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When crowdsourced data modernize local administrations. The case of the “DansMaRue” reporting system in Paris.

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Introduction

Introduced in the second half of the 2000s, reporting systems are now the flagship achievement of urban crowdsourcing technologies. These are digital tools that allow residents, via web or mobile applications, to report to their local authority a problem encountered in public space or to suggest an improvement. Initially limited to entrepreneurial solutions offered by Civic Tech companies, largest municipalities have progressively tended to build in-house their own version of these tools (Offenhuber, 2014). In most American metropolises, these reporting systems have continuously grown in importance over the 2010 decade, becoming today a crucial device for citizen-administration interactions when it comes to the maintenance or policing of public space. But because they generate massive volumes of reports (over a hundred thousand per month in cities like New-York or Los Angeles), those tools are also invested by “reform entrepreneurs” (Bezes, 2009, p.127) as instruments to fuel organisational transformations in local governments. In cities like Philadelphia, New-York or Boston, some empirical studies document how the reporting data collected are used to advance various modernisation projects: building a more “evidence-based” spatial distribution of maintenance resources (Nam et Pardo, 2014); instilling a “culture of service” within local administrations (Chekmarova, 2020); or strengthening work supervision procedures (Hartmann, Mainka et Stock, 2017).

This article takes seriously these empirical observations and sets out to systematically study the organisational impact of these data-driven modernization¹ undertakings. On the one hand, we study the administrative forms and ways of doing that emerge when massive and frequent data flux produced by citizens are integrated and processed in local governments. On the other hand, we explore how these data-driven organisational changes affect the maintenance agents whose missions are being redefined.

¹ The use in this article of the notion of “modernization” as opposed to that of “reform” is intended to emphasise that the transformations studied here have less to do with a conscious and coherent movement than with a series of heterogenous shifts that are still largely in the making.

Literature review

The dynamics of organisational change that interest us here are of course not limited to the case of reporting data and municipal administrations. They are part of a broader contemporary wave of modernisation centred on digital data (massive or not) and the algorithmic or visualisation technologies associated with them (Loebbecke et Picot, 2015).

In recent years, a data imperative has indeed been established in both private and public organisations (Fourcade and Healy, 2016). In line with the success of large digital companies, the transformation of organisations by (and for) data is now a very influential intellectual reference. Thus, in a growing number of organisations, cross-functional teams are being set up to carry out a data agenda, and demand for data specialists in operational departments are higher than ever. On the infrastructural side, information systems are being redesigned to promote the circulation of data, while tools for analysing and visualising large masses of data are multiplying. On a more prospective level, use cases for the implementation of algorithms, artificial intelligence and other data science related knowledge are being experimented in various business sectors.

As these modernisation undertakings stabilise and academic investigations on the subject accumulate, three different sets of effects of this data-driven projects are standing out. The first set of effects concerns organizational forms and ways of doing. Several authors emphasise that data projects lead to a strengthening of cross-functional logics of organizing (Clarke et Margetts, 2014) and to an increase in the importance of support functions in the organisational hierarchy (Jeannot et Maghin, 2019). We are also witnessing changes in the forms and logics of organisational control, which exhibit more comprehensiveness, instantaneity, opacity, and a disintermediation of managers (Kellogg, Valentine et Christin, 2020). Finally, several studies point to the fact that organisations equipped with data deploy renewed modes and rationalities of action (Fourcade et Gordon, 2020). Whether it is in the domain of workforce management and resource allocation (Benbouzid, 2019), service delivery (Dencik et al., 2019) or reputational monitoring (Kotras, 2020), the introduction of data technologies leads to a remodelling of business processes around the logic of real-time adaptation, risk prevention, and/or triaging.

A second set of effects then relates to the representations, identities, experiences and practices of workers caught up in this wave of data-driven modernisation. Several studies show first how the deployment of data analysis technologies tends to reduce the autonomy of workers whose activity is quantified, while at the same time giving rise to new forms of resistance (Kellogg, Valentine et Christin, 2020). The literature also identifies changes in professional expertise, following the arrival of new cognitive devices such as dynamic dashboards (Kitchin, Maalsen et McArdle, 2016) and new knowledge regimes borrowing from data science (Dorschel, 2021). Finally, concrete practices and professional roles of frontline and office workers alike are being redefined as decision-support tools question professional discretion and a growing number of tasks are being automated (Vogl et al., 2020).

Finally, these modernisation undertakings affect the beneficiaries/clients/targets of these data-driven organisations. First of all, several authors show how the accumulation and processing of ever larger masses of data intensify the surveillance of individuals, both by public institutions (Brayne, 2020) and private companies (Zuboff, 2019). However, this extension of control is unevenly distributed across society, focusing most often on already marginalised groups and in so doing reinforcing a range of pre-existing inequalities (Dubois, Paris et Weill,

2018 ; O’neil, 2016). These unequal dynamics are even amplified by the fact that a number of crucial life decisions (e.g access to credit, justice proceedings, benefits allocation) now increasingly rely on a series of automated and opaque data processing. Data-driven modernisation projects hence extend the territory of arbitrariness on both sides of the public/private boundary (Brayne et Christin, 2021).

On all of these levels however, one has to bear in mind that the different effects outlined are in no way systematic and homogenous across contexts. The concrete impacts of data-driven modernist projects are often very far from the initial revolutionary ambitions of the proponents of these technological tools (Poel, Meyer et Schroeder, 2018). The more empirically grounded studies thus regularly show how specific context of implementations and work practices contribute to shape the actual effects of these devices (Christin, 2017).

Aims

This article aims to contribute to this growing literature by studying what a specific type of data (crowdsourced data) can generate in a particular organisational context (local administrations) when mobilized in modernisation projects. In an approach at the crossroads of the sociology of quantification (Espeland et Stevens, 2008) and the sociology of administrations (Bezes, 2020), we seek to make sense of the way in which these reporting data produce (or not) a series of changes. To do so, we conduct a cognitive analysis of these data, which focuses on the conventions of quantification (Desrosières, 2014, p.38) on which they are based, as well as on the representations and potential for action that they contribute to. At the same time, we analyse reporting data and their uses through a social lens. We study the coalitions between political, administrative and citizen actors that are built around them, as well as the dynamics of power redistribution that they contribute to. Ultimately, the aim is to identify the conditions of possibility, the mechanisms and the limits that characterise the agency of such modernising endeavours centred on data produced by lay individuals. In doing so, the results are intended as situated contributions to the larger project of building an intermediate level theory of what data do in organisational settings (Christin, 2017).

In order to operationalise these various theoretical questions and ambitions, the article presents the results of a monograph on the “DansMaRue” (DMR) reporting system, which is active on the territory of the city of Paris. A unique case in the French and European landscape, this reporting system, launched in 2013, has experienced an exponential growth in terms of its use² and is currently fuelling several modernisation projects within the Parisian administration. After a brief presentation of the Parisian case and the history of the DMR system, the first part of the paper examines the organisational transformations that are attributable to the reporting data. We show that DMR data have significantly impacted both the modalities of bureaucratic control within the Parisian administration, and the rationalities of action and ways of doing of the maintenance services. In the second part, we examine the heterogeneous consequences these organisational transformations have internally.

² Between 2013 and 2021 the monthly number of reports has increased more than tenfold, exceeding 80,000. These volumes of reporting data make “DansMaRue” one of the most used platforms in the world, competing at the level of metropolises like Los Angeles or New-York.

Methods

This article is based on an extensive empirical investigation conducted between July 2019 and May 2020, expanded by an ongoing, albeit more distant, monitoring of the developments of the DMR reporting system until September 2021. Based on a campaign of 22 semi-structured interviews, supplemented by three ethnographic observation sessions, the objective was to cover a wide panel of social and professional groups concerned by the DMR system: the civil servants in charge of the reporting system, the City Hall teams and elected officials, borough municipalities, managers and frontline workers in maintenance departments. For each of these sub-fields, a set of information was collected on the history of the development of the DMR device, on the actual uses that were made of the reporting data, on the possible conflicts and resistance that arose in the process.

Case study background

The idea of internally developing a reporting app for the City of Paris emerged at the end of 2011 within the department in charge of IT and user relation of the Direction of Urban Cleanliness (DPE). These reflexions were held in anticipation of the appearance in Paris of a reporting system like the one that was active in the British capital at the time: FixMyStreet. This citizen-based reporting system functioned essentially as a tool for denouncing the inaction of the authorities and did not therefore allow London's administrations to easily collect and resolve the reports. This meant that maintenance departments ran the risk of being inundated with publicly visible complaints from unhappy residents to which they could provide no systematic answer.

The case of FixMyStreet thus made the IT team at the DPE aware of the political risk that such reporting tools could pose to the public reputation of their colleagues' actions. That's how the idea of preventively developing an administrative-based reporting system was born. The DMR app was then designed according to a few key technical principles that ensured reports would be easily manageable by operational teams and less politically sensitive: closed nomenclature, no public mapping of reports, automatic distribution of reports to the maintenance departments concerned.

Originally, the DMR system was thus created as a simple add-on to municipal maintenance policies, serving above all as a safety valve for the discontent of Parisians most concerned about the state of public space. However, over the years, the reporting system left this marginal position and gain in importance within the City of Paris. This rise is largely due to the considerable increase in the number of reports over the decade from a few thousand monthly reports when the application was launched to more than 90,000 monthly reports in September 2021. As a result, the application has now become a central instrument in the municipality's user relations policy. While it remained relatively discreet about this tool at the beginning, the City now systematically positions the application as the number one contact channel for issues relating to public space.

Results

Data-driven organisational transformation in the Parisian administration: between old trends and new dynamics

In this part, we focus on two major dynamics of organisational transformation that followed the rise in importance of DMR data within the Parisian administration. The first entails the ways in which public space maintenance activities are structured. The second organisational transformation entails renewed modalities of bureaucratic control. In both cases, we will make sense of the processes through which the crowdsourced data lead to these dynamics of change. In doing so we will highlight the interplay between institutional, contextual, and sociotechnical mechanisms. We will in addition discuss the extent to which these data-driven transformations operate by continuity, hybridization, or disruption with pre-existing organisational logics.

Ways of doing and modes of organizing of maintenance activities

Historically, public space maintenance activities have been organised according to political and administrative planning documents that order the actions of maintenance teams on a geographical and temporal level. The activities of the decentralised services of the DPE are structured, for example, around a Cleanliness Plan. Combining the experiential knowledge of field workers about their work (urban space and its degradation) with the political concerns of the borough councils, this document establishes a weekly schedule that defines, for each subdivision of the Parisian territory, the amount of maintenance to be administered in the form of sweeping rounds or the use of washing machines. Re-evaluated at the beginning and halfway through each term of office, the stated objective of this mode of functioning is to provide the same level of cleanliness throughout Paris.

These logics of functioning and ways of doing have been however challenged in the recent years, concomitantly to the rise in importance of the DMR system and its data in the administrative machinery. To understand how this happened, three sets of mechanisms must be integrated to the analysis. The first one involves the Parisian political context around cleanliness issues at the end of the 2010 decade, notably in the coming months (and since) the municipal election of June 2020. The cleanliness of the capital has long been an important issue in the Parisian public debate. Since the 1960s, the dissatisfaction of Parisians with the maintenance of their living environment has been regularly highlighted in opinion polls or journalistic reports (Prost, 2006). However, the sequence that began around the mid mandate is different from the previous ones in the intensity of the criticism addressed at the municipality. Through a considerable multiplication of articles in the press, comments on social media and statements by political figures, the 'disastrous' state of the public space was placed at the centre of the Parisian public debate. The city's action was denounced as insufficient and ineffective, and the critics were particularly seeking to delegitimise the figure of Mayor Anne Hidalgo. This political context destabilised the municipal team, which found itself obliged to react to the criticism and defend its public image. Existing ways of organising maintenance activities were thus no longer considered as untouchable and Parisian decision-makers became open to potential changes.

This political window of opportunity was then seized by a team of “reform entrepreneur” who invested the DMR system and its data as an instrument of change. Positioned within the “General Secretariat” at City Hall, these civil servants were part of “smart and sustainable city” mission, responsible for a series of cross-cutting digital projects. By combining technical, political, administrative and strategic expertise, these civil servants gradually built up legitimacy with both the cabinets of the City Hall and the staffs of the operational departments (Zaza, 2016). Operating like an independent agency, relying on a small team capable of responding urgently to a public order and overcoming certain traditional administrative obstacles, these civil servants have gradually become key resources for elected officials. Building on their institutional base, they have been deploying various. But these digital/data reformers don’t seem to adhere to any well defined and most of their concrete actions depends on the technical devices available and the policy problem at hand. In the case of the modes of organising of maintenance activities, crucially, the way this broad reformist ambition was materialised into a precise orientation of change was shaped by two qualities of the DMR data: its spatial (granularity) and temporal (frequency) richness.

This dual technical quality of DMR data was leverage into several concrete sociotechnical endeavours. Under the impetus of officials from the General Secretariat, diverse technical tools and professional practices have indeed been developed to increase the weight of DMR data in the organisation of maintenance activities. Within the DPE, for example, the managers of the territorial departments regularly receive heat maps summarising the spatial distribution of different categories of reports in their district. The aim is to provide these managers with a continuously updated “*field vision*” from which to amend the thematic and territorial priorities of the Cleanliness Plan if necessary. In the same way, the municipal police receives representations of reporting data in the form of hotspots in order to identify “*incivility corners*” previously unknown to the services. These new expertise supports are intended to make public space maintenance and policing policies more reactive. By equipping operational managers with maps of reports, the aim is to base administrative intervention on Parisian territory more on the (changing) needs of Parisians as they transpire from the reports collected.

*“In concrete terms, with DansMaRue, we say to the agents: ‘now you will do your missions according to the number of DansMaRue reports, and no longer according to the routes you decided to follow ten years ago and which have not changed since then’. More flexibility is required to be more reactive and not to let a situation get worse.”*³

*“There comes a time when you have to adapt the means to the problem at stake, you can't always hide behind a plan. So if the way I organise myself brings a plus - if I have fewer complaints about a subject through DansMaRue - then that's a sign that I'm going in the right direction, I'm going in the right direction in terms of matching the means implemented with the expectations of Parisians. With DansMaRue we can be proactive in my opinion”*⁴

In parallel to these first achievements, the Parisian executive has been working on the development of decision support tools based on the reporting data. These projects are based on the hypothesis that DMR data constitute “*weak signals*”, i.e. precursory signs of the emergence of phenomena affecting Parisian public space that are not yet sufficiently advanced to be distinguishable by the services, but that the use of statistical techniques from the data sciences

³ Interview with an attaché in the office of the First Deputy Mayor, 5 May 2020.

⁴ Interview with the co-founder of the DMR scheme, General Secretariat, 3 October 2019.

can allow to detect. By exploiting these “*weak signals*”, maintenance activities would no longer be merely corrective, but would also seek to anticipate the occurrence of anomalies and implement preventive cleaning or repression. In concrete terms, this means equipping operational managers with business intelligence devices, which apply various calculation (spatial analysis, regression, automated learning) and visualisation operations to DMR data sets. The idea is to obtain a series of “*indicators likely to have an impact on the field organisation*”⁵ and to make them accessible on a continuous basis and in an easily understandable format. The aim of all these statistical devices is to put local managers and team leaders in a position to identify for themselves the territories and issues of concern that emerge from the DMR data and to adapt, if necessary, their arrangements in real time to deal with them.

All in all, those data-driven modernisation projects contribute to refine the principles underlying maintenance activities. We are moving from a configuration in which the stated objective is to intervene over the entire Parisian territory at more or less frequent intervals to provide the same cleanliness service, to another (still in the making) in which priority is given to the areas in which user demands are the strongest. In such configuration, the functioning of the maintenance service becomes less a matter of pre-defined procedures and more a question of triaging and reactivity.

Modalities of bureaucratic control

The reporting data also fuelled a second dynamics of change within the Parisian maintenance service: the transformation of bureaucratic control procedures. Outside of projects involving the transformation of work practices, civil servants from the Secretariat General indeed leveraged DMR data to make maintenance services more open to supervision and control by elected officials in Paris. This reformist ambition was this time not originally elaborated by the digital/data reformers mentioned previously but emerged directly from Parisian elected officials within City Hall. The latter indeed felt the need to make the Parisian administration more legible to political scrutiny, where until then there was a feeling of opacity:

*“The City of Paris is an ‘administrative monster’. In this kind of big machine, it's very difficult for politicians to have precise indicators of the reality on the ground. And what's great about DansMaRue is that it's a tool that allows you to have a somewhat objective view.”*⁶

Because it is separated from the decentralised services by several hierarchical levels (central services for the administrative aspect, and borough councils for the political aspect), the municipal team does not have direct access to the daily activity of its administration. The vision of the work of the maintenance services available to City Hall has therefore traditionally been dependent on the feedback provided by the very entities that are being evaluated. As a result, the Parisian administrative system has tended to be relatively fragmented, with decentralized maintenance service enjoying a strong autonomy vis-à-vis the political and administrative centre.

It is in this institutional context that DMR data were leveraged as a tool to renew the existing modalities of institutional control and integration, which were until then essentially

⁵ Ibid.

⁶ Interview with an attaché in the office of the First Deputy Mayor, 5 May 2020.

based on direct hierarchical supervision and loose reporting of information. This specific choice of instrumentation was made possible by a combination of two key technical features associated with DansMaRue system and its data. Firstly, the design of the informational system of the reporting device (a central database connected to the mobile app interface through an API) allows for an automatic and centralised collection, storage and processing of information that used to be only available to the operational teams that produce them. When a report is codified as resolved by a maintenance worker, its status is automatically updated in the central database and the information becomes widely accessible across the organisation. On top of that, the type of information produced has a particularity of being traceable back to particular maintenance team or even individual worker. Before that, reporting sheets filled by shift supervisors had to be compiled with each other to travel up the hierarchical ladder. In the end, what was produced was an aggregated view of maintenance activities, with little possibility to zoom in on the actions of particular subpart of the administrative apparatus.

Building on this dual quality of centrality and individualisation associated to DMR data, reformers from the General Secretariat have been implementing since 2018 a series of data-driven modernisation work. They have firstly enacted new professional guidelines for frontline workers around the use of the DMR app and its associated back-office software. DansMaRue has become an "internal communication platform" that agents are strongly encouraged to use when they want to record or transmit every information about maintenance actions. For example, maintenance agents are invited to use a professional version of the DMR application to document with a photograph, location and classification every single cleaning action they undertook during their field tour. This repositioning of the DMR app, from a tool built to facilitate the transmission of citizen claims to a professional tool for maintenance agents, thus implies a digitalization of pre-existing information flows that were inscribed into very heterogeneous formats (emails, post-its, sms, telephone exchanges, spreadsheets, etc.):

“Interviewer: But before you used to report to your hierarchy with paper sheets, no? Why did you move to reporting through using the DMR app?”

Team manager: It's because now they want everything that is handled by [name of his team] to be reported, to be seen at the top, so that they can extract it and make statistics on our specific actions. I'm not going to go up to the executive team of the DPE with my handwritten mission sheets [laughs]”⁷

The DMR team in the General Secretariat then leveraged this unprecedented pool of data to renew the activity dashboard used by City Hall teams to monitor administrative proceedings. A new set of statistical graphs and maps have been added to summarize for each local decentralised service the average time taken to deal with each category of reported items. These statistical indicators are used by the staff of elected officials to monitor the quality of service provided to Parisians and to call to order, if necessary, the departments and local teams that show 'abnormal' time trends.

“For each territorial section we do some statistical assessments of the DansMaRue's reports and we break them down according to the specific categories. The idea is both to help them, and to be

⁷ Interview with a team leader of a special unit dedicated to “urgent” cleanliness issue, DPE, 3 September 2019

*able to say: 'Well, how come the reports on littering have skyrocket lately? Why is our respond time on the subject of overflowing bins lagging behind? This allows us to spot any malfunctions. We keep them informed and we keep ourselves informed with the reports.'*⁸

Such bureaucratic control procedures through statistical indicators obviously did not appear with the DMR data. They were notably already at the heart of previous neo-managerial inspired reform “Paris Clean together”⁹. However, in practice, the municipal team's reformist project quickly came up against various strategies of resistance and avoidance of quantification on the part of field agents and their territorial managers (Le Lay et Corteel, 2014). The uses of DMR data described above thus revive the disappointed ambitions of the Parisian executive regarding the supervision of maintenance services. However, in their discourse and modernisation practices, the officials of the Parisian executive are more modest than in previous waves of reform. More than strict control through numbers (Galès, 2016), the renewed modality of bureaucratic control is about making the administrative functioning legible at a distance and “*dispelling the fog*”¹⁰ that envelops the daily work of the field services.

In comparison to the neo-managerial uses of quantification, the data-driven modernization carried out in the Parisian case also emphasizes a second modality of bureaucratic control, based on the dissemination of self-monitoring tools for territorial managers. Since the summer of 2019, the General Secretariat's team of reformers has been rolling out a series of efforts to encourage managers of decentralised services to regularly consult the reporting data concerning their own teams. One of the workstreams consists in particular in equipping the managers of the territorial directorates with the same type of interactive dashboard tools already mentioned before (Business Intelligence tools), which make it possible to continuously view statistics and maps drawn from DMR data. This decentralisation of statistical representation capacities is part of a desire to renew the logic and methods of control by number within the Parisian administration:

*“The days when we had a central service that made analyses and sent them to everyone, and then the field services received the word from above, saying "oh, I've been pinned down, they saw that I had more anomalies than the others", are over. Now it's a question of giving the agents the means to manage themselves.”*¹¹

With the reporting data, the General Secretariat intends to make the transition from a time when statistics were used solely for disciplinary purposes (to “*pinpoint*” non-performing teams) to a time when statistics are also becoming a support from which staff members can improve themselves in complete independence. Thus, the control exercised by the quantification devices is no longer applied from the outside but is internalised. DMR data must become instruments through which territorial managers will be able to self-question the validity of their organisation and professional practices. This data-enhanced form of professional consciousness operates through a mechanism of nudging by number that resembled what has been found in research studying self-quantification practices (Dagiral et al., 2019).

⁸ Interview with the Deputy Head of the Research and Statistical department, DPE, 12 Novembre 2019.

⁹ This reform was initiated during Bertrand Delanoë's first mayoral term (2001-2008) and aimed to transform the management and organisation of maintenance services through the introduction of neo-managerial instruments (notably performance contracts between City Hall and each administrative departments).

¹⁰ Interview with the Deputy Mayor in charge of cleanliness, Hôtel de Ville, 3 September 2019.

¹¹ Interview with the co-founder of the DMR scheme, General Secretariat, 3 October 2019.

How reporting data affect maintenance civil servants: a tale of disruption and resistance

In the second part, we look at the effect of these administrative transformations on the individuals and professional groups whose work experience is being redefined by the two dynamics of change outlined above. The aim is to examine the way in which these administrative transformations are received by the different entities they affect, while paying attention to the possible strategies of resistance that may emerge. We will look successively at the effects on maintenance fieldworkers and their supervisors, before moving on to the case of middle managers.

Effects on maintenance field agents

The transformation of how maintenance work is being organised, from a model centred on planification to an increasing importance given to data-driven logics of reactivity and triaging, generates two types of effects on the work experience of maintenance fields agents. First in a context of pressure on the human and material resources allocated to maintenance services, it generates a significant increase of their daily workload. From the point of view of operational services, Planning had the advantage of allowing to adapt the agents tasks to the means available, the latter being judged less on the number of anomalies dealt with than on the appropriate coverage of pre-identified territories. In a setting where reporting data guides public intervention, considerations about the adequacy between resources and planned actions fall behind the imperative of resolving as many complaints as possible as quickly as possible. Increasing the hourly productivity of maintenance staff inevitably becomes the adjustment variable for dealing with the increasing flux of reports:

“The DansMaRue app, it’s kind of good without being good. [...] Now we have too many reports, and we get duplicates... I spend my time chasing reports. At the beginning it was fine, but now we’re really overwhelmed. [...] Frankly, I think that they should remove access to the application from Parisians and that it should only be people from the town hall who are in charge of reporting so that we can organise ourselves quietly like we used to do”¹²

Then the transformation of how maintenance work is being organised weakens a key aspect of the maintenance workers’ professional identity: their territorialized expertise. One structuring dimension of their professional sense of self-worth comes historically from the knowledge and social ties that are built through years of repetitive intervention in the same urban space (Mourad, 2018). The planification documents that traditionally organise maintenance activities precisely acknowledge this expertise and try to valorise the input of fieldworkers. But through the DMR application this professional expertise gets challenged by the experiential knowledge of lay individuals that report public space anomalies. Therefore, as maintenance activities become more and more organised according to external output, the professional identity of those workers is undermined, and they tend to express as a result discontent and hostility to the on-going changes:

“The maintenance supervisor often says to himself ‘I know my sector, I know how I should organise myself, I don’t need to follow up on reports from people who know nothing of the job.

¹² Interview with a fieldworker in charge of cleaning illegal posting, 12 February 2020.

So there's a lot of explaining to be done because it touches a sensitive point with agents who are very proud of their 'field knowledge' ...»¹³

"Sometimes I feel like things are going a bit too far...like I've worked 20 years in this district I know where my 'hot-spots' are, I don't need no maps or figures telling me how I should plan my day thank you...It even feels a bit disrespectful you know, as if I needed to re-learn my own job..."¹⁴

Then, when it comes to the new modalities of bureaucratic control, maintenance agents are effectively sensing that their activities are monitored more closely by their hierarchy and the Parisian political executive. From the moment the reporting system was launched, and periodically since then, the maintenance staffs and their trade union leaders have explicitly criticised what they understand as an attempt to make the work of maintenance agents more legible:

"When you say to field workers, 'from now on, the deputy mayor of the cleanliness department will know at all times how many things you have done or not done'... you get the unions coming in and saying, 'but wait, wouldn't this be a tool for monitoring the quality of the workers' work?'"¹⁵

"We get maintenance supervisor wondering whether, in the end, collecting reports from Parisian on the existence of an unresolved pothole is not a way of denouncing them, of showing that they are bad at their job."¹⁶

This diffused feeling of tracking does not however seem to produce the type of normalised subjectivity and compliant behaviours often assumed in the literature on disciplinary devices. During the interviews, no maintenance field agents indeed expressed significant fear that their job would be endangered by the new data-driven supervision scheme in play.

In practice, these various set of effects are often modulated by how maintenance workers concretely receive and often oppose the changes that are brought upon them. Through various resistance strategies, they tend to preserve for themselves space of professional autonomy and thus limit the scope of the data-driven transformations associated with the DMR system. During our fieldwork, we have first notice that many maintenance teams neutralize City Hall's modernising prescriptions by simply leaving aside the tools and ways of doing build around the crowdsourced reports. To justify their behaviour, these interviewees most often criticize the informational value that this new type of data is supposed to provide. Arguing that these reports provide redundant or biased intel, some maintenance supervisors prefer to stick to their pre-existing ways of working:

"Oh no, no, we don't organise ourselves according to DansMaRue. We don't need to have the hotspots pointed out to us [laughs]. It's known things, we already know where we're being sent. We already know about 80% of it. [...] For us, it doesn't change anything. It's a tool that was created to respond to the demands of Parisians and to show that we are proactive. [...] We

¹³ Interview with the co-founder of the DMR scheme, General Secretariat, 3 October 2019.

¹⁴ Interview with a maintenance supervisor, DPE, 7 Novembre 2019.

¹⁵ Interview with an attaché in the office of the First Deputy Mayor, 5 May 2020.

¹⁶ Interview with the Deputy Head of the Research and Statistical department, DPE, 12 Novembre 2019.

*follow our traditional patrol plan that is sectorised according to the days of the week and the shifts schedule. That's the one that is posted on the wall there [shows a paper map]."*¹⁷

The discrepancy between the ambitions of the Parisian executive and the actual effects reporting data have on maintenance services of maintenance can also stem from another type of resistance practices. Frontline maintenance workers, especially those in charge of urban cleanliness, tend in their day-to-day practices to distort the modalities of bureaucratic control analysed above. In our interviews, we found that a lot of these civil servants were fine with the new methods of data-driven supervision associated with DMR data, and even saw them as an opportunity to legitimise themselves within the Parisian administrative apparatus:

*"When we respond to a report and mark it as resolved, we first warn the resident that his or her request has been dealt with, but since we fill it through our back office we also show our hierarchy, our elected representatives, and the Mayor of Paris, that the resources they have put in place are effective. This way we can justify, show and highlight the work that is done on a daily basis. We want them to know that we are not just twiddling your thumbs all day you know [laughs]"*¹⁸

This logic of showcasing oneself as being essential through the production of DMR data goes so far as to influence the type of anomalies that maintenance teams handle as a priority. In fact, between two reported anomalies, it is frequent that these civil servants find themselves multiplying the treatment of anomalies that are not time-consuming to resolve. Changing bags in street litter bins and sweeping up dog messes are therefore very much at the top of the list of items handled by these teams. Without going so far as "making-up statistics" (Didier, 2011) or "gaming" the supervision system (Hood, 2006), frontline supervisors thus find themselves shifting their scope of action in order to give the best possible statistical image. The "reactivity" (Espeland et Sauder, 2007) shown by these officers in the face of data-driven controls of their activity undermines some of the ambitions of the Parisian executive in terms of the modernisation of maintenance services. Indeed, it seems clear that this concentration of the work of cleanliness teams on street litter and dog messes is a significant departure from the ideals of an efficient and reflective administration that the Parisian executive intended to promote through the DMR system. This example shows the type of "bureaucratic vicious circle" (Crozier, 1963) that data-driven control can generate in organisations.

Effects on middle management

As introduced previously, the transformations around the introduction of the DMR system and its data also affect the managers in charge of the territorial maintenance services. Those are managers that occupy an intermediary position in the Parisian administration, between operational teams that implement day-to-day maintenance actions and executive teams that elaborate policy goals with elected officials in City Hall. Their role traditionally centres around issues of human resources management and the handling of sensitive public relations cases. They are rarely involved directly in the practicalities of how the maintenance teams they supervise plan and conduct their tasks. With the data-driven changes affecting both maintenance organizing and professional supervision, the scope of responsibilities of these civil servants is however expanding. It is now implicitly expected of them that they leverage the

¹⁷ Interview with the supervisor of a team of municipal policemen in charge of fighting incivility in public spaces, DPSP, 14 October 2019.

¹⁸ Interview with a team leader of a special unit dedicated to "urgent" cleanliness issue, DPE, 3 September 2019.

various visualisation and statistical tools made available to them to take a more active part in the ways of doing and modes of functioning of their teams. The modernisation efforts around DMR data reshape the “professional consciousness” of these professional by adding a form of “care of the self” (Foucault, 2012, p.10) that was previously not part of the job of these middle managers. They now should build on the data-visualisation interfaces at their disposal to question how their frontline teams operate and seek to amend them if needed:

“We want managers to ask themselves: ‘We never had a problem with this type of anomaly and now it's starting to happen, what's going on?’, and then proceed with ‘Well, have our organisation changed, is there something we don't do anymore, is there something we used to do better?’ [...] DansMaRue should allow officers to have feedback on their organisation in the field so that they can adapt or rationalise if necessary.”¹⁹

The interviews highlight that in practice, this new organisational mandate is subject to contrasting reception within the Parisian administration. On one hand, for some managers, this new organisational mandate generates scepticism and unease. These managers resist the type of data-enhanced professional consciousness that City Hall reformers hope to instil into them. In their day-to-day work, they pay little attention to the interactive dashboards monitoring how their teams are faring in terms of handling of DMR reports. To legitimize this omission, they often refer to a lack of skills, time and resources, or mention that this type of request falls outside of the scope of their activity:

“Yes, we have a kind of dashboard, I think, that we can see... Well, I don't do statistics like ‘I have so many messages for such and such a street, it concerns such and such a sector, so I have to change such and such a thing’. I let my maintenance supervisors solve the problems according to their feeling and experience. Statistics and all that is not my field, my job is to know my sector and make sure that my teams on the ground have what they need [laughs a bit uncomfortably].”²⁰

In our inquiry, the managers that exhibit these reluctant behaviours share two main characteristics: they are at the end tail of their career, and they started their professional journey as frontline maintenance agents. During their previous professional positions they have been socialized to the representations and ways of doing associated with planned maintenance work. They have experienced first-hand the stakes and complexity of this localised interventions and value the professional autonomy granted to territorial teams. For all these reasons, they are reluctant to question the professional practices of their former colleagues, especially via data-driven supervision tools. The perspective of their retirement also reduces the incentive to comply to City Hall’s injunctions to secure institutional rewards.

On the other hand, we found in the interviews intermediary managers that have fully embraced this data-enhanced professional consciousness. The following case of one DPE section manager from the north of Paris exemplifies this logic:

“I find these [heat] maps very interesting. It allows us to adapt our resources, to redeploy them a little. You have to manage the staff according to the phenomena that occur, otherwise you don't meet the expectations of Parisians. [...] For me, it allows me to optimise my teams to make

¹⁹ Interview with the co-founder of the DMR scheme, General Secretariat, 3 October 2019.

²⁰ Interview with an operational manager in charge of a territorial section at the DPE, 12 September 2019

sure I'm always in the right place at the right time [...] Anything that allows me to think a little bit about my organisation is good to take.”²¹

This manager relies on the heat maps provided to him to assess the adequacy of his staffing levels and resources in relation to the spatial distribution of anomalies. DMR reports are for him a support for reflective feedback on the organisation of his department. He enthusiastically steps out of his pre-defined institutional role to get involve in the work of his operational teams. To him, urban maintenance is less about the application of a well-defined cleaning plan to a territory, and more an activity that requires regular adaptation in order to be “*always in the right place at the right time*”. Middle managers that exhibit this type of behaviour tend to be relatively early in their career (second or third position) and have no first-hand experience of maintenance work. As a result these civil servants are more willing to carry the data-driven modernist torch championed by City Hall. For them, being able to showcase a mastering of innovative professional devices is key to maximise their chance at upward professional mobility²². Moreover, the fact that they have experienced only administrative and managerial positions reduces their proximity and allegiance to the ways of doing of field teams and makes them more prone to question their handling of daily operations

Conclusion

Through the case of the DMR reporting system, we have shown that the conduct of modernising endeavours around crowdsourcing data can produce two set of organisational transformations. The first one concerns the rationales for action and the ways in which public space maintenance activities are structured. In a where maintenance policies were under acute criticism, the granularity and frequency associated with ever increasing flow of reports was leveraged by City Hall to produce a relative shift in the value system that guides maintenance policies: the objective is no longer so much to provide a uniform cleanliness result but rather to prioritise the areas where users' demands are most pressing. Through the use of various visualisation techniques and interfaces, DMR data are turned into "weak signals" on the condition of urban space and thus reorient maintenance policies around logics of triaging and reactivity. Because the reporting system allows to collect and process in a centralised fashion disaggregated information on the activities of maintenance teams, the Parisian executive has also mobilised reporting data to feed new tools of professional supervision. In themselves, DMR data lead, because of their individualisation and frequency, to an increase of the legibility of frontline workers activities across hierarchical and organisational boundaries. Coupled with certain visualisation technologies (Business Intelligence dashboards), this data also has a nudging effect on middle managers, inviting them to embrace more continuous and in-depth evaluation practices toward their teams.

Our exploration of the Parisian case also led us to discuss the effects that these data-driven dynamics of change have on different professional groups within these municipal administrations. We saw that maintenance field workers face an increase in their workload and a questioning of their professional expertise. Through various adaptation/resistance strategies,

²¹ Interview with the director of a northern Borough cleanliness department, DPE, 18 Mai 2020

²² During the span of our field inquiry (2 years), two of the more proactive middle managers went on to take on top leadership positions within their respective Parisian administration.

these agents are however building spaces of autonomy in this new environment, which led in some cases to defuse a large part of the data-driven transformations envisioned by the municipal executive. On the side of the middle management, there is an increased internalisation of data-driven evaluation practices, which leads to the emergence of an original professional “care of the self”. But the extent of these behavioural changes depends heavily on the managers professional trajectory.

On a broader level, our study highlights three set of mechanisms that are worth looking at when explaining what data do in organisational settings. First it points out how different institutional configurations shape the types of modernist endeavours that data come to instrument. In the DMR case, it’s the encounter between a political crisis, a legacy of incomplete managerialist past reforms, and the emergence of a specific type of reform entrepreneurs that led to define the type of data-driven organisational changes that were set in motion. Then our study stresses that depending on their quantification qualities, data can possess different types of transformative agency. Here, it’s the temporal and spatial richness of DMR data, its disaggregation to specific maintenance teams, and its centralised infrastructure of collection/processing that made possible the reinvention of the maintenance modes of organising and modalities of bureaucratic control. Finally, this work shows how local professional practices have the power to modulate, reorient or neutralize the effective organisational changes that are brought along around data technologies.

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