Thinking with Maintenance and Repair to Account for Obduracy of Macro Orders

The Case of Informational Migration Management in Europe

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Abstract: Ongoing work and theorizing in the field of STS has made important progress in conceptualizing agency, and stressing contingency and dynamic processes in science, technology and society. However, this focus on case studies and micro dynamics has left the field ill equipped to account for obduracy and stability. We suggest a framework for understanding obduracy in STS can be found by reassessing various insights from the social sciences and STS on the processes of maintenance and repair (M&R). To illustrate our framework, we offer a concrete example in one of Europe's crises: alterity processing or the collection of practices and infrastructures to manage Europe's 'migration crisis' (Pelizza 2019). We make explicit how maintenance and repair can be used to consider the obduracy of large scale orders without losing the empirical edge that the STS offers.

Keywords: maintenance; repair; migration management; alterity processing; Europe; obduracy.

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1. Introduction

In 2015 the increased collective mobility of third country nationals travelling to Europe, often without the required visa, was dubbed "Europe's migration crisis" (Evans 2015; Park 2015). This labelling has since persisted (Islam 2020). The conceptualization of crisis was not only

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adopted in media accounts on migration. Formal governing bodies of the European Union (EU)[1] embraced it, as well. The European Commission (EC), for example, adopted a new Agenda for Migration (European Commission 2015b), which maintained the crisis frame and introduced the so called "Hotspot approach" to streamline methods of migration management through "informational and bureaucratic standardization" (Pelizza 2020, 269). The Hotspot approach is illustrative of existing tensions between member states (MSs) and the EC triggered by the informational management of the outer edges of Europe. Infringement decisions, for example, have revealed tensions which were originated by the pressures set on frontline European countries who received the most people (Geddes 2019; European Council 2015a; 2015b). All in all, the onset of the "migration crisis" has laid bare the fragility of the EU project in a key area of integration such us internal affairs and security.

Scholars have questioned the nature of what is allegedly in crisis (Tazzioli and De Genova 2016). What does it mean that Europe is facing a crisis? This expression assumes the EU as a solid, obdurate construction that is being put under threat by people on the move. Scholars have conceived of the mobility of non-Europeans to Europe as a challenge to European stability (Mayblin and Turner 2021). They follow public and policy debates on migration and highlight the ways migration is problematized, and how certain citizenship laws and integration policies are set up to face this issue. The stability of the EU, or of MSs, is here conceived as something that needs to be reproduced through social processes (De Koning et al. 2018; Bracke and Hernandez Aguillar 2020). Differently, with this paper we aim to outline a framework which posits fragility to be a key characteristic of the European socio-material construct, highlighting the material and epistemic dynamics by which the EU is kept stable, to account for the obduracy of Europe. Obduracy is here taken as its hardened quality to persist and remain stable. We aim to investigate the constant work of maintenance that allows a complex set of organizations and scales like the EU to hold together amidst migration-related tensions. In particular, in this paper we wish to explore the extent to which the social sciences and in particular the Science and Technology Studies (STS) literature on maintenance and repair (M&R) can contribute insights to the effort of framing the current European condition. We hypothesize that if the ongoing migration "crisis" has up to now avoided the breaking point, this might be due to a work of M&R.

We suggest that a novel, potentially ground-breaking field of research opens when looking at European institutional relationships (e.g., between EC and MSs, as well as among MSs and International Organizations) from the perspective of M&R. Assuming fragility and precariousness instead of stability allows focusing on the mediating agencies, tentative at-

tempts and unexpected developments that not only keep the EU going, but every time enact it as a diverse outcome amidst crises. This is clearly revealed when it comes to migration management, where migration is accounted for as an issue that can be efficiently managed through sociotechnical solutions and informational controls. Data infrastructures for migration management are indeed conceived of as efficient solutions promising to smoothen the process of asylum application and relocation across Europe (European Commission 2015a). While various systems of registration and data collection are deployed, integrated and standardized to the end of upkeeping the EU, what is maintained and repaired every time is a different outcome.

We thus wonder how data infrastructures and practices of migration management operate to maintain and repair institutional relationships. In Europe, the data-based management of migration goes back to the early Union's Treaties (Balch and Geddes 2011) and further intensified with the Hotspot approach (European Commission 2015a). As the rationale goes, digital data infrastructures are expected to make the process of asylum application, deportation or relocation across Europe more efficient and effective (Amoore and Raley 2017; Dijstelbloem and Meyer 2011). By so doing, we suggest that they also contribute to address the tensions between MSs and European agencies, data infrastructures being a crucial element in the work of maintenance and repair of the European order.

In what follows we first provide an "archeology" of the objects of inquiry of M&R in literature. Then, we discuss insights on M&R from sociology and STS, and the works on (data) infrastructures specifically. The potential of these conceptualizations to understand the M&R of Europe is then discussed against the field of migration management. Finally, we conclude by outlining the potential consequences of a M&R framework for the maintenance of macro orders.

2. Maintenance and Repair between Engineering and Social Sciences

Through a systematic analysis for M&R in scientific databases like Scopus, it clearly emerges that until the 1990s most works were published in engineering disciplines, where the analyses were focused on the material infrastructures of mobility. They mainly dealt with the practical cases of repair or maintenance of roads, highways or bus systems (Dutta and Maze 1989). Their driving interest mainly concerned the financial or economic aspects of M&R. From the 1990s on, maintenance of mobility and transport systems was discussed in combination with computer models. The introduction of computers in the literature on M&R did not only

take computers as objects to be maintained (Ganderton 1990); they were also conceived of as maintenance warning systems (Hudson et al. 1993;). Computers therefore emerged since the 1990s as tools supporting M&R. Still in the 1990s, journals in aviation business and commerce published the first articles on aircrafts M&R (Parke 1995). It is in this field that M&R are for the first time discussed in relation to some other values than economics. Tripp (1995), for example, discussed the cosmetic side of repairing an aircraft as a matter of aesthetics, whereas previous civil/transport engineering journals mostly discussed M&R as a necessary aspect to be modelled into optimization or financial models (Luxhoj and Jones 1986). Furthermore, aviation studies for the first time discussed the enacting potentialities of M&R. Bradley (1995), for example, discussed M&R as key sites where business relations can be established or strengthened.

M&R have remained important concepts in civil and transport engineering well into the present. However, from 2000 onward we see M&R being taken up by more heterogeneous disciplines. In environmental science and policy, for example, maintenance is conceptualized as important in reducing CO emissions produced by personal automobile vehicles (Wenzel 2001, 2003). Interest in maintenance as an environmental matter was often mentioned in engineering journals – or interdisciplinary journals in engineering and environment (Kazopoulo, Kaysi and El Fadel 2007). This entangling of engineering and environmental concerns was also evidenced in the notions of "forest maintenance", wherein "maintenance" is taken up as an important factor in relation to climate change (Rummer 2008; Platt, Veblen and Sherriff 2008). Around the same time, the notion of "boundary maintenance" arose even in journalism and communication journals (Bicket and Wall 2007, Wall and Bicket 2008), used to discuss the process by which journalists maintain or protect an authoritative position in the face of challenges to this authority, either through online challengers or globalization processes.

As such, around the early 2000s the notion of maintenance started to trickle to the social sciences and be referred to sociotechnical topics. We saw the emergence of studies which did not consider M&R to be purely material or physical activities, but guided and laden with moral and social norms and ideologies (Graham and Thrift 2007; Gregson, Metcalfe and Crewe 2009). M&R started to appear in relation to safety science, risk analysis and accident prevention (Lombardi et al. 2009; Hon, Chan & Wong 2010) – mirroring Beck's (1992) insights on risk management and the risk society – as well as in urban studies and geography (Jacobs & Cairns 2012; Chelcea and Pulay 2015). The use of M&R in these latter was often done in response or relation to Nigel Thrift's (2005; 2007) work which convincingly called for an analysis of the politics of M&R. It was

also often explicitly related to the work of Latour and STS more broadly: it emphasized the role of non-human actors and stressed emergence, contingency and unpredictability (Edensor 2011).

However, it is against the micro-sociology of everyday life that M&R dynamics have been predominantly framed. Studies in M&R in the social sciences, and STS in particular, adopted Garfinkel's (1967) conceptualization of social order as produced through and in everyday interactions. Ethnomethodology – seen as a microsociology focused on people's response to the breach of interactional order – was a resource to investigate the breakdowns of social order to which M&R are expected to react. As such, social studies in M&R became interested in conversation analysis (Schegloff, Jefferson and Sacks 1977), and – especially relevant for this overview – focused on "repair" as a category of analysis (Henke 1999). As in conversations, when breakdowns halt smooth interaction, thus requiring clarification or repair, so in sociotechnical M&R breakdowns are revealing of taken for granted assumptions.

This understanding of repair as indebted to ethnomethodology was especially adopted by Henke (1999), among others. He described the work of repairmen at his university and discussed how they engage in a situated activity of repair through tacit knowledge and networked practices. He points to the ways in which repair is not always material, or not only material, but can concern users' expectations towards an artifact. What Henke (1999, 65) describes as "repairing the costumer" or "people repair" points to the gap between actual workings and expectations, for example in the case of establishing whether it is the air conditioner that needs to be repaired, or the user that needs to be convinced that the air conditioner is not broken. Henke (1999:64) points to the ways technological equipment is used as an extension of a worker's body, describing the body and the used equipment as a network, which is set to work to repair technological infrastructures, but also expectations and demands from office workers – wherein the body is the link between the social and the material. Henke's work points to the myriad of ways in which "order" is (re-)enacted in workplace settings through the constant work of repairmen.

While Henke draws on these early STS insights and on analytically neglected forms of work (Hochschild 1983; Orr 1996), ethnomethodology is foundational to his attention to and conceptualization of M&R. This is particularly evident in his analytical effort to frontstage those activities which are usually kept in the backstage in everyday life. Henke transposed the theorizing on M&R in conversation and the situated organizing of order through conversations to account for the material, situated, networked and embodied practices of maintenance and repair. Given Henke's influence on more recent STS theorizing about M&R, it is not by chance that many contemporary studies are underpinned by an ethno-

methodological approach based on micro situations, everyday interactions and contingency (Sormani, Strebel and Bovet 2015; Denis, Mongili and Pontille 2015).

3. Strands of M&R in Social Sciences and STS

We suggest that thinking with sociotechnical M&R opens up possibilities for theorizing about fragility and precariousness of institutional enactment from an STS perspective. As Denis, Mongili and Pontille (2015) point out, analyzing M&R can expand our understandings of sociotechnical work and object agency, and can help us rethinking the dynamics of innovation (Russell and Vinsel 2016), institutions (Sims and Henke 2012), power (Graham and Thrift 2007; Barnes 2017; Ureta 2014), the narratives and imaginaries of technology (Jackson 2014), as well as the careful, but potentially exploitative relations people have with their (built) environment (Mattern 2018; Puig de la Bellacasa 2011) and the ontology (Denis and Pontille 2015) and epistemology of order(ing) (Denis and Pontille 2020).

Given the burgeoning field of M&R in social sciences at large and STS specifically, we can identify four strands of research that are pertinent to our goal of exploring the extent to which the literature on M&R can contribute insights to the understanding of the work of maintenance and repair of the European order in the field of migration management. These strands should not be interpreted as straitjackets, but as identifications of common themes and tropes. Aspects of some strands can be found in articles that are here named under other strands, and authors named as emblematic of one strand can be found citing or relying on authors in other strands.

The first strand we identify is not so much interested in M&R activities framed as such, but it is rather concerned with the implications of the fact that relations, objects, organizations or structures require constant work in order to persist. Highlighting this is one way to challenge societal imaginaries of innovation, or a productivist bias in STS (Jackson 2014). Jackson (2014) formulates this as the general theory of 'Broken World Thinking' (BWT). BWT takes erosion, decay and breakdown as everyday phenomena. Its two main components are the appreciation of the fragility of the world we inhabit, and the recognition that many of the stories and orders of modernity are in process of coming apart, perhaps to be replaced by better stories and orders (Jackson 2014, 221). As such, Jackson (2014, 222) states:

> Here, then, are two radically different forces and realities. On one

> hand, a fractal world, a centrifugal world, an always-almost-falling-apart world. On the other, a world in constant process of fixing and reinvention, reconfiguring and reassembling into new combinations and new possibilities—a topic of both hope and concern. It is a world of pain and possibility, creativity and destruction, innovation, and the worst excesses of leftover habit and power. The fulcrum of these two worlds is repair: the subtle acts of care by which order and meaning in complex sociotechnical systems are maintained and transformed, human value is preserved and extended.

For Jackson, repair serves to hold pieces together, in this dual process of centrifuging-reconfiguring, so that other pieces can be added and discarded. Work in this strand focusses mostly on technological imaginaries and stories, and complicates these imaginaries by describing the use of technology in practice or in disrepair (Wakefield 2018; Donovan 2015).

A second strand is concerned with M&R as specific knowledge practices, and their production. This strand explicitly names the study of M&R as one that "helps reconsider an old legacy of ANT: The opposition between breakdown (crisis, controversy) and routine (taken-for-grantedness)" (Denis 2019, 284). While drawing from, or dialoguing with, the other strands here identified, this strand has an explicit focus on ontology and epistemology. It conceives of M&R as knowledge practices that help shape an order, but also "cultivate a particular epistemology of public order" (Denis and Pontille 2020, 21). In this analysis the authors attempt to grasp the ecology of maintenance interventions in order to discuss the dynamics of order and disorder, stability and fragility. As Denis and Pontille (2015, 353) state:

> Social scientists have known for a long time that order and disorder go hand in hand. Order does not get rid of disorder, just as bringing disorder to light does not remove order. […] In the case of maintenance activities, producing order is less costly, but necessitates operations that have a short reach, […] the emergence of order from disorder in maintenance work is always ephemeral. It draws on situated reordering micro-processes that have to be continually repeated. The very stability of the wayfinding system relies on each of the maintenance workers' interventions.

The production of order is thus a process that draws not only on norms and standards, which define stabilized states for objects and their environments, but also on the practices accomplished in the name of taking care of things. Order is thus not the negation of vulnerabilities, but it emerges by taking vulnerabilities into account. With this, Denis and Pon-

tille (2015) mean that the nature of "order" is constructed, something that requires constant re-enactment. Even if there is a materially standardized system in place, this standardized system requires maintenance.

The third strand highlights M&R as political practices in which relations are formed or abandoned. Work done in this strand emphasizes M&R's specific type of politics. Graham and Thrift (2007) discuss these politics as twofold: in the case of defining what is broken and how it should be repaired; and in the practice of M&R which displace some relations in favor of others. In the former, the politics is about definitions and discourses and how this influences other politics. In the latter, Graham and Thrift (2007, 17) call for an analysis of M&R as a mode of doing politics:

> Maintenance and repair is an ongoing process, but it can be designed in many different ways in order to produce many different outcomes and these outcomes can be more or less efficacious: there is, in other words, a politics of repair and maintenance.

Always in this strand, Barnes (2017) discusses how the everyday maintenance of irrigation canals in Egypt, done by local farmers, helps to build community relations and therefore empowerment. In contrast, the Egyptian state operates large scale repair on this irrigation system once per year, in which they undo many of the community-made adjustments. Barnes (2017) here highlights how the acts of M&R enact power relations, and can be used to (re)enact the state, or to enact counter power. Here, the specific practices of M&R matter, as well as who does them.

Concerning the issue of M&R having a discursive dynamic as well as a material one, Ureta (2014) describes how the Transantiago bus system in Santiago de Chile was repaired through a dual process of repair by numbers and by buffering. Herein the 'by numbers' mode refers to a discursive process of normalization that strategically refers to numbers and narratives. Repair by numbers points to quantitative metrics to shape a narrative of control. The first stage in implementing such a repair was to define what is "normal". Statistics were then used to identify those areas where the current system lagged behind the envisioned normal state. Second, the goal was redefined as bringing those specific areas that did not meet the standards up to the "normal" level. The failures of the Transantiago were framed by the project's management as a failure to reach the so defined standards of normality. As a result of these adjustments, the Transantiago was "normalized", repaired by bringing its quantitative metrics in line with its predefined standards. All in all, Ureta recalls, the aim of repair by numbers is affirming the government's power and capacity to plan and manage, by normalizing the situation. It works for "the maintenance of power, not the improvement of societies and/or individu-

als" (Ureta 2014, 372). While this mode of M&R raises also technical aspects, "repair by numbers" is mostly done through public discourse.

"Repair by buffering" instead refers to the practice of introducing mediators to relegate an issue in the background. One issue that haunted the Transantiago was the boarding speed of passengers. During the afternoon rush-hour, users who prioritized the possibility to sit in the bus and were thus willing to wait for the next bus used to slow down the boarding process. However, the Transantiago was designed around a different type of users: users who would board a bus in a minute's time. The design of the Transantiago's platform foresaw travelers as fare-and-time-optimizers; rational individuals who used the Transantiago in the most time-efficient manner and would thus board a bus rapidly. It quickly turned out that those intended users were quite different from actual travelers, who often preferred the convenience of achieving a sitting place, rather that boarding the first available bus. This unforeseen behavior was the cause of frequent disruptions.

While ostensibly a minor problem, these small disruptions had cascading effects on the full system, as every delayed bus delayed the next one. The project managers first attempted to educate those users that slowed down the system by hiring staff to stand at the platform and instruct users on proper usage. However, these attempts had no positive effects and only heightened tensions at the platform. After having found that it was impossible "to reduce traveling time because people don't want to change their behavior" (Ureta 2014, 381), the project managers begrudgingly accepted to redesign the bus stations to allow for two types of users: those who prioritized seating, and those who wanted to board the first possible bus. "Buffering" took place by redesigning the Transantiago system so that it allowed for two types of users in addition to the initially inscribed one. Buffering did not materially fix the problem but mediated it: "the new design is a buffering device mediating between, on the one hand, people with multiple motivations to use public transport and, on the other, a system that mostly enacts them as fare-and-time-optimizers" (Ureta 2014, 385). Buffering, in other words, can be understood as a process of placing (material) mediators as devices to separate conflicting entities.

The three strands so far identified were underpinned by univocal theoretical references: respectively BWT, ANT and a political-sociological call to relocate the site of politics. These strands are grouped based on the focus of analysis, and their theoretical underpinnings. A fourth strand that focuses more on methods than on theoretical underpinnings of M&R research was proposed by Colmellere (2015). The author discusses the production of workplace order through the organized repair of an IT system (named the 'K' system in the article), and outlines a method for stud-

ying the co-production of order and maintenance. Such method is located at the meso level of analysis. Colmellere indeed points to the need to investigate "an intermediate level, halfway between studies in ethnomethodology and analyses of macro scale structures" (2015, 106-107), which she locates in the workplace, as she calls to study the "links between repairs practices and maintenance issues in the workplace" (ibid.). Colmellere's approach develops at the intersection of sociotechnical M&R and organization studies to make sense of how structures and social orders change and stay the same. Her analysis combines an attention to machine properties with organizational structures, power, and micro social practices. This still novel, and relatively unexplored, perspective is how we'd like to label this last strand: one focused at the sociotechnical M&R dynamics between organizations and social actors.

Leavitt Cohn (2019), Glouftsios (2020) and Bellanova & Glouftsios (2020) can be conceived of as further recent works in this strand. Leavitt Cohn (2019) discusses the maintenance of an old code in a space mission. She describes how legacy codes are not appreciated, but more begrudgingly accepted as something to live with despite their endurance, not because of it. The author discusses how the old code is tied up with the mission, or organization more broadly, and how a specific group of maintainers have to keep it updated, keeping this "patchwork" (2019, 438) relevant and stressing its relation to the organization's past. Through keeping a legacy code, and reminding coworkers of its relevancy to the history and future of the organization, these maintainers also maintained the integrity of the organization, the author concludes. In this, maintenance work is tied to the functioning of an organization: "it is not so much the code, but the relational assemblage of software and organizational work that these engineers must tweak and adapt in order to prepare for the future" (2019, 436). All in all, Leavitt Cohn (2019) points to the dynamics of M&R as sociotechnical processes, stressing herein the effects of M&R on organizational processes. According to her, to maintain is to organize. The space mission was (partly) organized through the maintenance work of these maintainers; keeping the past in the present, enacting obduracy.

A further case is presented by Glouftsios (2020) who studied the M&R practices in maintaining two large information systems, the SIS II and VIS, which are deployed by the EU for migration management, law enforcement and border security. He describes these systems as unruly objects, which are made docile and workable through constant maintenance. Focusing mainly on the dynamics of (in)security, Glouftsios (2020) discusses M&R practices as part of the constant enactment of security. In this, he discusses maintenance and IT workers as security workers, and simultaneously discusses how border guards, police and data analysts are

made relevant in M&R practice through trainings and evaluations (Bellanova and Glouftsios 2020, 15). M&R are here discussed as a key part of how the EC gains and controls the means to govern international mobility, by discussing M&R in relation to a powerful organization like the EC, and the mundane practices of border guards and data analysts. All in all, Bellanova and Glouftsios (2020) practice the "intermediate level of analysis" that Colmellere (2015) calls for: they discuss the interplay between M&R practices of organizations and those more everyday M&R practices.

4. European Order and the Maintenance and Repair of its Migration Crisis

To what extent can the perspectives raised by the literature on M&R discussed up to now help us to understand the European institutional order in the informational management of migration as a matter of maintenance and repair? We suggest that a novel and potentially innovative research direction can be carved when studying the European order as a set of continued socio-technical M&R practices. From the previous overview of M&R in social science and STS literature, we have thus identified six insights that can be extended to the field of European migration management, and support the development of a framework to understand the maintenance and repair of the European order.

First, M&R teaches us that any order needs to be taken as inherently fragile (Jackson 2014). Similarly, as evidenced in the introduction, abstract macro organizations, or orders, such as the EU, are characterized by fragility and precariousness. Especially in the field of migration management, the EU is intrinsically conceptualized as a fragile order. Every continued "flow" of (unauthorized) mobility to Europe is considered a threat or a crisis (Tazzioli and De Genova 2016). In order to fully illustrate the fragility of Europe as a configuration of organizations one can turn to the decisions published in 2015 by the European Council (2015a 2015b). Here, the EC called the Hotspot Approach into existence in order to shape "informational and bureaucratic standardization" (Pelizza 2020, 269). This approach was accompanied by a series of infringement decisions lodged by the EC (European Commission 2015a), forcing EU member states to collaborate in informational cooperation. The image of the EU that emerges is then one that recalls Jackson's (2014) insights of any abstraction being simultaneously stable and powerful, but also fragile and precarious.

Secondly, as recalled by Denis and Pontille (2015) practices of M&R need to be understood as situated practices that shape an order. This or-

der is not to be taken as a negation of vulnerabilities, but it emerges by taking vulnerabilities into account. In the EU's efforts at migration management, this can be best highlighted by turning to the various data infrastructures in use that require maintenance and back-ups. For example, Bellanova and Glouftsios (2020, 10) describe the SIS II[2] system as the flickering foundation of the Schengen area; pointing to the inherent fragility or vulnerability of the system. The vulnerability of the SIS II system can emerge through various means; through the use of outdated local systems to something so banal as the breaking of cables somewhere in the countryside. This fragility is accounted for in the architecture of SIS II, containing a centralized back-up and copies of the central database stored at various national facilities. The European data infrastructures are the mediators through which the EU is made stable and obdurate. At the same time, as data infrastructures are materially and socially constituted, they themselves require updating, upkeep, and other types of maintenance (Glouftsios 2020).

Thirdly, order requires constant re-enactment, or said differently, obduracy is achieved by performing it iteratively. This is revealed also in the field of migration management. For the execution of much of the process of receiving and relocating people on the move, for example, the EU organization for border control and management Frontex receives a steady annual increase in funding (European Commission 2015b) and the International Organization for Migration (IOM) was mobilized to organize the relocation of migrants deemed eligible to stay in the EU (IOM 2018). These moves make clear that a powerful order such as Europe needs to continuously respond and adapt to various processes and pressures. Furthermore, mobility forces the EU to expand some operations and take up a collaboration with non-governmental actors, such as IOs. Through these collaborations, the EU is enacted anew, yet along different boundaries that comprise new actors.

Fourth, there is a politics in M&R (Graham and Thrift 2007). M&R dynamics enact power relations or asymmetries, as previously illustrated by Barnes (2017) and Ureta (2014),. Similarly, a case in point in the field of the informational migration management are the communities of practice that regularly assemble at events organized by European agencies. EU-Lisa, the EU agency for the operational management of large-scale IT systems, for example, organizes yearly roundtables for various industry-partners to discuss digital solutions for emergent issues in border control and migration management (EU-lisa 2017; 2018). Here, heads of large commercial businesses such as Accenture and Thales present their wares of security software or hardware to senior bureaucrats, policy managers, and directors of the EC and various ministry representatives of MSs. In the last years, the proliferation of professional networks and working

groups dedicated to the informational management of migration has revealed de facto new assemblages that are constituted through the constant work of maintenance and repair of European relationships. At meetings and conferences, the formal boundaries of European institutions are made blurry, while trans-organizational arrangements keep this European collective going; updating and maintaining it. These networks can be read as buffers, as per Ureta's (2014) repair by buffering: they serve to mediate the issue at hand and binding multiple motivations and enactments together in a diffused network. The EU then, is stretched and diffused in this governance network; a dynamic network of state and non-state actors, an actor-network beyond the state (Passoth and Rowlands 2010; Pelizza 2016). Similarly, Pelizza (2021, 18) describes how, through the informational management of migration, the state becomes only one of the many actors in a network made up of "global corporate contractors, the FBI and the US security regime, the EU Commission, national authorities in Athens, and thousands of fingerprinted individuals, to name a few". We see novel relations, and asymmetrical power relations emerge through the goal of maintaining the EU in the migration crisis.

Fifth, these M&R dynamics can best be studied by focusing on the socio-technical infrastructures at a strategically selected organization (Colmellere 2015). The tacit knowledge of maintenance workers in any organization (Henke 1999), as well as their work of helping others remember the fundamentality of some material infrastructures (Leavitt Cohn 2019), needs to be understood as to maintain the structural integrity of an organization, while organizations are key in understanding the maintenance of more macro orders. As described above, also in the field of migration management an intricate network beyond only state actors emerges through the organizing of M&R practices for the EU. In this network, it is strategic to study specific organizations to highlight how M&R takes place in an organization, as part of the maintenance of a larger structure or abstraction. The hypothesis here is that valuable insights can be gained by turning to (non-EU) organizations to highlight how the EU's attempts at M&R through informational migration management plays out in practice, and which novel dynamics emerge in terms of practical, policy and epistemological positions (Passoth and Rowlands 2010).

The sixth insight stresses that M&R practices also shape "a particular epistemology of public order" (Denis and Pontille 2020, 21). The last insight is thus that M&R can also be done or found in knowledge practices. The notion of repair by numbering as introduced by Ureta (2014) is especially helpful to make these epistemological aspects of M&R visible. In the field of migration management, we shall turn to one strategic organization to illustrate this insight: the International Organization for Migration (IOM). The IOM takes up a unique position in the M&R dynamics

of Europe, which can be used to illustrate the re-enactment of Europe as well as the ways in which M&R intersects which various knowledge practices at specific organizations. The IOM runs their own data collection and analysis department; the Global Migration Data Analysis Centre (GMDAC), with which they help shape the EU's "migration crisis" through knowledge practices. Through these data practices, they aim to:

> foster better analysis, use and presentation of IOM data, establishing IOM as a key source of reliable data on migration through strategic partnerships, and to act as a data hub for decision makers and practitioners seeking the best available statistics. The Centre also contributes to the development of IOM's global migration governance framework (IOM 2020).

The GMDAC serves as the knowledge-branch of the IOM, their task is to collect and analyze data on migration, in order to support member states in managing migration. The GMDAC operates in multiple partnerships with organizations as diverse as the Organization for Economic Co-operation and Development (OECD), McKinsey, United Nations International Children's Emergency Fund (UNICEF), the UN and the European Commission's Knowledge Centre on Migration and Demography (IOM 2019). Through this work with GMDAC, the IOM builds a central database about Europe's migrant population and ongoing migration. In this, they deliver the numbers, by which the normal and crisis states are identified; allowing for norms to be set which delineate when 'migration' is under control, and when it has been normalized. Like the Transantiago (Ureta 2014), migration is enacted as a problem to be fixed by increasingly approaching a numerical normality. In this dynamic, in which the IOM takes up many of the tasks of practically governing migration, the GMDAC works to both assure the IOM a role as key referent, and to enact migration as a technocratic management issue which temporarily exceeded a normal state to which the situation must return. The knowledge practices of the GMDAC serve to grasp Europe's migration crisis in numerical terms and from a birds-eye view. Broeders (2011, 60) described the work of categorizing the flow of migrants as a key part of the work of securitizing the borders of Europe; similarly, we emphasized this work as M&R practices wherein Europe is maintained. This example also illustrates how M&R practices are also knowledge practices (Denis and Pontille 2020), and how these knowledge M&R practices constantly (re-)enact a particular order.

5. Conclusion: Maintaining Europe. Repairing Migration Management

In this scenario, we have set out to understand the persistence or obduracy of macro orders, despite their fragility. We aimed to address a central tension that is present in much theorizing in STS, while building on the vocabulary developed within STS. Within the discipline of STS many dichotomies have been opened up to scrutiny, such as subject/object, micro/macro, and agency/structure. In this, much attention has been given to the micro and the agentic, allowing to highlight enactment, performativity and emergence. This attention has opened up many avenues for research; however, it makes difficult accounting for obduracy without resorting to overly deterministic accounts or structuralist modes of analysis. In order to stay with the sensitivity for the role of everyday work and agency we extended insights from STS literature on maintenance and repair to account for order. As M&R practices are always in relation to an infrastructure, or existing set of practices, they are key in accounting for obduracy of order while keeping the analysis with everyday interactions and practices. As such, thinking with M&R helps us to explain and analyze obduracy without using said obduracy as an explanation in itself.

Foregrounding M&R allows one to highlight everyday practices, the role of sociotechnical infrastructures, while also accounting for the fact that these orders don't radically shift every day. We turned to the EU as a set of practices and organizations, as an order that is constantly being maintained in response to its ongoing "migration crisis" to illustrate the various ways thinking with M&R opens up a novel analytic for accounting for obduracy. This "crisis" presented an acute case in which M&R became visible as seen in the quick response of EUrope to update and streamline informational exchange systems. Thus, we take this informational migration management as the key site where EUrope is maintained and repaired. We have distilled six key insights which we inherit from STS M&R research and combine to shape a framework for thinking with M&R in accounting for obduracy. The six insights are the inherent fragility of any order (Jackson 2014), the complementarity of order and vulnerability (Denis and Pontille 2020), the constant work of re-enactment required by any order (Denis and Pontille 2015), the power relations or asymmetries that are enacted or distributed in M&R, as well as in the maintenance of Europe (Ureta 2014; Barnes 2017), organizations that can function as a tactical site as the interplay between everyday M&R practices and the stability of a structuring organization (Colmellere 2015), and finally, knowledge practices and infrastructures that play a significant role

in the maintenance of any order. Focusing on M&R practices at strategic organizations makes it possible to discuss the interplay between everyday social actions and macro orders, while taking these orders to be fragile yet powerful, to be obdurate but not unchanging.

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References

Amoore, L. and Raley, R. (2017) *Securing with Algorithms: Knowledge, Decision, Sovereignty*, in "Security Dialogue", 48, pp. 3-10.

Anderson, B. (2006) *Imagined Communities*, London, Verso.

Balch, A. and Geddens, A. (2011) *The Development of the EU Migration and Asylum Regime,* In H. Dijstelbloem and A. Meijer (eds.) *Migration and the New Technological Borders of Europe*, Basingstoke, Palgrave Macmillan.

Barnes, J. (2017) *States of maintenance: Power, politics, and Egypt's irrigation infrastructure,* in "Environment and Planning D: Society and Space", 35 (1), pp. 146-164.

Beck, U. (1992) *Risk Society. Towards a New Modernity*, London, Sage.

Bellanova, B. and Glouftsios, G. (2020) *Controlling the Schengen Information System (SIS II): The Infrastructural Politics of Fragility and Maintenance,* in "Geopolitics", 27 (1), pp. 160-184.

Bracke, S. and Hernandez Aguilar, L. M. (2020) *'They love death as we love life': The 'Muslim Question' and the biopolitics of replacement, in* "British Journal of Sociology", 71(4), pp. 680-701.

Bicket, D. and Wall, M. (2007) *Circling the wagons: Containing the downing street memo story's impact in America,* in "Journal of Communication Inquiry", 31 (3), pp. 206-221.

Bradley, P. (1995) *Managing your maintenance dollar,* in "Business and Commercial Aviation", 76 (3), pp. 68-73.

Broeders, D. (2011) *A European 'Border' Surveillance System under Construction,* In H. Dijstelbloem and A. Meijer (eds.) *Migration and the New Technological Borders of Europe*. Basingstoke, Palgrave Macmillan.

Chelcea, L. and Pulay, G. (2015) *Networked infrastructures and the 'local': Flows and connectivity in a postsocialist city*, in "City" 19 (2-3), pp. 344-355.

Colmellere, C. (2015) *Repair in Socio-technical Systems. The Repair of a Machine Breakdown that Turned into the Repair of a Shop*, in "Tecnoscienza: Italian Journal of Science & Technology Studies", 6 (2), pp. 81-112.

Denis, J. (2019) *Why do maintenance and repair matter?*, In A. Blok, I. Farías and C. Roberts (eds.) "The Routledge Companion to Actor-Network Theory", London and New York, Routledge.

Denis, J., Mongili, A. and Pontille, D. (2015) *Maintenance & Repair in Science and Technology Studies*, in "Tecnoscienza: Italian Journal of Science & Technology Studies", 6 (2), pp. 5-16.

Denis, J. and Pontille, D. (2015) *Material Ordering and the Care of Things,* in "Science, Technology & Human Values", 40(3), pp. 338-367.

Denis, J. and Pontille, D. (2020) *Maintenance epistemology and public order: Removing graffiti in Paris*, in "Social Studies of Science", 51 (2), pp. 233-258.

Dijstelbloem, H. and Meijer, A. (2011) *Migration and the new technological borders of Europe*, Basingstoke, Palgrave Macmillan.

Donovan, K. (2015) *Infrastructuring aid: materializing humanitarianism in northern Kenya*, in "Environment and Planning D: Society and Space", 33 (4), pp. 732-748.

Dutta, U. and Maze, T.H. (1989) *Model for comparing performance of various transit maintenance repair policies*, in "Journal of Transportation Engineering", 115 (4), pp. 450-456.

Edensor, T. (2011) *Entangled agencies, material networks and repair in a building assemblage: The mutable stone of St Ann's Church, Manchester, in* "Transactions of the Institute of British Geographers" 36 (2), pp. 238-252.

European Commission (2015a) *More Responsibility in Managing the Refugee Crisis: European Commission Adopts 40 Infringement Decisions to Make European Asylum System Work in*, http://europa.eu/rapid/press-release_IP-15-5699_en.htm (Retrieved May 25, 2020).

European Commission (2015b) *European Agenda on Migration: Securing Europe's External Borders*, in https://ec.europa.eu/commission/presscorner/detail/en/MEMO_15_6332 (retrieved February 15, 2021).

European Council. (2015a) *Council Decision (EU) 2015/1523*, in "Official Journal of the European Union", pp. 239: 146–156, in https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015D1523&from=EN (retrieved June 7, 2020).

European Council. 2015b) *Council Decision (EU) 2015/1601,* in "Official Journal of the European Union, pp. 248/80–94. https://eur-lex.europa.eu/legal-

content/EN/TXT/PDF/?uri=CELEX:32015D1601&from=EN (retrieved June 7, 2020).

Evans, G. (2015) *Europe's migrant crisis: The year that changed a continent,* in "BBC News", in https://www.bbc.com/news/world-europe-53925209 (retrieved June 7, 2020).

Ganderton, P.S. (1990) *Microcomputer maintenance in schools-a survey of current practice,* in "Journal of Computer Assisted Learning", 6 (1), pp. 34-47.

Garfinkel, H. (1967) *Studies in Ethnomethodology*, Englewood Cliffs NJ, Prentice Hall.

Geddes, A. (2019) *Crisis, normality and European regional migration governance*, In Geddes, A., M.V. Espinoza, L. Hadj-Abdou and L. Brumat (eds.) *The dynamics of regional migration governance,* Cheltenham, Edgar Elgar Publishing.

Glouftsios, G. (2020) *Governing border security infrastructures: Maintaining large-scale information systems*, in "Security Dialogue", 52(5), pp. 452-70.

Graham, S. and Thrift, N. (2007) *Out of Order. Understanding Repair and Maintenance, Theory, in "*Culture & Society", 24 (3), pp. 1-25.

Gregson, N., Metcalfe, A., and Crewe, L. (2009) *Practices of object maintenance and repair: How consumers attend to consumer objects within the home, in* "Journal of Consumer Culture", 9 (2), pp. 248-272.

Henke, C. (1999) *The Mechanics of Workplace Order: Toward a Sociology of Repair*, "Berkeley Journal of Sociology", 44, pp. 55-81.

Hudson, R.W., Carmichael, R.F., III, Hudson, S.W., Diaz, M.A., Moser, L.O. (1993) *Microcomputer bridge management system,* in "Journal of Transportation Engineering", 119 (1), pp. 59-76.

Hochschild, A. (1983) *The Managed Heart: Commercialization of Human Feeling*, Berkeley, CA, UCLA Press.

Hon, C.K.H., Chan, A.P.C., Wong, F.K.W. (2010) *An analysis for the causes of accidents of repair, maintenance, alteration and addition works in Hong Kong*, in "Safety Science", 48 (7), pp. 894-901.

International Organization for Migration (IOM) (2018) *IOM's recommendations. A Permanent Solidarity Mechanism in the EU Lessons learnt from relocation*, Brussels, IOM RO, in https://eea.iom.int/publications/ioms-recommendations-permanent-solidarity-mechanism (retrieved June 3, 2020).

International Organization for Migration (IOM) (2019) *About GMDAC. IOM's Global Migration Data Analysis Centre*", in https://gmdac.iom.int/about-gmdac (retrieved May 25, 2020).

International Organization for Migration (IOM) (2020) *Country offices*, https://www.iom.int/country-offices (retrieved July 20, 2020).

Islam, S. (2020) *Europe's migration 'crisis' isn't about numbers. It's about prejudice,* in "The Guardian", https://www.theguardian.com/world/2020/oct/08/europe-migration-crisis-prejudice-eu-refugee-orban-christian (retrieved July 20, 2020).

Jackson, S, J. (2014) *Rethinking Repair* In T. Gillespie, P. J. Boczkowski and K. A. Foot (eds.) *Media Technologies: Essays on Communication, Materiality, and Society*, Cambridge, MIT Press.

Jacobs, J.M., Cairns, S. (2012) *Ecologies of Dwelling: Maintaining High-Rise Housing in Singapore,* "The New Blackwell Companion to the City", pp. 79-95.

Kazopoulo, M., Kaysi, I., El Fadel, M. (2007) *A stated-preference approach towards assessing a vehicle inspection and maintenance program,* in "Transportation Research Part D: Transport and Environment", 12 (5), pp. 358-370.

Koning, A., Marchesi, M., Vollebergh, A., Ruijtenberg, W., Botton, L. and Chakkour, S. (2018) *Reproducing Europe: Migrant Families, Professionals and the Welfare State.* Open Access public book, in www.reproducingeurope.nl (retrieved July 20, 2020).

Leavitt Cohn, M. (2019) *Keeping Software Present: Software as a Timely Object for STS Studies of the Digital*, In J. Vertesi and D. Ribes (eds.) *digitalSTS: A Field Guide for Science & Technology Studies,* Princeton, Princeton University Press.

Lombardi, D.A., Verma, S.K., Brennan, M.J., Perry, M.J. (2009) *Factors influencing worker use of personal protective eyewear*, in "Accident Analysis and Prevention", 41 (4), pp. 755-762.

Luxhoj, J.T., Jones, M.S. (1986) *A framework for replacement modeling assumptions,* in "Engineering Economist, 32 (1), pp. 39-49.

Mattern, S. (2018) *Maintenance and Care,* in "Places Journal", *https*://placesjournal.org/article/maintenance-and-care/ (retrieved June 7, 2020).

Mayblin, L. and Turner, J. (2021) *Migration Studies and Colonialism*, Cambridge, Polity Press.

Orr, J. (1996) *Talking About Machines: An Ethnography of a Modern Job,* Ithaca, NY, Cornell University Press.

Park, J. (2015) *Europe's Migration Crisis*, in "Council on Foreign Relations", https://www.cfr.org/backgrounder/europes-migration-crisis (retrieved June 7, 2020).

Parke, R. (1995) *Europe's premier business aviation center*, in "Business and Commercial Aviation", 76(6), pp. 58-67.

Passoth, J.H. and Rowland, N.J. (2010) *Actor-Network State: Integrating Actor-Network Theory and State Theory,* in "International Sociology", 25 (6) pp. 818-841.

Pelizza, A. (2016) *Developing the Vectorial Glance: Infrastructural Inversion for the New Agenda on Governmental Information Systems*, in "Science, Technology and Human Values", 41 (2), pp. 298-321.

Pelizza, A. (2020) *Processing Alterity, Enacting Europe: Migrant Registration and Identification as Co-construction of Individuals and Polities, in* "Science, Technology and Human Values" 45 (2), pp.262-288.

Pelizza, A. (2021) *Identification as translation: The art of choosing the right spokespersons at the securitized border*, in "Social Studies of Science", 51(4), pp. 487-511.

Platt, R.V., Veblen, T.T., Sherriff, R.L. (2008) *Spatial model of forest management strategies and outcomes in the wildland-urban interface*, in "Natural Hazards Review", 9 (4), pp. 199-208.

Puig de la Bellacasa, M. (2011) *Matters of care in technoscience: Assembling neglected things*, in "Social Studies of Science", 41(1), pp. 85–106.

Rummer, B. (2008) *Assessing the cost of fuel reduction treatments: A critical review*, in "Forest Policy and Economics", 10 (6), pp. 355-362.

Russell, A and Vinsel, A. (2016) *Hail the Maintainers*, in "Aeon Magazine", https://aeon.co/essays/innovation-is-overvalued-maintenance-often-matters-more (retrieved July 20, 2020).

Schegloff, E., Jefferson, G. and Sacks, H. (1977) *The Preference for Self-Correction in the Organization of Repair for Conversation*, in "Language", 53, pp. 361-382.

Sims, B. and Henke, C. (2012) *Repairing credibility: Repositioning nuclear weapons knowledge after the Cold War*, in "Social Studies of Science", 42 (3), pp. 324–347.

Sormani, P., Strebel, I. and Bovet, A. (2015 *Reassembling Repair: of Maintenance Routine, Botched Jobs, and Situated Inquiry*, in "Tecnoscienza: Italian Journal of Science & Technology Studies", 6 (2), pp. 41-60.

Tazzioli, M. and De Genova, N. (2016) *Europe/Crisis: Introducing new keywords of "the crisis" in and of "Europe",* in M. Tazzioli and N. de Genova (eds.) "Europe at the Crossroads: Managed Inhospitality", New York, Zone Books.

Thrift, N. (2005) *But malice aforethought: Cities and the natural history of hatred,* in "Transactions of the Institute of British Geographers", 30 (2), pp. 133-150.

Tripp, E.G. (1995) *Damage history: the bottom line*, in "Business and Commercial Aviation", 76 (1), pp. 54-58.

Ureta, S. (2014) *Normalizing Transantiago: On the challenges (and limits) of repairing infrastructures, in* "Social Studies of Science", 44 (3), pp. 368–392.

Wakefield, S. (2018) *Infrastructures of liberal life: From modernity and progress to resilience and ruins*, in "Geography Compass", 12 (7), pp. 1-14.

Wall, M. and Bicket, D. (2008) *The 'Baghdad Broadcasting Corporation': US conservatives take aim at the British news media*, in "Journalism", 9 (2), pp. 123-140.

Wenzel, T. (2001) *Reducing emissions from in-use vehicles: An evaluation of the Phoenix inspection and maintenance program using test results and independent emissions measurements,* in "Environmental Science and Policy", 4 (6), pp. 359-376.

Wenzel, T. (2003) *Use of remote sensing measurements to evaluate vehicle emission monitoring programs: Results from Phoenix, Arizona*, in "Environmental Science and Policy", 6 (2), pp. 153-166.

[1] In this paper we refer to the European Union (EU) as the historically circumscribed attempt at a supra-national form of governance. We sometimes use "European order" as a synonym that however stresses how even institutions can be performed and are not fully obdurate. They are both distinguished from what we refer to as "Europe", a community of belonging (Anderson 2006) that includes not only institutional actors, and it is often declined in the plural, as it might entail multiple, diverse "Europes" (Pelizza 2020).

[2] "SIS II" stands for *Second Generation Schengen Information System* and functions to make information exchange between national border controls, customs and police possible. It collects and transfers data on individual people, as well as goods, documents and money.