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On new military templates for the organizational society

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Inside out: social digitalization as further bureaucratization

War and Society, a recent book by Centeno and Enriquez (2016), shows how wars and preparation for war transform societies. Organization of war shapes political and social structures, especially organization of total war far away from the 'gentlemen's war'. The line between soldiers in the battlefield and civilians behind them is blurred (81). War has become a war between peoples, not only between soldiers (82). It leads efforts to master new technologies (for example, transport, communication or weaponry), from which efficiency in battle can be gleaned. Dynamics of war can lead to organized and depersonalized genocides and to the physical and 'social death' of entire peoples. Strangest of all is the 'mutual agreement and understanding [between enemies] required to maintain the system' (114): 'nuclear arms, for example, requiring that the adversaries be in constant communication, mutually assuring each other of intentions and safeguards' (115), and often increasing similarities between them. The authors add: 'What we do not know yet is how these changes in war will change the nature of society in the decades to come' (172). If the impact of the military on societies is as extensive as they think, if the organization of war shapes political and social structures, our social change can be anticipated, at least in part, by the evolution of the contemporary military. For example, military institutions today, protected by secrecy, make pharaonic investments in the digitalization of their organizations and the battlefield. Digitalization of war promotes radical technological innovations for military objectives, but these innovations will probably become part of a broader process of 'social digitalization'.

Social digitalization, as an indicator and substantive part of contemporary social morphogenesis (Archer, 2014), takes complex forms. Part of this social change can be called 'organizational morphogenesis' – that is, co-constitution and co-evolution of two ideal-typical models of organization, bureaucracy and collegiality (Lazega, 2001; 2017), in multilevel, organized collective agency. These forms of co-constitution and co-evolution are particularly useful to understand social change because contemporary society has become an increasingly bureaucratized organizational society. In a simplified way, bureaucracy can be ideal-typically defined as a form of organization based on routine tasks, hierarchy and impersonal interactions between members. Collegiality can be ideal-typically defined as a form of endogenous organization based on non-routine and innovative tasks, carried out by peers who seek various forms of agreements to coordinate, and use personalized relationships to do so. In theory, we tend to see this co-constitution as a problematic, multilevel struggle without optimal equilibrium (Lazega, 2015a). But the technological revolution brought about by the creation of digitalization, with its capacity to invent new kinds of routines, strengthens the centuries-old

process of bureaucratization theorized by Max Weber as the 'polar night of icy darkness'. With the new industrial revolution driven by digitalization, bureaucracy and social Darwinism are increasingly taking over again (Rosenblat, 2018).

This chapter explores a specific dimension of organizational morphogenesis by looking at how meso-level institutions – here the military – use this digitalization to try to reorganize and further routinize work and collective action by some of its members – here soldiers in the battlefield.[2] In this case in point, social digitalization appears to strengthen two processes: firstly, the already deep control of the world by these institutions and their capacity to reinvent bureaucratization – an increase of control traditionally brought about by wars (Centeno, 2002); and secondly, the capacity of these institutions to invent models of organization of work that are likely to spread later on in the organizational society at large, and to shape more mundane, everyday practices. This exploration focuses on the example of the digitalization of the battlefield, especially the remote control of teams of soldiers on the ground. Team building, team behavior and team management have long been a focus of attention in military organizations, not only with the purpose of increasing their efficiency, but also to neutralize their capacity to build oppositional solidarities, whether between *compagnons de feu* (Shils & Janowitz, 1948; Stouffer et al., 1949) or between disqualified or demoralized soldiers (Shibutani, 1978). This is equivalent to saying that, with such digitalization, large bureaucratic organizations could finally be in a position to collect and exploit, in real time, data on soldiers' behavior, exchanges, interactions and relationships, not only to guide their actions as in a digital straightjacket, but also to weaken or neutralize group 'bottom up collegiality' (Lazega & Wattebled, 2011) by transforming personalized relationships among soldiers into more routinized interactions (Lazega, 2017; Duran & Lazega, 2015).

2 This exploration is based on observations made as an expert embarked on a three-day 'Board of Visitors' of a contemporary Army Research Office, referred to as ARO-BoV in this text. None of the materials accessed during this visit were classified. Such visits are organized to try to attract scientists towards military-funded research. They are dominated by displays of research and its use of mathematical models of social phenomena developed for the military by academics, computer scientists and engineers. Among the models on display were the particularly visible models of swarms. In this chapter I use quotes for the military language that was used during the three days.

This process of further digitalization and bureaucratization in the military can be found in its fascination with swarms. Beyond its biblical connotations (flies as the fourth plague, Exodus 8:24), in the military definition swarms are self-organizing systems. They are made of 'resilient, high performance teams assembled from heterogeneous networks, aligned on common mental maps and emotional reactions' (ARO-BoV). Military fascination with swarms leads to a representation of war as fight between self-organized (and to some extent unpredictable) teams scaling up linearly to entire battalions adapting flexibly, almost organically, to battleground tasks. Digitalization focuses on engineering and steering these teams and battalions with support from artificial intelligence that brings together and analyses big data and social network data in and around the battlefield in real time. Here the 'transformational capacity' of these technologies appears to be associated with, indeed often driven by, mathematical models of swarms as normative metaphors for collective action of teams and between teams.

Knowledge of swarms borrows from animal life (Van der Vaart et al., 2019). Reynolds (1987), and many others ever since, for example Hildenbrandt, Carere, and Hemelrijk (2010), reduce models of relative fixed speed (fear-based) movement of bird behaviour in flocks to three simple rules: Separation – avoid crowding neighbours (short-range repulsion based on ability to sense pheromone); Alignment on changing leaders – steer towards the average heading of neighbours; Cohesion – coordinate with a limited number of interaction neighbours (five for real starlings) and steer towards average position of neighbours (long-range attraction). The swarms of birds work by trying to keep a distance constant with five birds (in the front, on the left, on the right, above, below). There is a leader, but birds rotate in this position. A swarm can avoid and challenge a predator. Swarms are thus both vertically and horizontally structured

forms of semiautonomous common action. Given the rotation in the front position, they are a mix of both. Rules of positioning with distances completely standardized are enough to build coordination in to impersonal interaction. A swarm is meant to be self-organized and resilient. This has given rise to mathematical modelling of the work and behaviour of teams (for example Aggarwal et al., 2015; Bogdanov et al., 2013; Jones, Friedkin, & Singh, 2017; Lungeanu, Huang, & Contractor, 2014; Woolley, Aggarwal, & Malone, 2015) that is used for modelling behaviour of soldiers on the ground. Indeed, one of the reasons why this comparison seemed possible is that, in the contemporary military, soldiers are often trained to replace their superiors up to two ranks above their own, in case these superiors fall in combat: like birds, soldiers could lead the flock one after the other. Such replacements are called battlefield promotion (or 'field promotion', or 'jump-step' promotion as advancements from current rank to a rank above the next higher one), and they can occur only while deployed in combat. In theory, each soldier can thus be prepared to take the lead of the group/swarm. This potential for multilevel positioning introduces the possibility of a modicum of formal 'top down collegiality'[3] (Lazega & Wattebled, 2011) in military teamwork. It pictures soldiers locking themselves in the swarm, taking turns for its lead, relying on digital equipment to steer the group as a single entity, and nevertheless free to break away at any time, at their own risk.[4]

[3] Multilevel positioning protects formal collegial pockets as recreated by the bureaucratic ruler. This is different from protecting basic, bottom-up collegiality (Lazega, forthcoming).

[4] Soldiers endure enormous physical and psychological pressures, from fear of ambushes to "blunders" costing lives, and often break down or revolt. They know that if they step aside in action, do not follow instructions (whether or not derived from mathematical models), there are consequences for their careers – at best their pension or invalidity insurance will be reduced by military bureaucracy. The same mindset applies with AI measurements and models, except that robotized individuals' behaviour and performances are then evaluated based on highly precise digital tools and comparisons with abstract models.

From a broader organizational perspective, mathematical models of teams as parts of swarms are also fascinating for the military because they promote a model of cooperation that gets rid of traditional forms of internal contestations and oppositional solidarities. Indeed there are at least three ways in which we find bureaucracy and collegiality together in the same organizations (Lazega, 2017). At the top of bureaucracies, collegial oligarchies can be found, for example in the executive suite or in boards of directors. The top of organizations is always collegial because work at that level is rarely routine, always political. Even autocrats have around them a system of peers that controls the bureaucratic organization below (Lazega & Wattebled, 2011). Further below, we find two kinds of collegial pockets: either professional departments, such as R&D departments, in which expert members consider each other as peers; or further down the hierarchy, groups of members, for example at the shop floor level, who together build forms of 'autonomous regulation' (Reynaud, 1989) or oppositional solidarity (Shibutani, 1978; Wittek & Van de Bunt, 2004). One of the managers' tasks is to monitor and sanction oppositional solidarity in the lower levels.

The argument here is that if digitalization of the battlefield is explored by military management using the swarm template, among many purposes, to build and control efficient teams/platoons of soldiers[5] as they operate in the messy battlefield, the same templates could be used in the future to redefine collegial settings/pockets within bureaucratic organizations. This template becomes an example of how a new digital bureaucratization can be used by organizations and institutions to invent/explore new forms of collective action for society at large. The swarm template is a model for cohesion in action but also for neutralizing collegiality (and its built-in oppositional solidarity) that survives at the bottom of bureaucratic contexts. Teams are meant to keep the *esprit de corps* (they motivate, give courage, give the impression to individual soldiers that they are understood by their peers), and at the same time to shed their capacity to create oppositional solidarity, to erase doubts about the purpose of the war, to not get out of control and start doing things that the military hierarchy does not want them to do.

A rich body of research looks at finding ways of creating the most efficient teams of soldiers based on knowledge about them, who they are, how they react, etc. But we do not know a great deal about how teams are currently built in the military based on combined AI, Computational Social Science and Social Network Analysis. For example, do they last a few weeks, months, years? Much of this body of knowledge that is also public seems to be based on network statistical models of 'team assembly' and reshuffling derived from adolescent online war games (Contractor, 2013) that address the basic managerial dilemma raised by military teams – but in a gamified way. The data on applications on the ground we do not get to see.

This chapter first looks at how this digitalization is meant to exercise that influence on teams on the ground, beginning with soldiers' work and the mechanics of this digitalization, its meaning in organizational terms, its extension to society at large and the consequences in terms of reinventing specific forms of collective responsibility. It is indeed suggested that, in a creepy way, through this process of digitalization as bureaucratization of the battlefield and neutralization of team-based oppositional solidarities by remote-controlled task performance, social actors potentially become subjected to new forms of punitive collective responsibility.

In the specific example used here, i.e., military research on designing and using high performance teams, swarm fantasies are developed by mathematicians and engineers combining artificial intelligence (AI) and big data, including social network analysis (SNA) reducing relationships between soldiers to impersonal interactions at the "right" physical and social distance. In many ways, if combinations of AI and SNA provide military management with tools that build efficient teams while neutralizing oppositional solidarity, they are able to transform and bureaucratize collegiality as defined here. They want to turn relationships that are personalized into interactions that are impersonal, and still be able to retransform interactions into relationships when the *esprit de corps* is needed again. This can be called the 'inside out' effect (Lazega, forthcoming). In this model, collegiality is neutralized and steered towards alignment. Bureaucratic management has been dreaming of this magic formula for more than a century. The question raised by this combination of AI, SNA and CSS is whether or not the meeting of this mathematical template with this dream will have an effect on society through social digitalization and the emergence of a new form of collective responsibility as a result.

Military work in the battlefield: 'fire-and-forget swarms'

The next sections look at how the military wants to use AI algorithms applied to big data, including social network data, to make armies work in ways armies have never worked in history. AI is changing what it means to be a soldier on the ground. In the battlefield, soldiers are first becoming data-gathering informants-sensors for data discovery and analytics. The military discusses this under 'revolutionizing the soldier's equipment for situational awareness' (ARO-BoV). Soldiers' 'situational awareness' is meant to complement digital information systems available to officers. The soldiers' job is first to be there, describe into their microphone what they see, focus their cameras on anything that might be of interest, 'automatically discovering knowledge', providing information that helps their hierarchy deal with uncertain data and make decisions in a context where officers would rely on access to 'knowledge repositories' (databases, satellite observation, intelligence etc.). Information collected by the soldiers on the ground is recorded to augment a dedicated database processed mechanically using deep learning algorithms under the surveillance of the battalion's ICT analyst, who, in turn, is 'communicating with knowledge systems'.

From all of this, the battalion analyst watches AI algorithms process mountains of data, combining this military intelligence and surveillance systems with these observations made in real time by soldiers on the ground – thus helping officers make specific combat-related decisions (whom to target, how to get out of there etc.). This analyst communicates with officers

who rely on AI output as the basis for such decisions and further instructions. In this work, soldiers as highly parametrized sensors and battlefield workers are remote-controlled and steered by these officers relying on AI platform recommendations. Soldiers help officers make 'trade-offs in accuracy and efficiency of algorithms', meaning that these help officers make sense of information, of analyses and of recommendations that they receive from AI machine learning algorithms. Without these sensors on the ground, the army recognizes that 'communication between humans and knowledge repositories is fraught with ambiguity and lack of trust (on part of the human), and the problem of mediating information exchange is open' (ARO-BoV).

Soldiers' work is thus redefined to serve sophisticated digital equipment carried on the battleground and communicating live with databases and AI algorithms that process this data and filter it towards scripted recommendations. Their tasks are partly parametrized to feed the database and to guide their swarm towards their targets. Compare this for example with discourse on swarms of robots. Parallel to the trend described here, there is another trend of deploying swarms of cheap robots networked together in a single 'swarmanoid' that can bring greater mass, coordination, intelligence and speed. The military use an interesting comparison with swarms of soldiers: 'Such machines do not get bored, tired, angry or frightened. They work out the best way to carry out their mission as it unfolds' (ARO-BoV). One important fact must be taken into account to understand the promotion of swarms as templates. Military digitalized/digitalizing bureaucracy is already infused with swarm thinking, assuming the possibility of diverse mechanisms: decentralized movement of self-organizing, autonomous systems (*'Fire-and-Forget Swarms'*), performing collective tasks with no intervention; interactions between individuals based on midge sensing being assumed automatically to scale up to produce the macroscopic state of the large swarm; mechanisms producing resilient networks that are robust towards cascading failures and that can be engineered. This digitalization is thus equivalent to routinization and bureaucratization of usually highly chaotic situations that often fail to produce collective action.

New intelligence, surveillance and reconnaissance methods, space-based communication and stealth technology are part of long-term trends in warfare. Autonomous systems must observe, orient, decide and act ('OODA'). They perceive the world through their sensors, including those worn by humans. The horizon is that of designing algorithms that will power and coordinate truly autonomous machines and teams. This digitalization and bureaucratization of the battleground drives the military to focus on autonomous learning systems, human-machine collaborative decision making, assisted human operations networked with autonomous weapons. Such human-machine collaboration in combat is meant to help humans make better decisions more quickly. AI algorithms become important in big data analytics managing unprecedented amounts of data, including video, generated by surveillance drones and the monitoring of social media posts by enemy groups. AI will combine all the information brought up by microphones, cameras, and so forth, analyse it and provide maps updated in real time, a description of the situation, and recommendations derived from analyses of similar situations recorded in the past. We do not know the extent to which this is actually used by officers to make decisions and manoeuvre through the battlefield.

Combat may speed up so much that humans can no longer keep up (Scharre, 2018), and therefore it is apparently hard for these soldiers to trust their digital assistants, i.e., systems they do not understand; but also to trust their officers who make decisions based on data that may not be accurate (missing information) and on norms/patterns that they may not share or even understand (see Al-Amoudi & Latsis, present volume). The information that is collected is heavily framed in graph-theoretic terms both for social network analysis (who is observed as interacting with whom in the 'host population', for example) and for semantic network analysis (which words recur in the soldiers' descriptions), and finally for the coevolution of both social

networks and semantic networks. The 'Army Impact' of this technology, that is, the more specific goals, is described using the following terminology: 'discovering information about social structures in a host population'; 'community detection in interaction diagrams'; 'processing neural network structures for functionality'; 'hidden structure detection: de-emphasizing strong communities to identify weak, hidden communities'; and finally 'finding hidden communities in large graphs for detection of adversarial groups embedded in host populations' (ARO-BoV).

A digital group exoskeleton against collegial/oppositional solidarity

In order to understand this focus on 'team assembly', it is useful to recall that teams have always raised problems for the hierarchical and bureaucratic military organization. Indeed, they represent both forms of motivation and secondary socialization, making it possible for soldiers to maintain high morale while behaving in ways unimaginable in civil life. Many studies (from Stouffer et al., 1949, to Shibutani, 1978) have confirmed the importance of small local units for morale among soldiers who understand each other as human beings. But also, a form of oppositional solidarity and informal norms are created by the same soldiers once they no longer feel that they understand, believe in or support the project behind the war. That is, when they are no longer willing to risk their lives for a war that does not make sense to them, or when they disobey orders coming from a hierarchy that is losing control.[6] Early and classical sociological work by Shils and Janowitz (1948) shows how important personalized relationships, group cohesion, esteem, affection, knowledge of expectations and protection of immediate associates, as well as a complex rapport to authority, were to Wehrmacht soldiers during WWII, not so much dedication to Nazi ideology (that characterized Waffen-SS troops much more).

6 A Shibutani-inspired research project would notice that no information is available in the literature about potential resistance to swarm-teams. As shown by Scharre (2018), interactions between humans and new technologies both excite and disturb the military establishments. This might be true of soldiers on the ground as well. Elite soldiers, for example, might dislike the deskilling entailed, and perhaps even sabotage manoeuvres by ignoring the voice in the mike, or by keeping the camera muddy.

When considered together with parallel research on 'team science', that is, team composition, the mathematical and normative template for team mobilization acquires a new meaning. The purpose of change in team management is expressed in military technocratic terms: 'Reducing Mission Planning and Execution' with a '25% decrease in planning and execution time'; with '50% reduction in gel time for squads, platoons, staffs, and joint combat operation teams'; and with '20% faster deployment of units' (ARO-BoV). The army benefits from high morale created by group solidarity but fears the disaffection of groups of soldiers once the latter start developing demoralized oppositional solidarity. Combined AI, CSS and SNA have raised military hierarchy expectations from social engineering in team management techniques that would prevent demoralization and solve problems more easily.

It is thus meant to leverage an assumed 'swarm intelligence' of the group. This would be equivalent to providing/imposing, with battlefield AI-driven equipment, what could be called a digital group exoskeleton for the group and its capacity for collective action. A sophisticated bureaucratic framework wants to compute and use an impersonal, interactional dynamic invariant around which the personalized relational infrastructure of the group can adjust. The managerial purpose is thus both to streamline the social energy and value of the group and leverage the capacity to coordinate that can be found in its nascent collegiality, and at the same time neutralize the potential for oppositional solidarity that it could generate simultaneously, and this by making soldiers more zombie-like than they have ever been. Pre-socialization to

swarm-teams for these future soldiers, but also for future workers and citizens, might be provided by first-person shooter (FPS) video games (such as *Counter-Strike, Borderlands, Call of Duty, Gears of War*, etc.). These video games start by immersing the players into a situation in which they have a gun, a minimap and in which they receive real-time instructions about objectives to collectively clarify using this 'swarm intelligence'.

Zooming in, zooming out: extension to teams in society at large

This case of military use of AI, CSS and SNA deserves attention, in spite of all the questions that can be raised about this reasoning, because society is actually ready for the transfer of the swarm template from the battleground to the workplace. Social scientists may interpret this fascination for swarms and mathematics as pure rhetoric and dismiss the underlying hyperbolic vision as laughable, as a vision in which no real-life chain of command believes a word. It could emerge from agency competition or corruption (companies selling technology to the military cost a fortune to taxpayers) even if a subgoal of this project is for many actors to line their own pockets, make sure their budget stays the same size, insure their buddy down the corridor does not get more than they do, and so forth. Part of this is a dream of replacing soft diplomatic expertise with hard military expertise based on science and other kinds of analysis within intelligence agencies. This is also what would drive this hyperbolic tone. Nevertheless, the reality is that society seems ready for these models and templates.

Rapid advances in AI and deep learning affect the ways wars are fought as much as how ordinary business is conducted in society (Mazzucato, 2015). The objective of swarms as a project is control and a new form of social discipline based on specific uses of technology that creates a new interaction between human and machine. This transition from military to civil life has been accelerating since 11 September 2001. If AI, machine learning, robotics, big data analytics, and theories of management of human groups in swarms transform military work on the ground and change warfare, it is important to look at how military competition and the unstoppable arms race for AI dominance might influence societal change. Trends in warfare will change society because they create new and overwhelming problems when the human is out of the loop.

Temptation to let the machine take over may itself become overwhelming,[7] and temptation actually to use the human group as a machine will be even more overwhelming. If, based on Centeno and Enriquez (2016), this becomes a template or model for widespread reorganization of work in society, then we may be witnessing a new form of bureaucratization, one that heralds the last days of collegiality at the ground level, on battlefields as much as on the shop floor or in everyday civilian projects. 'Swarming project management' might become a management tool for coordination in organizations. Beyond the buzzword, swarming might become a specific project management practice. Organizations and institutions beyond the military might be ready to follow this ideology and and use the technology. The datasets are available. They are not just owned by private Big Tech hegemonic platforms specialized in social and organizational networks.[8]

[7] We were not provided with information about how this system might be implemented, adopted and criticized by the top brass of the military as well as from the rank-and-file soldiers, for example in terms of military efficiency (ratio of number of enemy destroyed per dollar spent; loss of a number of relational goods such as camaraderie, respect for the human element, respect for their own trade (being a (wo)man of war) or for their elite troop status (as opposed to just a drone with a human body), including collateral damage).

[8] For example, the controversial decision taken by the U.S. Administration in March 2012 to allow the National Counter-Terrorism Center (NCTC), one of the agencies that was created in the aftermath of 9/11, to collect and

merge into one database all the information the US government has on any US citizen, whether suspected, or linked to, a specific procedure of investigation by public authorities, was a news item, like so many others, that was put into the 'big surveillance' category. Now the NCTC can conduct any analysis of individuals and their behaviours, organized activities or networks based on the data the US public authorities have (in the financial, economic, educational, police, health, relational etc. domains). It can also share and exchange information with foreign governments when necessary. According to the American media, that political decision, though disputed within the Administration, did not meet with much resistance from the public, although half the Administration team in charge of the project left in protest. On that topic see: A Comparison of the 2008 and 2012 NCTC Guidelines: www.fas.org/sgp/othergov/intel/nctc_guidelines.pdf

Relations between public authorities (in the US) and Big Tech companies are well known, and 'big surveillance' now extends not only to individuals but also to social and organizational networks and to the links between those networks. However, beyond the surveillance of individuals, whose private life and right to privacy are obviously threatened, if not disappearing, such organizations are able to piece together, and even anticipate, the development of different forms of social mobilization and collective action in civil society. This includes knowing the leaders and the members, their organization and the techniques they use to circulate information on social media, the structural and semantic characteristics of those movements, their coordination, their capacities to mobilize and their collective resources, including the content of their projects.

AI algorithms are also one of the specificities of CSS and complexity sciences in the analysis of such very large and rich network datasets (sociodigital media like the blogosphere, groups or lists of collective actors who 'follow' each other in real time and communicate in new sociotechnical environments, etc.) combined with big surveillance. Given the gigantic scale of those databases in which the private, for-profit study of social behaviour is increasingly grounded, the methods used in such approaches will for example result in the mechanical detection of 'communities' and their dynamics. Just as practitioners of targeted marketing look for specific niches and really central prescribers-intermediaries between those niches, the analysis and detection of communities allows for the zooming in and zooming out that institutions such as the NCTC practice.

Until recently, the very big digital social networks that were studied were made up of a very high number of entities on which very little was known. Relations between those entities were also usually written in a very simplified way: the 'data' was considered at a very high level of generality, which was enough to identify those 'communities' but rarely to specify, for example, their different forms of collective action. Action theories on which those approaches relied, when they existed, were minimal (see Barabási's (2003: 11) punchline: 'Think of yourself as a dreaming robot on autopilot, and you will be much closer to the truth'). Generalized competition, increasingly flexible labour markets and mobilizations of civil society lead actors to look for or create new tools to manage their economic and social interdependencies. The development of personal and organizational digital online networks, together with platforms organizing them, created a context where interdependencies can be managed as relational capital by the individual or as social capital for the organization, which could sometimes have virtuous effects and sometimes disastrous ones. The forms of social discipline that citizens accept as legitimate has evolved with technological changes (Lazega, 2015b). Techniques of control of individual behaviour through the manipulation of sensitive reactions and emotions (in military ARO-BoV jargon: 'angry mood manipulations') have reached a degree of refinement which allows bureaucracies to directly and unobtrusively intervene on those behaviours.

AI is already increasingly used by administration, public or private, to forecast demand, hire workers and deal with customers, helping managers exercise extraordinary control over their employees. Badges already track employees around the office and reveal how they interact with colleagues, spreading ubiquitous surveillance. With merged data from badges and from employees' calendars and e-mails, for example, algorithms will decide whether or not

employees are team players, monitor how they are collaborating, send feedback on their work in real time, and provide instructions on how to do better. The choice in some jobs will be between being replaced by a robot or being treated like one. This oppressive and Orwellian surveillance in the workplace is presented as creating trade-offs between privacy and performance, dehumanizing employees (Morgan, in this volume).

If the data is available for civil institutions to start fantasizing about the use of the swarm template, online social network data already falls in this category of big data and AI is already at the heart of how online social network platforms manage this network data. AI as a set of 'machine learning' or 'deep learning' algorithms are inherently secretive and normative black boxes. Their working can be next to impossible to understand for outsiders. They format, homogenize, analyse, classify and diagnose the phenomenal amounts of information that they have on billions of actors (persons, organizations, governments) and their behavior and interdependencies. Algorithms are programmed to filter and analyse these massive datasets that are updated sometimes in real time. These algorithms find statistical regularities in the data, and then associate these regularities with patterns and norms to identify solutions to problems by recommending content (news, thoughts, knowledge), contacts, jobs, behavior/action/moves, or products (marketing) in a personalized and mechanical way. Since data (about context – including context as social network and characteristics of one's contacts – behavior, relationships, etc.) changes continuously based on input by pervasive technologies, norms and solutions may change and be updated too. AI no longer uses fixed and rigid scripts to find 'solutions'. How these algorithms work, how they build this reflexivity, is proprietary and unknown to the public, with many arbitrary sub-decisions (related for example to thresholds, significance levels, etc.). Platform engineers are said to understand what the algorithms that they programmed do. But post-learning connections between new information cannot be predicted ex ante without running the algorithm first. Contemporary examples show that this digital infrastructure is used for directly political purposes, such as monitoring, intoxicating and paralyzing opposition. One can wonder through which specific processes Big Tech influences AI. How do they choose when the algorithms need refining and when they are fit enough for purpose? For instance, false results affecting rich, white, politically active people might prompt fine-tuning the algorithms even if this is costly; on the other hand, false results affecting poor, brown, politically neutralized people might be safer to ignore.

Struggles for the control of this technology by powerful actors is likely to be violent, providing new tools for political influence and socio-economic control of individual behaviour and societies and their institutions, for example through personalized 'filter bubbles' (Roth & Cointet, 2010). This transition is hyper-centralized, in the making, and based on mainly private research – public academic research being largely shut out and left behind. Perhaps swarm-teams were born in the military because it is an institution in which the organization of work leaves little room for normative discussions in the first place. In the army, situations are often urgent and hierarchy is usually clear and inflexible. As shown by Al-Amoudi and Latsis (this volume), AI is not capable of justifying normative decisions to human beings. In the context of the military, AI's incapacity to provide normative justification might perhaps explain how swarm-teams spread: first in the army, then at work, then in everyday life.

Broader social and cultural conditions of possibility for the spread of the swarm-teams template might include the more general weakening of collegial pockets below the executive suite in organizations, especially unions at the shop floor level and the professions in more expert departments. It will be difficult for soldiers (and after them perhaps for medical doctors, for lawyers and for academics) to criticize swarm-teams on the basis of their professional group's values. An additional cultural condition can be identified in the exclusion of morals from public reasoning that Porpora (this volume) wrote extensively about. So a soldier may criticize swarm-teams on the basis that they are not as efficient as they pretend to be. However,

it might be difficult to criticize them on the basis that they undermine the honour of combatants (see Edelmann, 2018, for an extension of this argument).

Swarm templates as reinventions of collective responsibility

During my visit, the Board of Visitors was staffed with mathematicians advising about a more general mathematization and social digitalization of military work. Swarms as mathematical collective action templates show a vision of collegiality as shaped by bureaucracy, that is, that has been transformed inside out, as in stigmergic interactions. In this template, swarms are a top-down organizational process that is also meant to co-opt bottom-up processes such as oppositional solidarity. One may argue that if these are attempts to find mathematical laws that will lead to ways to control people and 'help' them govern society, they are bound to fail. However, the problem is that the assumptions and rules that are derived from these swarms end up framing decisions. Just because a goal is unattainable does not mean that pursuing it is without consequences.

Although this chapter does not provide an in-depth look at the military organization of teamwork in battlefields, the point is to understand the direction in which the military institution using AI is potentially steering social change with digitalization. The military swarm template signals that the large bureaucracies of the world want to neutralize collegiality 'below' in the hierarchy using AI. One of the few kinds of collegiality left in a bureaucratized world is in workgroups, in teams on the ground. Such collegial pockets/settings have always been closely monitored (and often targeted for dissolution) by the wider bureaucratic organizations of which they are part, because they are crucial to carrying out tasks but also tend to develop oppositional forms of solidarity, even if they are also innovative (Courpasson, 2000). This oppositional solidarity can be further dissolved, used and transformed by digitalization, but this time used and transformed inside out to become forms of solidarity that are no longer threatening to the bureaucratic organization as a whole.

Digitalization is the latest avatar of bureaucratization, a special avatar, one that has turned on collegiality itself, that is, innovative work that needs coordinated human relationships to be carried out, trying to routinize what had always resisted routinization. It does this by trying to reduce relationships to digitalized interactions. Thus what swarm templates represent or illustrate is a generic attempt at uniformization of cooperation and innovation emerging from relationships, relational infrastructures and social processes in society. There is something dystopian and profoundly socially destructive in this social trend: the idea that AI technology will finally succeed in doing, unobtrusively, what bureaucracy was never able to achieve up to now: controlling the residual part of action that needs appropriateness judgments, endogenization of structure, relational infrastructure and reflexive commitment to the whole – not just to five flock neighbours.

More public knowledge is needed about criteria for team assembly (Contractor, 2013). Team composition may be important to answer the question of whether it is really possible to eliminate oppositional solidarity and at the same time make a team effective. Solidarity is an element of effectiveness, which emerges from experience and questions the possibility of achieving both goals simultaneously. This is where criteria of team assembly are important. Common experience sometimes erases the salience of differences between team members. Teams sometimes begin as very unsettled and then emerge as very effective groups thanks to experience.

The military institution invests massively in mathematical research and digital technology of collective action that is meant to redesign its ways of war. And yet social scientists are sceptical, not just because coordination among humans cannot be perfect, but because the very uncertain nature of many of their tasks requires personalized relational work that is not just a series of impersonal interactions that can be remote controlled systematically (Duran & Lazega, 2015). But the military has long been a source of inspiration for management, from leadership vision, organizational preparation, planning, evaluation of tactics against broader strategy, and avoidance of mission creep, all considered as requisites to winning battles. This includes for example principles of commando training: clear communication and alignment; definition of a team's goals and missions; recruitment of people who want to be part of a team and are willing to be good followers; clear definition of team members' roles and responsibilities, of everyone's action plans in uncertain and changing environments; autonomy and the ability to take decisive action; capacity to assume the roles of superiors at a moment's notice; giving and receiving support.

As presented everywhere today in the mass media, artificial intelligence is one of the most powerful technologies developed by humankind. AI prospects and pumps and centralizes unprecedented quantities of data, non-stop, from the internet, open or closed access, public or private, confidential or intimate, on all digital online devices, in all its forms, written, images, audio, video. Then it analyses, classifies, aggregates, and updates in real time. This technology is transforming almost every industry, including the medical, finance and banking industries. Due to its potential, there are enormous financial investments into AI. Every time one of the users of online hegemonic platforms opens an application, a personalization algorithm sorts through all the posts that a person could theoretically see and dishes up the fraction it thinks she or he would like to see first. The system weighs hundreds of frequently updated signals. Without AI, many of these signals would be impossible to include in statistical analysis, but analysis nevertheless is never neutral.

Combined with the efficiency of AI described previously, these management devices will change the workplace. The overall argument is that bureaucratization is well positioned to win through AI which will help eliminate at least one form of collegiality in bureaucracy, that is, bottom up with oppositional solidarity, as Human Relations Management has been trying to do for a century. One critique of this argument is that if AI is giving good, effective information then armies based on this digital and social technology will fail by creating precisely the oppositional structure that they are trying to avoid.[9] So the question of how clear it is that the technology is succeeding or failing needs further attention. Indeed, failure and success are very relative in this area. Digital technology might just provide a more efficient killing machinery, a more efficient form of destruction that just spreads the illusion of efficiency and perfect organization by simply hiding certain forms of inefficiency. From this perspective, it is impossible not to mention, for example, journalistic information that the 'U.S.-led coalition in Iraq is killing far more Iraqi civilians than previously acknowledged in its "precision" air campaign against the Islamic State – 31 times more, in fact.'[10] This might be the cost of using AI and the swarm template to target enemy networks. The swarm-and-forget approach did indeed forget to measure the collateral damage of this military strategy. Social digitalization thus converges towards imposing on people's destiny a social script derived from such data by computer scientists, engineers and bureaucrats. Whether well intended or not, this trend can only reinforce physical and symbolic violence in a society already very unequal (Elias, 1984 edition; Delzescaux, 2016; Varman & Al-Amoudi, 2016). This imposition is nothing new, but its systematization can only decrease social cohesion at a time when this cohesion is needed for more justice, more resilience in the ecological transition and more sharing of new ideas for institutional entrepreneurship.

9 Something very similar takes place in universities. Top management sees many adavantages in bureaucratization. Collegial units are monitored for their precise objectives and quantified performance outcomes, which generates further oppositional structure and mindset.

10 A.Khan and A.Gopal, "The Uncounted", *New York Times*, 16 November 2017.

Prospects of its extension to civil society may be linked to the fact that, in many ways, this swarm template requires a form of collective responsibility that might also be useful to governments in the management of future transitions. The lesson from the military swarm template might be that new forms of collective responsibility, based on transforming human beings into 'dreaming robots on auto-pilot', to use again Barabási's (2003) expression, reduce relationships to interactions. This is part of controlling and dehumanizing people, which is also what the military does, as historians have recently shown about manipulations of emotions by the massive distribution of alcohol in WWI trenches. With the swarm template and digital exoskeleton, social actors might be subjected to new forms of punitive collective responsibility as part of a now irreversible process of the digitalization of society.

Punitive collective responsibility has always been a reality. Recall Hannah Arendt's observations on collective responsibility in *The Origins of Totalitarianism* (1951):

The Okhrana, the Czarist predecessor of the GPU, is reported to have invented a filing system in which every suspect was noted on a large card in the center of which his name was surrounded by a red circle; his political friends were designated by smaller red circles and his nonpolitical acquaintances by green ones; brown circles indicated persons in contact with friends of the suspect but not known to him personally; cross-relationships between the suspect's friends, political and nonpolitical, and the friends of his friends were indicated by lines between the respective circles. Obviously, the limitations of this method are set only by the size of the filing cards, and, theoretically, a gigantic single sheet could show the relations and cross-relationships of the entire population. And this is the utopian goal of the totalitarian secret police: a look at the gigantic map on the office wall should suffice at any given moment to establish, not who is who or who thinks what, but who is related to whom and in what degree or kind of intimacy. The totalitarian ruler knows that it is dangerous to send a person to a concentration camp and leave his family and particular milieu untouched; [It is a common practice in Soviet Russia to arrest whole families; Hitler's 'Health Bill' also foresaw the elimination of all families in which one member was found to be afflicted with a disease.] the map on the wall would enable him to eradicate people without leaving any traces of them – or almost none. Total abolition of legality is safe only under the condition of perfect information, or at least a degree of knowledge of private and intimate details which evokes the illusion of perfection.

(Arendt, 1951/1973 edition: 432)

Arendt's early lucidity suggests that a new form of punitive collective responsibility is in the making in society where AI is organizing collective action based on the swarm template.

These trends represent vital challenges for sociology. This transformation of one of the last forms of bottom-up collegiality as an organizational form into bureaucratically remote-controlled processes may have more effects than we currently anticipate and deserves more attention. In current environmental and societal crises, the number of complex and extreme situations that citizens must face, experience and act upon is increasing. In this context, different kinds of social networks, physical and digital in particular, are building blocks of new forms of collective action. Sociologists should look more at how citizens use relational and network thinking and new (particularly digital) technologies to build new forms of social discipline that they (the citizens) consider to be legitimate, and that they (the citizens) hope will help them manage the dilemmas of their individual and collective actions in such complex and extreme situations. One requirement for facing this challenge is to build public knowledge of how social network analyses help citizens approach the generic processes of their own social life at the local level: forms of social solidarity, inequalities and exclusions (for sharing all sorts of resources, including cultural, economic, emotional); collective learning and forms of

socialization; social control and conflict resolution; regulation and institutionalization of new norms and practices; and so forth. The recursive feedbacks between such processes on the one hand, the creation of new and specific digital technologies or web-based social networks on the other hand, are among the frontiers of current knowledge in the social sciences.

Are we bound to witness and participate in this bureaucratization through AI digitalization based on this swarm template? Since this might kill innovation as well as people, facing this challenge requires finding alternatives. A recent explosion of collegial organizations harnessing the potential of collegial networks online and in real life is associated with peer-to-peer (P2P) networks (Pazaitis, Kostakis, & Bauwens, 2017; Bauwens & Kostakis, 2017): control of these technologies could be shared at least by open science, preventing monopolistic hegemons from acquiring the power over knowledge that the military has over physical strength and violence. Technology will not facilitate the good society if it is hoarded and monopolized. Other uses of data and applications may make bottom-up collegiality easier and easier to afford and operate, as in P2P self-organization by coworking groups or cooperatives. The latter may solve difficult and costly problems associated with collegiality, building consensus for example, by relying on P2P technology, cloud computing and information available to all on the internet (with or without internet neutrality).

Indeed, such alternatives might help resist the privatization of knowledge and privatization of social sciences by private web giants increasingly monopolizing data about individuals, relationships and societies, reshaping economies and politics through platform reorganization, concentrating power to compete with public authorities and build institutions, and dismantling checks and balances to the point of threatening already fragile democracies. The new technology is not necessarily violent in the sense of physical brutality. It is violent in the sense that it undermines alternative forms of collective action based on the commons, including the knowledge commons, and alternative conceptions of the public interest. A credible regulation of such giants remains to be designed and enforced.

Swarm templates mobilize belief in 'laws'[11] derived from heavy-duty mathematics and are a symbol of further bureaucratization of warfare and of military-driven social morphogenesis. The public at large does not know exactly what the algorithms of AI are and what they do. They are private and secret. Big Tech companies build their competitive advantage and monopoly powers on this secrecy. But AI models will be 'efficient' as long as their assumptions hold. If society follows that path, this new kind of bureaucratic and symbolic violence will allow those in power to decide who will be able to coordinate and pool resources (material goods, intelligence, effort, time etc.) to act collectively. This struggle has always been part of democracy, but the latter's future is again at stake in the new ways in which this further struggle takes place between digitalized bureaucracy and collegiality turned inside out.

11 "Laws" that echo George Orwell's "Sooner or later a false belief bumps up against solid reality, usually on a battlefield" (*In Front of Your Nose*).

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