* in public for "*raising the awareness of the issue of exploitation of East European drivers and rampant rule-breaking.*" In addition, three different motor carriers contacted the *Cabotagestudien* team and offered to supply their data logs in exchange for being certified as honest players, not abusing *cabotage* rules. These episodes illustrate the interconnectedness between information diffusion and infrastructure work. The programmer compared the GPS logs data to the crowdsourced data and found they were aligned, bolstering the credibility of *Cabotagestudien*.

6. Discussion

In this study, we address the following research question: *How can low-power actors use a bricolage of ICT-based tools, processes, and ideas to bring about meaningful institutional change?* We conducted numerous interviews, analyzed contemporaneous messages and diary entries, and consulted media and governmental reports to uncover three types of micro-level, mutually reinforcing institutional work (*infrastructure, crowd, and data*) completed by diverse low-power actors and their allies to effect meaningful institutional change. As a result, our *Cabotagestudien* case study contributes to institutional change and policy literature (Kukk et al., 2016; Selander and Jarvenpaa, 2016; Selviaridis et al., 2023) by showing how a decade-long

project made a meaningful institutional change by countering, or at least delaying, the predominant deregulation efforts of the European Union. In the following, we discuss the crowdsourcing, institutional work, and bricolage aspects of *Cabotagestudien* and how they together contributed to its effectiveness. In addition, we briefly discuss unintended consequences, followed by limitations and areas for future research.

6.1. Crowdsourcing

Cabotagestudien demonstrates how organizers can use social media effectively to recruit, mobilize, and manage the activism of low-power actors. At the same time, as a crowd science initiative, it mitigated social media's disruptive tendencies by channeling activist energy into productive and focused work. As science enjoys high levels of legitimacy (Gauchat, 2023), it lends greater credence to activist efforts (Brown, 2019). We assert that activist movements supported by scientific methods and data can gain a foothold, whereas populist actions motivated by slogans and anecdotes will more likely be short-lived (Phelps et al., 2021; White, 2017).

Following conceptualization, the designing and constructing work by hired professionals who constructed the initial technological infrastructure was straightforward. The relative simplicity with which the LR completed the infrastructure work stands in contrast to the complexity of creating "traditional" physical organizational infrastructure (Bhamare et al., 2016), representing one of the most significant advantages of leveraging ICTs for institutional change. Once the technological infrastructure was built, it required calibrating several times, both proactively to improve the system functionality and appearance as well as reactively to address the unexpected ways users interacted with the technology. Here, we see the strengths and weaknesses of crowdsourcing on full display. Crowdsourcing was an effective method for quickly generating data; however, the *Cabotagestudien* organizers were forced to find creative

ways to mitigate crowdsourcing's vulnerability to data quality issues and deliberate manipulation by actors resisting change, as noted by Bonney et al. (2009), Franzoni et al. (2022), and Lenart-Gansiniec (2021).

This case highlights the importance of crowd work as well as its overlap with and dependence on technological infrastructure work. Still, we also see that generating a viable technology is not enough. After the app was ready, hardly anyone downloaded it, and the initiative was on the brink of failure. The direct plea by the LR to Truckers' Paradise moderators and popular participants illustrates the power of tapping into an existing network as an effective recruiting tactic, illustrating one of the key advantages of a bricolage of crowdsourcing and social media for activism.

Interestingly, none of the Truckers' Paradise opinion leaders held an official position of power within the motor carrier industry. Several were not STWU members, illustrating the polycentric (Gil and Pinto, 2018; Mindel et al., 2018) nature of social media and online communities where anyone can rise to prominence. Polycentricity—the spontaneous self-rising of order in environments devoid of official hierarchies and incentive structures (Mindel et al., 2018)—may also explain the self-deployment of the activists. Once the opinion leaders started promoting a common objective and influencing their online friends to participate in data collection, peer recruiting was further cascaded on Facebook and elsewhere (Hunt and Benford, 2004). This organic cascading effect illustrates a significant strength of ICT in institutional work to help overcome the challenges incurred with a large, geographically dispersed population of activists (Bertolotti et al., 2015; Hoegl and Proserpio, 2004).

Deploying work mainly occurred organically. Once the LR had built some social capital (Siqueira et al., 2020), his efforts to motivate the low-power actors extrinsically helped keep and

even increase the intensity of participation (Acar, 2019). *Cabotagestudien* organizers encouraged the deployment efforts through the gamification of the task, encouraging posts, and personalized direct messages recognizing activists' work, which motivated the low-power actors (Beck et al., 2022). A notably effective tactic was showing the activists the product of their work (Barberá-Tomás et al., 2019; Milan, 2017; Reinecke and Ansari, 2021), further illustrating the interconnectedness between infrastructure and crowd work. Developing a participant ranking and recognition system and data visualization immediately impacted the recruitment, deployment, and motivation of low-power actors. The activists' interaction with the technology influenced the infrastructure's calibration.

The infrastructure and crowd work directly impacted data work, which entailed recording the discrete input collected from activists in a centralized database. In turn, data work activities affected infrastructure and crowd work. For example, detecting erroneous data inputs during data cleansing led to the recalibration of the app and the introduction of a more stringent and less anonymous activist registration mechanism. The addition of maps showed how *Cabotagestudien* leveraged the interconnectedness of infrastructure, crowd, and data work to motivate activists.

Following the data cleansing and configuring work, the diffusing work ensured information was effectively spread across the institutional field. The presentation at Almedalen Week to an audience of influential actors in the institutional field of transport and the privately held presentation to political allies represents targeted information diffusion as a type of institutional work. At the same time, the way various actors in the institutional field spread information represents a form of spontaneous diffusion supported partially by behind-the-scenes efforts by the research team and the STWU leadership. Once the information was available for public consumption, it spread rapidly among actors in the institutional field with little direct

involvement of the STWU or the research team. The relative ease with which information was duplicated and spread represents a significant advantage of digital activism and its potential in pursuing meaningful institutional change. Our results inform digital activism research (Azer et al., 2019; Moss, 2018) by demonstrating how easily information can be duplicated, spread, and take on a life of its own.

Actors started reacting and repositioning as the information diffused. The media felt the information was interesting and timely and reported it. Politicians used the information to position themselves as protectors of Sweden's blue-collar workers ahead of the EU parliament and national elections. Other actors maneuvered to mitigate their own risks. One major retail chain revamped its transport sourcing practices while launching a marketing campaign highlighting its environmentally sustainable practices. Three motor carriers offered to open their GPS logs in exchange for being certified as honest players. The *Cabotagestudien* created pressure and compelled these motor carriers to support the institutional change objective. Their willingness to now share data, which the LR had requested years earlier, suggests that such deadlocks in acquiring data and gaining support may be overcome by sharing early results, which emphasizes one of the main distinctions of crowd science projects (Franzoni and Sauermann, 2014; Sauermann et al., 2020).

Some actors thought their interests might become compromised. For instance, a well-known logistics association that stood to lose if cabotage rules had been enforced acted to discredit the study early on. However, it was unsuccessful following motor carriers' release of GPS logs, confirming the crowdsourced data's validity. As expected, institutional resistance was strong (König et al., 2012; Selviaridis et al., 2023; Weiss and Huault, 2016); however, diffusing the information was a catalyst, causing many actors in the institutional field to make changes. These

changes occurred collectively and over time, representing a significant institutional trajectory alteration and a win for low-power actors, mainly Swedish drivers.

The byproduct of involving crowds of activists in the scientific process is faster and more effective execution of scientific research, creating a three-way win-win-win synergy. The activist crowd benefits from leadership and direction and the promotion of their interests (Deng et al., 2016). The activist organization benefits from greater credence afforded by science and engaging its stakeholders, improving its cognitive and pragmatic legitimacy (Suchman, 1995), and science benefits from improved efficiencies and the opportunity to generate research with meaningful real-world impact.

6.2. Institutional work and bricolage

A decade of published institutional work literature has not addressed how ICT may enable change through institutional work, with a few notable exceptions (Gawer and Phillips, 2013; Lingo and Elmes, 2019; Raviola and Norbäck, 2013). As such, our study of *Cabotagestudien* contributes to institutional theory by adding context and nuance to the discussion of digital activism and meaningful institutional change (Kukk et al., 2016). Gawer and Phillips (2013) highlight the importance of technology as a field structuring mechanism, but there is limited research on technology enabling change through institutional work. Indeed, the link between technology and institutional work has been under-researched and under-discussed, as indicated by growing interest in the area (Lawrence and Phillips, 2019; Lawrence and Suddaby, 2006). Expanding the limited work of scholars who have investigated the institutional impacts of existing technologies such as commercially available medical devices (Barley, 1986), newspaper websites (Raviola and Norbäck, 2013), and social media (Lingo and Elmes, 2019), the presented

case study promotes our understanding of how technologies, used together in a novel and unexpected manner, may contribute to meaningful institutional change.

Further, we contribute to the literature on digital activism and meaningful institutional change by explaining the micro-level *infrastructure work* necessary to create an institutional context around a technology that engages users, connects to broader institutional projects, and creates resource flows that support the crowdsourcing project (Kukk et al., 2016). Specifically, our findings expand the discussion of institutional maintenance and the roles of institutional members when faced with macro-level external changes, the introduction of new technology, and regulatory changes (Barley, 1986; Heaphy, 2013; Van Dijk et al., 2011).

While a bricolage of crowdsourcing, social media, and data analytics for activism through institutional work was proven effective, the path was not smooth. Conceptualizing the infrastructure resulted from equal parts inspiration and desperation. The latter was prompted by the growing pressure to deliver for the sponsor while not having the necessary information. While Waze, the navigation app, was the socio-technological template that inspired the LR, it was not feasible to duplicate it. Subsequently, the creative combination of smartphone-based geo-tagging, social media, spatial data analytics, and data visualization represents a form of technical bricolage (Baker and Nelson, 2005; Garud and Karnøe, 2003).

Although *Cabotagestudien* achieved the noteworthy feat of mapping the movement of trucks on a grand geographical scale, the system's effectiveness was never guaranteed. Without a means to collect the needed data, the first step was designing the technological infrastructure that the sponsor could use to legitimize their position (Garud et al., 2014; Herepath and Kitchener, 2016), which was contrary to that of the asymmetrically powerful EU officials (Goodstein and Velamuri, 2009; Micelotta and Washington, 2013). An app used to report road accidents inspired

the design, but the idea had to be accepted and funded by the sponsor before the next step could be taken. With the sponsor's approval, constructing the technological infrastructure was easily accomplished using professional developers. Once fielded, calibrating the technological infrastructure was necessary to improve the algorithm, visualize the observed trucks, and give participants access to the populated maps.

In a more general sense, the technology that was purposely shaped through the design, construction, and calibrating practices of infrastructure work provided a means for low-power actors to regain some institutional control (Goodstein and Velamuri, 2009; Lawrence and Suddaby, 2006), bolstered the legitimacy to the sponsor's position (Garud et al., 2014; Herepath and Kitchener, 2016), and triggered changes within the institutional field that may lead to a shift in institutional logics (Gawer and Phillips, 2013; Schildt, 2022). The various calibration actions and their immediate impact on the trajectory of the initiative indicate that agility may be the main advantage of institutional work with ICT. Comparatively, adjusting socio-technological organizational structures is less complex than pivoting traditional ones through focused institutional work, which requires considerable time and resources.

6.3. Unintended consequences

We acknowledge that almost every public policy creates winners and losers. Our objective was not to evaluate the merits of protectionism or neo-liberalism in the face of economic imbalance between EU-15 and EU-13 countries. In our case perspective, the Swedish drivers were the low-power actors, but they were not the only ones. While greater regulations of cross-border transport helped protect the interests of EU-15 drivers, some EU-13 motor carriers saw their opportunity to do business shrink. Interestingly, many EU-13 drivers were positively impacted by not being taken advantage of and forced to live out of their trucks while away from

their families. Further, Swedish motor carriers hired hundreds of EU-13 drivers as retailers abandoned cabotage in their distribution network. The Mobility Package also stipulates that drivers should be allowed to return home every month (European Union, 2020).

We found that a bricolage of crowdsourcing, social media, and data analytics coupled with activist passions has a potential dark side (Dong et al., 2017). In *Cabotagestudien*, it manifested in the form of losing control over some activists and a rise of nationalistic sentiments, which the union felt might endanger the enterprise's moral legitimacy (Suchman, 1995). The LR enlisted the help of trusted moderators to remove comments that jeopardized the study.

Another unintended consequence of combining scientific work with activism is blurring the lines between them (Andresen et al., 2000). While we know little about this blurred line, our case study empirically complements the “activism mobilizing science” stream of research (Conde and Orta-Martínez, 2023), highlighting the use of local and scientific knowledge to coproduce new knowledge. The LR motivated the activist and was toeing the line between science and activism in multiple instances, which could have potentially backfired. While science might lend greater credibility to activism, its legitimacy is likely to erode the more it gets involved with politics, which, if it happens continuously and on a large scale, might cause a dent in the legitimacy of science and might even endanger its long-term sustainability in the face of innovation-inhibiting institutional forces (Ottinger, 2015).

6.4. Limitations and future research

The findings of our in-depth case study have several limitations and suggest several opportunities for future research. First, geographic, institutional, and political idiosyncrasies may limit the generalizability of our findings. For example, Sweden and the EU may value empiricism more than other governmental entities. Instinctively, we believe data crowdsourcing

as institutional work has the potential to be an effective strategy across institutional environments, but this remains to be seen and presents an opportunity for further study. Second, we expound on the institutional work that created a novel combination of crowdsourcing, social media, and data analytics. However, we acknowledge that there are many ways to develop the data infrastructure necessary for effective and sustained digital activism. Future research can expand our understanding of the plethora of ways data can be acquired and captured when meaningful information does not exist. Third, there is considerable heterogeneity among projects (Franzoni and Sauermann, 2014). Comparative studies of successful and unsuccessful cases can potentially reveal essential insights into the transferability of our findings.

In this research, we elaborate on one case of meaningful institutional change brought about by the institutional work performed by low-power actors. While we primarily focused on investigating the bricolage approach to ICTs, another valuable contribution to the literature would be a deeper look at the challenges faced in managing sustained crowd engagement (Selander and Jarvenpaa, 2016). Specifically, crowd heterogeneity presents many challenges as the motivations and capabilities of the individual members vary (Sauermann et al., 2020). Given that crowds have substantial value for meaningful institutional change, future research should address how to achieve sustained motivation of heterogeneous crowds. In a related vein, future research should also study the configuration of cases to contrast failures and successes to further inform research and practice regarding the factors affecting digital activism outcomes.

7. Conclusion

Our *Cabotagestudien* case study offers insights from behind the scenes of a decade-long research project examining European cross-border haulage policies' environmental and social impact. The fundamental motivation behind *Cabotagestudien* was that the union and the

professional drivers they represent were excluded from policy decisions regarding an international policy directive of immense importance to them. When initially confronted, powerful governmental actors disregarded the union and their attempt to refute the official narrative shaped by powerful national and private sector actors, many of whom had financial interests in deregulation. The primary contribution of this case study is our uncovering of how low-power actors and their allies created and, more importantly, sustained an effective activist movement that countered the dominant logic of powerful institutional actors. We found that a bricolage of crowdsourcing, social media, and data analytics made this digital activism case effective when so many others have fallen short of achieving meaningful institutional change.

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Table 1

Details of data collection.

Source of Data	Type of Data	Use in the Analysis	Description
Interviews	We conducted interviews between 2016 and 2022 (we conducted most interviews in different sites in Sweden at the beginning of 2018) with the LR (6), the STWU president (1), vice president of operations (1), and secretary general (1), five drivers participating in data collection (5), the programmer (2), two former motor carrier owners (2), a manager of a large shipper (1), the legal counsel for an opposition interest group (1), and a high ranking politician (1) in the Swedish parliament who was a minister involved in cabotage legislations in 2014 and 2015	Primary retrospective data, including the thoughts and feelings of different actors involved in the case, provide contrast and balance of perspectives after the events have unfolded and actors had the opportunity to reflect on them.	21 interviews (19 in person and 2 remote), ranging from 35 to 180 minutes (mean of 50 minutes), totaling approximately 290 transcribed pages (mean of 14.5 pages).
Direct messages	Facebook Messenger direct messages chains between the LR and <i>Cabotagestudien</i> activists as well as moderators of Truckers' Paradise Facebook page, exchanged between 2013 and 2015	Primary contemporaneous data source of mostly unfiltered evidence of the thoughts, actions, and relationships formed between the LR and activists as well as moderators of Truckers' Paradise	47 message chains between the LR and 26 different drivers, totaling approximately 14,200 words (mean of 302 words).
Facebook posts	Posts made by the LR on <i>Cabotagestudien</i> Facebook page primarily to update and motivate activists	Primary contemporaneous data provides evidence of the tactics used to encourage activists as well as a window into the emotions and opinions expressed by some activists in responses to posts	44 posts, totaling approximately 7,700 words (mean 175 words) + 2,786 words in response to posts (mean of 63 words).

Personal diary entries	Personal diary entries made by the LR between 2012 and 2013.	Primary contemporaneous data provides evidence of the private thoughts and actions of the LR at the time of the events. (Given the personal nature of the data source, the LR removed non-germane entries).	11 entries, totaling approximately 920 words (mean of 84 words).
Emails	Email communications between the LR and other actors exchanged between 2012 and 2015, including the STWU, university department head, motor carriers, shippers, the forwarder association representative, programmers, and other industry players.	This secondary contemporaneous data source is evidence of the thoughts and actions expressed by different actors during the events. Most emails are composed as official communiques and thus provide a mostly filtered, limited view.	55 emails (we counted each email separately and not as a chain) between the LR and 21 different actors, totaling approximately 8,140 words (mean of 148 words).
Media reports	Online media reports and interviews published between 2013 and 2020 mentioning <i>Cabotagestudien</i> or the Mobility Package. Most media reports were published in motor carrier industry-related outlets.	A secondary data source of the evidence of <i>Cabotagestudien</i> and its growing impact on the institutional field of transport and political processes in Sweden and the EU.	51 media reports and interviews, approximately 98 pages (mean of 1.9 pages).
Official reports and documents	The original research grant application from 2012, 5 official <i>Cabotagestudien</i> reports published between 2013 and 2021, Social Democrats' official elections agenda from 2014, and the official EU commission report on the Mobility Package.	A secondary data source providing the context of the cabotage issue and its evolution.	8 total reports and documents, approximately 235 pages (mean of 29 pages).

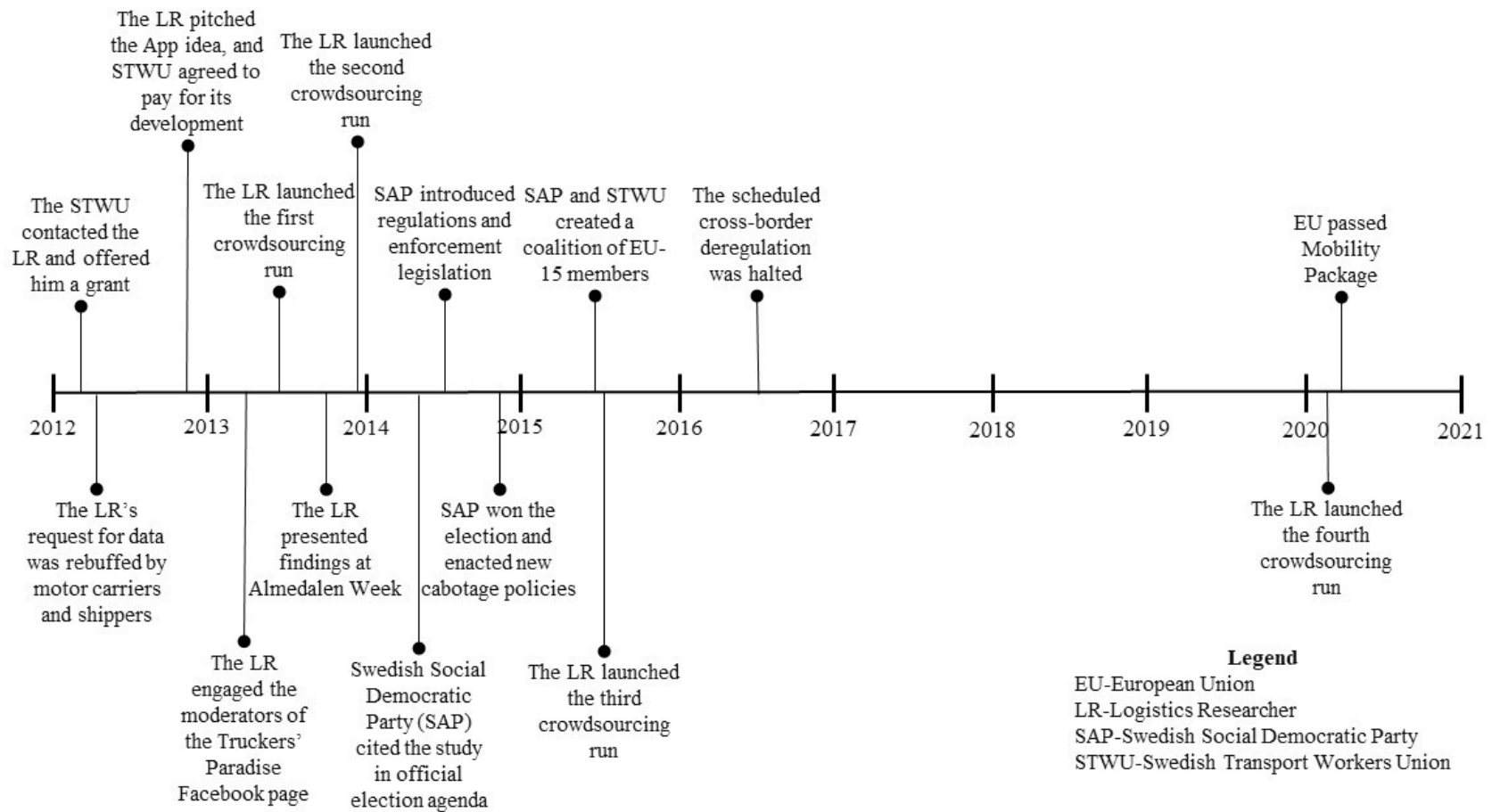


Fig. 1. Contextual timeline.

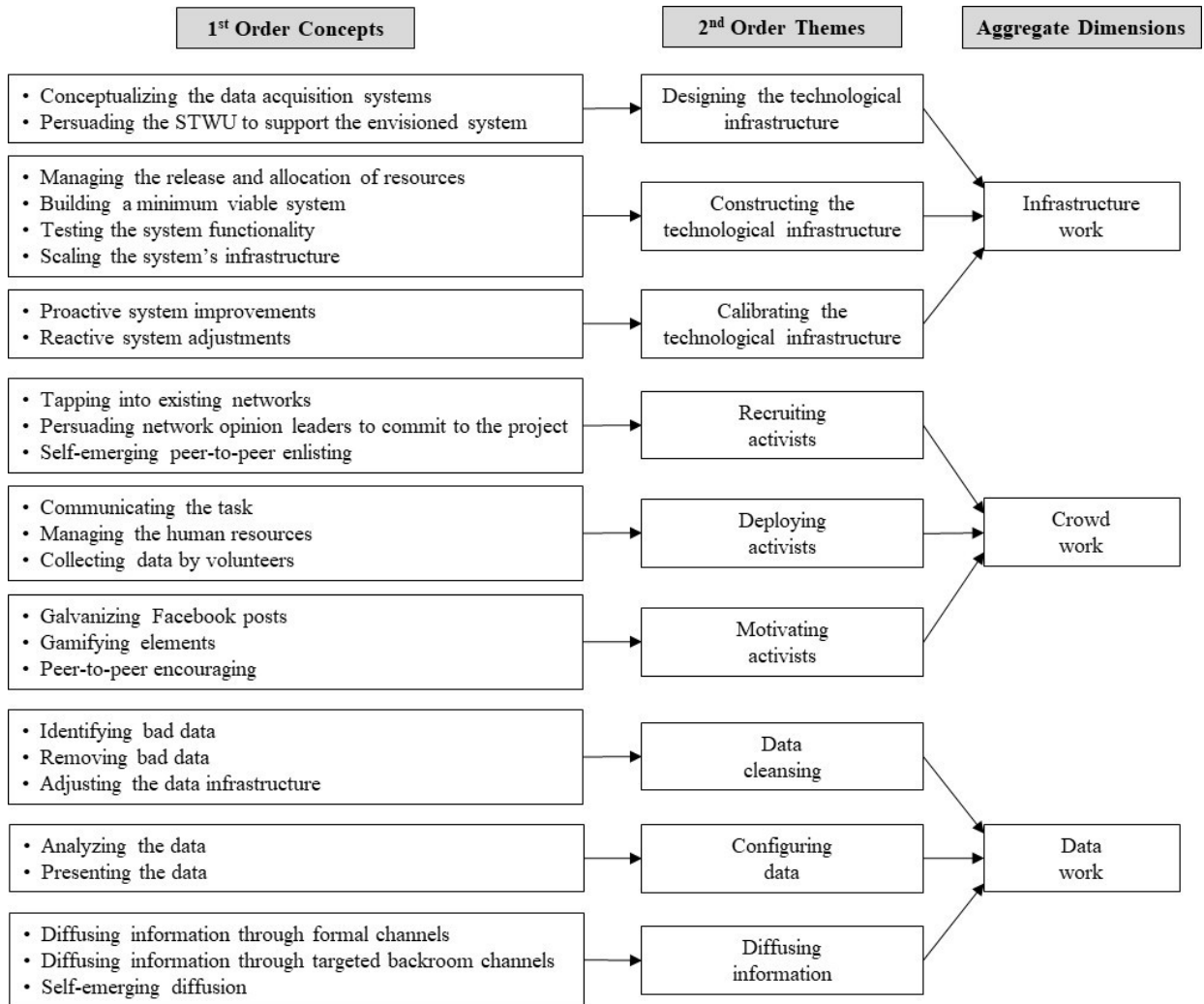


Fig. 2. Data structure.

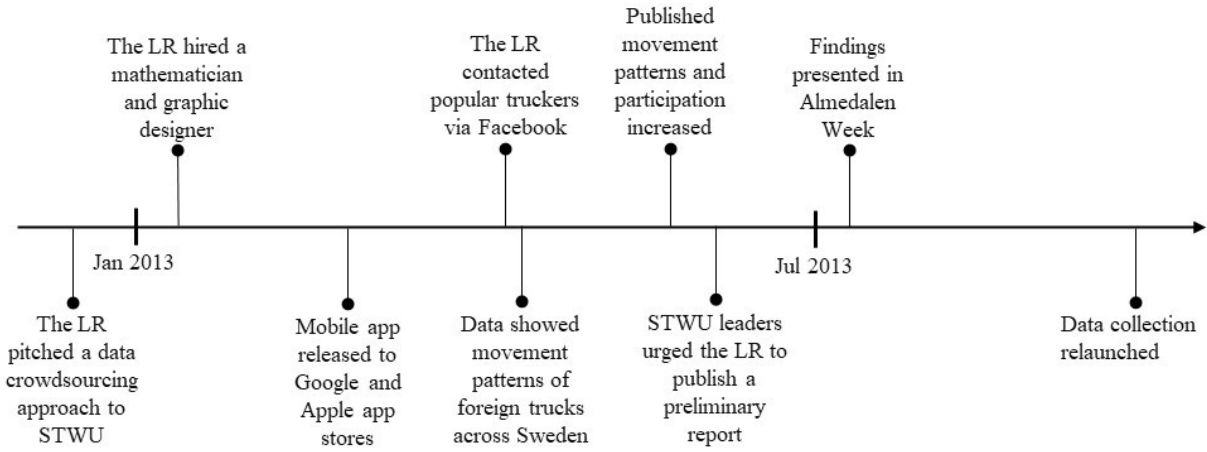


Fig. 3. Timeline of app development