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### Tightening the OODA Loop: Police Militarization, Race, and Algorithmic Surveillance

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# **Tightening the OODA Loop: Police Militarization, Race, and Algorithmic Surveillance**

**Jeffrey L. Vagle\***

## **Abstract**

This Article examines the role military automated surveillance and intelligence systems and techniques have supported a self-reinforcing racial bias when used by civilian police departments to enhance predictive policing programs. I will focus on two facets of this problem. First, my research will take an inside-out perspective, studying the role played by advanced military technologies and methods within civilian police departments, and how they have enabled a new focus on deterrence and crime prevention by creating a system of structural surveillance where decision support relies increasingly upon algorithms and automated data analysis tools, and which automates de facto penalization and containment based on race. Second, I will explore these systems—and their effects—from an outside-in perspective, paying particular attention to racial, societal, economic, and geographic factors that play into the public perception of these policing regimes. I will conclude by proposing potential solutions to this problem, which incorporate tests for racial bias to create an alternative system that follows a true community policing model.

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## **I. Introduction**

As militaries transition from a war footing to a postwar posture, they inevitably shed excess equipment and technology that is outdated, no longer needed, or too expensive to maintain. In the drawdown from the wars in Iraq and Afghanistan, the U.S. military found willing recipients of this materiel in local and state police departments. In addition to these technology transfers, local police departments have increasingly adopted military tactics, techniques, and procedures (TTPs)—originally conceived and designed for military units in combat operations—for use in their day-to-day policing. This combination has led to the overall militarization of civilian police forces in the United States, putting wartime tools in the hands of peace officers.

This trend toward police militarization has found enthusiastic support in departments adhering to the “broken windows” theory of policing, especially with respect to technologies and TTPs meant for intelligence analysis or surveillance purposes. This phenomenon may be seen as the natural result of the industrial and post-industrial society’s desire to maximize control and efficiency—across all spheres of life—through careful observation and data analysis. While these advances have garnered many societal benefits, it has also established a system of structural surveillance that has entered a renaissance with the help of military technologies. Automated surveillance analysis systems, developed in the wake of 9/11, have given police departments a powerful toolkit to advance algorithmic policing strategies. But these algorithmic approaches too often target poor and minority communities, inserting a de facto racial component into the system, even when the automated intelligence systems are fed “objective” crime data.

This Article examines the role military automated surveillance and intelligence systems have supported a structure of self-reinforcing racial bias when used by civilian police departments to enhance predictive policing programs. I will focus on two facets of this problem. First, my research will take an inside-out perspective, studying the role played by advanced military technologies and methods within civilian police departments, and how they have enabled a new focus on deterrence and crime prevention by creating a system of structural surveillance where decision support relies increasingly upon algorithms and automated data analysis tools, and which automates de facto penalization and containment based on race. Second, I will explore these systems—and their effects—from an outside-in perspective, paying particular attention to racial, societal, economic, and geographic factors that play into the public perception of these policing regimes. I will conclude by proposing potential solutions to this problem, which incorporate tests for racial bias to create an alternative system that follows a true community policing model.

## **II. The Militarization of Police Intelligence Operations**

The militarization of civilian law enforcement agencies (LEAs) has long been anathema to the founding principles of the United States, and viewed as corrosive to civil liberties in a constitutional democracy generally.<sup>1</sup> Paradoxically, contemporary American society has increasingly taken a distinctly militaristic approach to solving its (non-military) political, social, and economic issues, applying war metaphors to programs and policies to emphasize the seriousness of the problem and the approach to

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<sup>1</sup> See Phillip T. Wyrick, *Police Militarization: Attitudes Towards the Militarization of the American Police*, (2013), <http://dc.etsu.edu/etd/1161/> (last visited Sep 4, 2015).

it.<sup>2</sup> These mixed signals have been the backdrop to a steady increase in the militarization of U.S. civilian police forces post-World War II, with racial tensions, “broken windows policing,” the “war on drugs,” and the “global war on terror” acting as the primary catalysts of this phenomenon.<sup>3</sup> The most visible aspect of police militarization can be seen in the increased deployment within LEAs of weapons, equipment, and training designed for use in combat by militaries.<sup>4</sup> While these manifestations might be the most outwardly obvious signs of this trend, there is a more basic facet of militarization that LEAs have almost universally adopted—intelligence operations.<sup>5</sup>

### **A. Military Intelligence and the Development of the OODA Loop**

The importance of intelligence operations to the military is a long accepted principle, based on the fact that as often quite large and distributed organizations, militaries are expected to think and act as if they were a unitary being.<sup>6</sup> The pace, environment, and sheer horror of combat combine to create a state of near chaos—“the province of uncertainty”—through which militaries are forced to navigate.<sup>7</sup> In order to

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<sup>2</sup> See Peter B. Kraska & Victor E. Kappeler, *Militarizing American Police: The Rise and Normalization of Paramilitary Units*, 44 SOCIAL PROBLEMS 1–18 (1997).

<sup>3</sup> *Id.*; Amanda Geller & Jeffrey Fagan, *Pot as pretext: Marijuana, race, and the new disorder in New York City street policing*, 7 Journal of Empirical Legal Studies 591–633 (2010); Bernard E Harcourt & Jens Ludwig, *Broken windows: New evidence from New York City and a five-city social experiment*, The University of Chicago Law Review 271–320 (2006); Jamila Michener, *Neighborhood Disorder and Local Participation: Examining the Political Relevance of “Broken Windows,”* 35 Political Behavior 777–806 (2013); Steve Herbert, *Policing the contemporary city: Fixing broken windows or shoring up neo-liberalism?* 5 Theoretical Criminology 445–466 (2001).

<sup>4</sup> Peter B. Kraska & Louis J. Cubellis, *Militarizing mayberry and beyond: Making sense of American paramilitary policing*, 14 JUSTICE QUARTERLY 607–629 (1997).

<sup>5</sup> Robert W. Taylor & Amanda L. Russell, *The failure of police “fusion” centers and the concept of a national intelligence sharing plan*, 13 POLICE PRACTICE AND RESEARCH 184–200 (2012).

<sup>6</sup> Carl von Clausewitz, *On War* (1909).

<sup>7</sup> *Id.*

mitigate at least some of the disorienting effects of warfare, modern militaries must organize themselves around rational, bureaucratic principles, with robust networks of communication and information management at their core.<sup>8</sup> Military command structures simply can not function without the timely communication of information on a wide range of broad and narrow topics including terrain, troop strength and movements, civilian considerations, transportation networks, availability of supplies, enemy disposition and morale, weather and light conditions, and more—all in support of the theory that the better prepared and informed army has the advantage.<sup>9</sup> This general concept is often referred to as military intelligence, or more succinctly, “intelligence.”<sup>10</sup>

The term intelligence is not well defined, however, as it draws from a wide array of broader issues, such as strategy, command and control, and communications.<sup>11</sup> It is clearly more than an exhaustive cataloging of all available information. Even if this was

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<sup>8</sup> M. D. Feld, *Information and Authority: The Structure of Military Organization*, 24 AMERICAN SOCIOLOGICAL REVIEW 15 (1959). The concept of bureaucratic organization is essential to efficient military operations, where the principles of military command require levels of predictability and control at a level of scalability that precludes ad hoc organization. Because warfare is, by nature, chaotic and corrosive to organization and communication, military organizations attempt to minimize these effects through levels of bureaucratic stability that enable information flow—one of the essential requirements of command. Id.

<sup>9</sup> John A. Allen et al., *A framework for supporting human military planning*, in PROCEEDINGS OF THE SECOND ANNUAL CONFERENCE OF THE INTERNATIONAL TECHNOLOGY ALLIANCE, LONDON UK (2008), <https://www.usukita.org/papers/3857/CPM%20Framework.pdf> (last visited Sep 11, 2015). The hierarchical bureaucracy of military organizations is based around the need to efficiently pass information, intent, plans, and commands up and down the chain of command that is both time sensitive and scalable to large organizations.

<sup>10</sup> See Michael I. Handel, *Intelligence and the Problem of Strategic Surprise*, in MICHAEL I. HANDEL, RICHARD K. BETTS & THOMAS G. MAHNKEN, PARADOXES OF STRATEGIC INTELLIGENCE: ESSAYS IN HONOR OF MICHAEL I. HANDEL (2003).

<sup>11</sup> See MICHAEL WARNER, WANTED: A DEFINITION OF INTELLIGENCE (2002), <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA525816> (last visited Sep 11, 2015).

possible, such a tool would quickly prove useless to militaries as their organizations became mired in irrelevant information, and would be forced to spend valuable time and resources ferreting out the useful bits.<sup>12</sup> Intelligence, therefore, must produce information in a form and quantity that can be used by the organization to make timely decisions regarding plans and operations. This characteristic is often summarized as “actionable” intelligence.<sup>13</sup> The goal of perfectly actionable intelligence is often unattainable, however, and is best thought of in aspirational terms.<sup>14</sup>

The industrialization of the 18<sup>th</sup>, 19<sup>th</sup>, and 20<sup>th</sup> centuries yielded paradigmatic advances in the technology and, subsequently, the conduct of warfare, which in turn brought with it the critical need for more rapidly-made decisions based upon fresher, more accurate, and more copious intelligence.<sup>15</sup> The United States military experience in Vietnam illustrated just how crucial intelligence and communications had become in

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<sup>12</sup> See Robert L. Bateman III, *Avoiding Information Overload*, 78 MILITARY REVIEW 53 (1998).

<sup>13</sup> Andrew Rathmell, *Towards postmodern intelligence*, 17 INTELLIGENCE AND NATIONAL SECURITY 87–104 (2002).

<sup>14</sup> In fact, as military intelligence related incidents involving torture, untruths, and censorship over the past decade have shown us, the remorseless pursuit of perfectly actionable intelligence has led to bloated military contractor budgets, loss of friendly and civilian life, and atrocities. See, e.g., SEYMOUR M. HERSH & PETER FRIEDMAN, CHAIN OF COMMAND (2004), <http://samizdat.cc/shelf/documents/2004/05.10-hersh/hersh.pdf> (last visited Sep 11, 2015).

<sup>15</sup> Military theoreticians divide the history of modern warfare into four generations, each of which marked by technical, political, economic or social changes or advances. The first generation of modern warfare emerged with the widespread use of gunpowder and the shift in Europe from a feudal economy to the modern nation-state. Second generation warfare is identified with the nation-state’s ability to generate large revenue streams through widespread taxation on increasing wealth. The German Blitzkrieg is the starting point of third generation warfare, with high maneuverability being used to break the protracted impasses characteristic of World War I. Finally, fourth generation warfare—the mode in which theorists currently put us—is summarized by enormous advances in communications and weapon technologies along with the rise of guerilla movements and asymmetric warfare. See THOMAS X. HAMMES, THE SLING AND THE STONE: ON WAR IN THE 21ST CENTURY (2006).



modern warfare, where larger, better equipped forces were often outmatched by much smaller, yet better informed, groups of guerillas and regular army soldiers.<sup>16</sup> The post-Vietnam collapse of the U.S. military sent shock waves through the Pentagon, whose leadership began the arduous process of rebuilding a communications- and intelligence-centric army capable of fighting a fourth generation war.<sup>17</sup>

During this period of reconstitution in the U.S. military, a U.S. Air Force combat flight instructor named John Boyd, long known for his highly analytical approach to solving military problems, took on the challenge of intelligence and communication in a fast-moving conflict, and began to develop a general theory of military organizational analysis and action.<sup>18</sup> As a veteran of air combat flying the F-86 Sabre in “MiG Alley” during the Korean War, Boyd knew well the need for fighter pilots to gather, process, and act on information in a very short amount of time, all while flying an aircraft filled with jet fuel and munitions at hundreds of miles per hour, often while being shot at.<sup>19</sup>

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<sup>16</sup> A prime example of this phenomenon can be found in the January 1968 Tet Offensive, where North Vietnamese Army (NVA) and Viet Cong (VC) guerilla forces conducted a series of well-timed, highly-coordinated attacks on U.S. military installations and South Vietnamese government buildings across all of South Vietnam. While these attacks were ultimately repulsed by U.S. and South Vietnamese forces, the widespread effects of the offensive marked the beginning of the end of the American war in Vietnam. Historians and military theorists widely attribute much of the success of the outnumbered NVA and VC forces to poor U.S. military intelligence, which completely failed to anticipate the Tet Offensive as well as the military, political, and social costs that would follow from it. See JAMES J. WIRTZ, *THE TET OFFENSIVE: INTELLIGENCE FAILURE IN WAR* (1994).

<sup>17</sup> See HARRY G. SUMMERS, *ON STRATEGY: A CRITICAL ANALYSIS OF THE VIETNAM WAR* (1995).

<sup>18</sup> See Scott E. McIntosh, *The Wingman-philosopher of MiG alley: John Boyd and the OODA loop*, 58 *AIR POWER HISTORY* 24 (2011).

<sup>19</sup> See David S. Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, (1995). It is somewhat noteworthy that Boyd himself shot down no enemy aircraft during his combat tour in Korea. This was due not to a lack of combat sorties—Boyd flew 22—but to the fact that all of his combat flights were as a wingman, rather than lead. His perspective and experience in this role, however, may well have given Boyd the insights he later developed in his military theories and instruction. Scott E. McIntosh, *The Wingman-philosopher of MiG alley: John Boyd and the OODA loop*, 58 *AIR POWER HISTORY* 24 (2011).

Boyd, a student not only of the great modern military theorists such as Clausewitz and J.F.C. Fuller, but also of philosophers, mathematicians, and physicists, including Kurt Gödel and Werner Heisenberg, actively sought out symmetries and commonalities in his analyses in an attempt to get at the true root of the problem at hand.<sup>20</sup> His multidisciplinary approach allowed him to extrapolate common principles from his experiences, and in 1976, he published the first of five essays on the cognitive, psychological, and temporal processes core to all military intelligence analysis and decision-making processes, from the highest command levels to the lowest.<sup>21</sup>

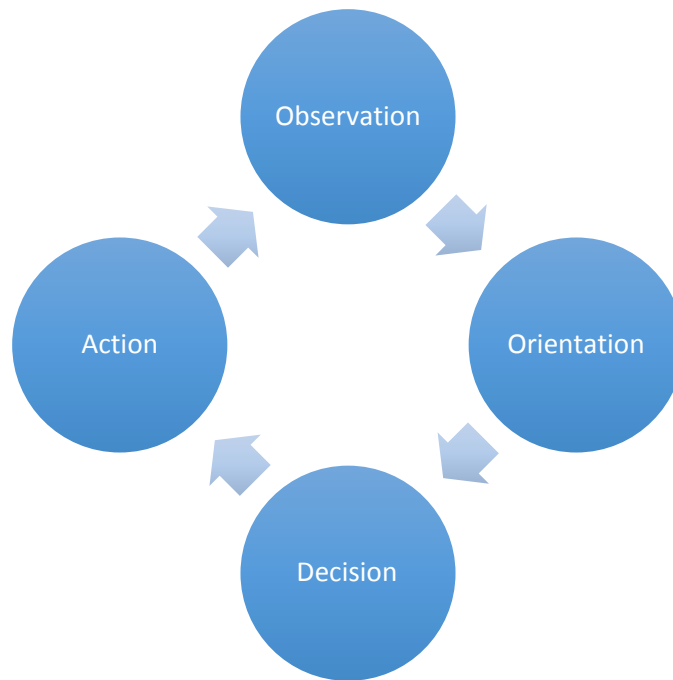
Boyd's described his groundbreaking theory as a cognitive cycle containing four tasks: Observation, Orientation, Decision, and Action (OODA) (see Figure 1).<sup>22</sup>

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<sup>20</sup> See David S. Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, (1995).

<sup>21</sup> *Id.*

<sup>22</sup> Since this Article is not devoted to Boyd's OODA loop per se, I will restrict the cycle's description to its most basic form. Boyd's insight can still be quite easily seen in this summarized version, as it describes the rational human behavior found in individuals as well as organizations. For a more detailed analysis of the OODA loop, see *Id.*; A K Cebrowski & J J Garstka, *Network-centric warfare: Its origin and future*, US Naval Institute Proceedings (1998); S E McIntosh, *The Wingman-philosopher of MiG alley: John Boyd and the OODA loop*, Air Power History (2011).



*Figure 1: The OODA Loop*

Through an informed utilization of the Boyd Cycle—more often referred to as the OODA loop—one could not only gain a strategic or tactical advantage over one’s enemy, but in turn, disrupt the enemy’s own OODA loop by denying them the ability to run through their own Boyd Cycle due to the speed at which you are able to run through your own.<sup>23</sup> The goal for any military organization, according to Boyd, is to increase the speed at which it can navigate this cycle, or “tightening” the OODA loop.<sup>24</sup> The army that is able to manage the tightest OODA loop is therefore able to “get inside” their opponent’s cycle, thus disrupting their ability to gather, process, and act on intelligence.<sup>25</sup>

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<sup>23</sup> Id.

<sup>24</sup> See S E McIntosh, *The Wingman-philosopher of MiG alley: John Boyd and the OODA loop*, Air Power History (2011).

<sup>25</sup> Id.

The OODA loop was, as Boyd observed, a characterization of the process all living things go through as part of their everyday survival.<sup>26</sup> Learning and adapting were what successful individuals and groups accomplished faster than their less lucky competitors—Boyd had distilled this naturally occurring process into a form which could be analyzed and executed by military strategists and tacticians. Boyd continued to develop this concept through the mid-1980s, and continued to present his theories to large military and civilian audiences well into his retirement.<sup>27</sup> Boyd’s theories enjoyed moderate success among contemporary military leadership at the time, mainly among theorists and scholars. But in the early 2000s, his ideas were rediscovered and found a heightened relevance among a new generation of warriors joining a high-tech military in a post-9/11 world.<sup>28</sup> This renewed popularity soared even further, when non-military and quasi-military organizations seeking competitive advantage through information-centric efficiency—universally accepted as the path to success since the earliest days of industrialization—increasingly turned to military organizational theories and doctrines for inspiration.<sup>29</sup>

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<sup>26</sup> See Scott E. McIntosh, *The Wingman-philosopher of MiG alley: John Boyd and the OODA loop*, 58 AIR POWER HISTORY 24 (2011).

<sup>27</sup> *Id.*

<sup>28</sup> This phenomenon will be more fully explored in Section III, *infra*.

<sup>29</sup> Since the mid-1990s, business and other non-military organizations—especially those in America—have fostered the emergence of a sizable cottage industry of books, consultants, and other organizational coaches applying military “lessons learned” to non-military environments. See, e.g., Douglas C. Bernhardt, “*I want it fast, factual, actionable*”—*tailoring competitive intelligence to executives’ needs*, 27 LONG RANGE PLANNING 12–24 (1994); GENE KLANN, CRISIS LEADERSHIP: USING MILITARY LESSONS, ORGANIZATIONAL EXPERIENCES, AND THE POWER OF INFLUENCE TO LESSEN THE IMPACT OF CHAOS ON THE PEOPLE YOU LEAD (2003); MARK C. BENDER, OPERATION EXCELLENCE: SUCCEEDING IN BUSINESS AND LIFE, THE U.S. MILITARY WAY (2004); PARTHA BOSE, ALEXANDER THE GREAT’S ART OF STRATEGY: THE TIMELESS LEADERSHIP LESSONS OF HISTORY’S GREATEST EMPIRE BUILDER (2004); DAN CARRISON & ROD WALSH, SEMPER FI: BUSINESS LEADERSHIP THE MARINE CORPS WAY (2004); SCOTT W. CHRISTIE, PRECISION GUIDED LEADERSHIP: HOW MODERN MILITARY

## **B. The Audit Society and the Allure of Information Management**

While Boyd's OODA loop theories were revolutionary in their military context, their foundations began to form nearly two centuries earlier with the emergence of industrialization and the associated growth of information-centric organizational theory.<sup>30</sup> The rise of bureaucracy as an efficient means of organizing at scales unnecessary in agrarian society brought with it a strong inclination toward surveillance, information processing, and data-based planning as a means of constant management and improvement, a school of thought both inspired and followed by military organizational theory.<sup>31</sup> Weber's theory of legitimate order and authority within a bureaucratic structure, with its "dut[ies] without regard to personal considerations," and an "obligation to obedience," provided the sort of military-based organizational

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DOCTRINE CAN SAVE CORPORATE AMERICA (2004); ANTHONY J. LE STORTI, *WHEN YOU'RE ASKED TO DO THE IMPOSSIBLE: PRINCIPLES OF BUSINESS TEAMWORK AND LEADERSHIP FROM THE U.S. ARMY'S ELITE RANGERS* (2003). This phenomenon would have been largely unthinkable in the fifteen years between the American military's ignominious withdrawal from Vietnam and its rebuilt success in the First Gulf War, the hangover from which lingered through 2001 in the form of military contempt for its civilian leadership. See Richard H. Kohn, *Out of Control: The Crisis in Civil-Military Relations*, 35 *THE NATIONAL INTEREST* 3–17 (1994).

<sup>30</sup> See Max Weber, *Economy and Society* (1978) 969–73; James R. Beniger, *The Control Revolution: Technological and Economic Origins of the Information Society* (1986) 7 [hereinafter *Control Revolution*]; Edward Higgs, *The Rise of the Information State: The Development of Central State Surveillance of the Citizen in England, 1500–2000*, 14 *Journal of Hist. Sociology* 175 (2001); MICHAEL POWER, *THE AUDIT EXPLOSION* (1994); Michael Power, *Evaluating the audit explosion*, 25 *LAW & POLICY* 185–202 (2003).

<sup>31</sup> See Anthony Giddens, *The Nation-State and Violence* (1985); Ulrich Beck, *Risk Society and the Provident State*, in *Risk, Environment and Modernity: Toward a New Ecology*, Scott Lash et al., eds. (1998). Beck describes the need for increased surveillance as a direct result of industrial society, when the "social, political, ecological, and individual risks created by the momentum of innovation increasingly elude the control and protective institutions of industrial society." *Id.* at 27. When these new or expanded risks outstrip the existing capacities of analysis, policy, or regulation to understand or cope with the issue, pressure is created to develop new methods of surveillance and control.

socialization needed—albeit with some allowance of modification for less martial pursuits—for the management of such modern concepts as large-scale factories, prisons, hospitals, and law enforcement.<sup>32</sup>

Militaries of the 18<sup>th</sup> and 19<sup>th</sup> centuries were quick to adopt these organizational innovations, which fit quite well with their existing hierarchical frameworks and began to give them the tools to realize a modern form of military intelligence and personnel management which existing organizational models would not support.<sup>33</sup> All of these advances were necessary to support and maintain large armies, but military intelligence was perhaps the biggest beneficiary of these innovations. The increasing amounts of information necessary to make military decisions within the increasingly complex world brought about by modernization and industrialization highlighted the importance of bureaucracy as an essential tool in dealing with the modern crisis of control.<sup>34</sup> But even with the benefit of a modern bureaucracy, some of which already existed within military organizations, an army's ability to process intelligence information had been quite limited by existing technologies.<sup>35</sup> This limitation of a military organization's ability to

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<sup>32</sup> See MAX WEBER, *THE THEORY OF SOCIAL AND ECONOMIC ORGANIZATION* 330-40 (2009).

<sup>33</sup> The need for larger and more widely distributed militaries, driven largely by the expanding imperial goals of many nations, created serious organizational problems for military leadership. Muster lists, payroll records, logistics planning, and many other of the modern military's more prosaic tasks benefited greatly from these new forms of communication and information processing. See Edward Higgs, *The Rise of the Information State: The Development of the Central State Surveillance of the Citizen in England, 1500-2000*, 14 *JOURNAL OF HISTORICAL SOCIOLOGY* (2001).

<sup>34</sup> Reinhard Bendix notes that any study of modern bureaucracy must acknowledge both the challenges to and protections of individual freedoms: “[T]he modern critics of the ‘service state’ tend to forget that governmental ‘interference’ has increased individual freedom by promoting social security, just as the earlier governmental aid in the development of corporate enterprise and western expansion increased the freedom of the business man.” Bendix, *Bureaucracy and the Problem of Power*, 5 *Public Administration Review* 194, 195 (1945).

<sup>35</sup> Beniger at 9.

make informed decisions based on “coded” intelligence information was directly dependent upon its ability to communicate, store, and process that information, described in Weber’s concept of rationalization.<sup>36</sup> The promise of increasingly detailed intelligence pictures—improved “situational awareness”—brought about through a combination of the improved organizational methods of Weberian bureaucracy and the advances in communication, transportation, and information processing technologies of industrialization, began to move military thinking toward an information-centric style of warfare.<sup>37</sup>

This quest for more information, better data handling tools to sift and analyze that information, and improved methods of communicating the results of this analysis in order to maximize efficiency through informed decision-making has become paradigmatic of modern (and post-modern) society.<sup>38</sup> This “control revolution,” as Beniger puts it, has grown to permeate every area of society where efficiency is sought, bringing with it a need to develop metric spaces within which to measure and evaluate

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<sup>36</sup> Rationalization is the proposition that an organization’s creation and containment of power through control can increase either through increasing the organization’s capability to process coded information, or by limiting the amount of that information to be processed. *Id.* at 15-16. The modern military modified this concept by maximizing both precepts: increasing information processing capability in order effectively decrease the amount of information that is processed.

<sup>37</sup> This is not to say that modernization has solved the military intelligence problem, of course. Indeed, the same organizational and technological advances that have enabled the modern military intelligence framework have also yielded an increasingly complex and and chaotic world within which militaries are expected to operate. See Andrew Rathmell, *Towards postmodern intelligence*, 17 *INTELLIGENCE AND NATIONAL SECURITY* 87–104 (2002); THOMAS X. HAMMES, *THE SLING AND THE STONE: ON WAR IN THE 21ST CENTURY* (2006).

<sup>38</sup> See JAMES BENIGER, *THE CONTROL REVOLUTION* (1986); Edward Higgs, *The Rise of the Information State: The Development of the Central State Surveillance of the Citizen in England, 1500-2000*, 14 *JOURNAL OF HISTORICAL SOCIOLOGY* (2001); MAX WEBER, *ECONOMY AND SOCIETY* (1978).

an activity's effectiveness.<sup>39</sup> The concept of civilian police agencies is driven primarily as an executive facet of a society's social control function, and as such, makes them prime candidates for the information-centric style of organization and leadership.<sup>40</sup>

The quasi-military structure most police departments now adhere to can be found in the organization of Sir Robert Peel's London Metropolitan Police in 1829, credited as the first modern civilian law enforcement organization.<sup>41</sup> The rapid industrialization of Europe and the United States in the first half of the 19<sup>th</sup> century

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<sup>39</sup> This concept is not always as uncontroversial as it might seem on the surface. For example, one of the chief criticisms of Utilitarianism, an early version of the information-centric movement originally promulgated by Bentham and Mill, has been in its concentration on the maximization of utility, which in turn requires that measurability is always an option. Such an approach can not apply to every human endeavor, say critics, as there are concepts like morality and justice that defy measurement. See John Rawls, *Justice as Fairness*, 67 *THE PHILOSOPHICAL REVIEW* 164 (1958); Beniger; Reinhard Bendix, *Bureaucracy and the Problem of Power*, 5 *PUBLIC ADMINISTRATION REVIEW* 194 (1945);

<sup>40</sup> The use of the term social control function bears with it a requirement to explain its definition in this context. Here, I refer to control in its most general sense—to influence or direct behavior toward some predetermined goal. This definition is informed by the sociology literature, which examines the social relationship, the organization, voluntary or compulsory social participation, and consensual and imposed order. Hence, control, in this sense, is primarily concerned with the two elements of influence and purpose, and control theory—in both the sociological and mathematical senses—require facilities for the communication and processing of information in order to manage behavior through feedback. See Richard Bellman, *Control Theory*, 211 *Scientific Am.* 186 (1964); J.W. Forrester, *Industrial Dynamics: A Major Breakthrough for Decision Makers*, 36 *Harvard Bus. Rev.* 37 (1958); William T. Powers, *Behavior: The control of perception* (1973).

<sup>41</sup> See James H. Auten, *Paramilitary Model of Police and Police Professionalism*, *The*, 4 *POLICE STUD.: INT'L REV. POLICE DEV.* 67 (1981); J. L. Lyman, *The Metropolitan Police Act of 1829: An Analysis of Certain Events Influencing the Passage and Character of the Metropolitan Police Act in England*, 55 *THE JOURNAL OF CRIMINAL LAW, CRIMINOLOGY, AND POLICE SCIENCE* 141 (1964); John M. Jermier & Leslie J. Berkes, *Leader Behavior in a Police Command Bureaucracy: A Closer Look at the Quasi-Military Model*, 24 *ADMINISTRATIVE SCIENCE QUARTERLY* 1 (1979).



brought with it a sudden population increases, much of it concentrated in urban areas.<sup>42</sup> This caused no small amount of concern among the upper class, who feared disease, petty crime, property damage, and political insurrections, just to name a few of the phobias the ruling elite held regarding the “dangerous classes.”<sup>43</sup> Peel, who while Chief Secretary for Ireland introduced legislation creating paramilitary forces to suppress Catholic and nationalist “disturbances,” applied the lessons from Ireland to London, and continued the use of the military organization as a model for civilian law enforcement.<sup>44</sup> The quasi-military civilian police organization was necessary, Peel argued, since “the police must be stable, efficient and organized along military lines” in order to enable strict and unquestioning—Weberian—discipline in order to allow rapid mobilization in public emergencies.<sup>45</sup> In addition, Peel recognized that former members of the military made excellent candidates for the role of civilian police officer, since they would arrive

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<sup>42</sup> See J. L. Lyman, *The Metropolitan Police Act of 1829: An Analysis of Certain Events Influencing the Passage and Character of the Metropolitan Police Act in England*, 55 THE JOURNAL OF CRIMINAL LAW, CRIMINOLOGY, AND POLICE SCIENCE 141 (1964).

<sup>43</sup> See Id.; Giddens, *The Nation-State and Violence*. Giddens argues that the crisis of control brought about by industrialization required a dramatic change in the way the state viewed its citizens, as “no pre-modern states were able even to approach the level of administrative co-ordination developed in the [modern] nation-state.” Giddens, *The Consequences of Modernity* 57 (1990).

<sup>44</sup> See Tadhg O’ Ceallaigh, *Peel and Police Reform in Ireland, 1814-18*, 6 STUDIA HIBERNICA 25–48 (1966); J. L. Lyman, *The Metropolitan Police Act of 1829: An Analysis of Certain Events Influencing the Passage and Character of the Metropolitan Police Act in England*, 55 THE JOURNAL OF CRIMINAL LAW, CRIMINOLOGY, AND POLICE SCIENCE 141 (1964); James H. Auten, *Paramilitary Model of Police and Police Professionalism, The*, 4 POLICE STUD.: INT’L REV. POLICE DEV. 67 (1981).

<sup>45</sup> See J. L. Lyman, *The Metropolitan Police Act of 1829: An Analysis of Certain Events Influencing the Passage and Character of the Metropolitan Police Act in England*, 55 THE JOURNAL OF CRIMINAL LAW, CRIMINOLOGY, AND POLICE SCIENCE 141 (1964); Martin E. Spencer, *Weber on Legitimate Norms and Authority*, 21 THE BRITISH JOURNAL OF SOCIOLOGY 123 (1970); James H. Auten, *Paramilitary Model of Police and Police Professionalism, The*, 4 POLICE STUD.: INT’L REV. POLICE DEV. 67 (1981); John M. Jermier & Leslie J. Berkes, *Leader Behavior in a Police Command Bureaucracy: A Closer Look at the Quasi-Military Model*, 24 ADMINISTRATIVE SCIENCE QUARTERLY 1 (1979).

on the job pre-acclimated to a quasi-military environment, and would have an instinctive feel for hierarchy, discipline, and order.<sup>46</sup>

These somewhat practical decisions cannot, however, be separated entirely from the growth of information-centric organization theory, political economics, and surveillance technologies which were interlaced with much of the social, political, and economic activity of industrialization and modernity.<sup>47</sup> In the period from the mid-18<sup>th</sup> through mid-19<sup>th</sup> centuries, as industrialization in western nations began to create increasingly complex systems of interdependencies between manufacturing, capital, energy production, labor, and markets, new means of communication and control were required to take full advantage of new economies of scale and realize productivity levels unheard of under earlier forms of management and organization.<sup>48</sup> As Giddens points

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<sup>46</sup> There is something of a “chicken and egg” relationship between Peel’s quasi-military organization of the London Metropolitan Police and the natural fit with former members of the British military: was a quasi-military organizational structure selected for its qualities as best suited for civilian policing, thus making military men (and they were all men) the best candidates for the job? Or was the choice of a quasi-military police force preordained by the desired characteristics and availability of former soldiers? The literature suggests the former, but even today, we still see a career transition from soldier to civilian police officer as quite natural. See J. L. Lyman, *The Metropolitan Police Act of 1829: An Analysis of Certain Events Influencing the Passage and Character of the Metropolitan Police Act in England*, 55 THE JOURNAL OF CRIMINAL LAW, CRIMINOLOGY, AND POLICE SCIENCE 141 (1964); James H. Auten, *Paramilitary Model of Police and Police Professionalism*, *The*, 4 POLICE STUD.: INT’L REV. POLICE DEV. 67 (1981); John M. Jermier & Leslie J. Berkes, *Leader Behavior in a Police Command Bureaucracy: A Closer Look at the Quasi-Military Model*, 24 ADMINISTRATIVE SCIENCE QUARTERLY 1 (1979).

<sup>47</sup> While industrialization flattened somewhat the complex class relationships in England and elsewhere, social norms and values increased in complexity, attracting a new generation of political, economic, and social theorists to the tasks of making sense of changes to social order and reestablishing control over existing social structures. See, e.g., Thomas Malthus, *An Essay on the Principle of Population* (1798); Jeremy Bentham, *A Fragment on Government* (1776); James Mill, *Elements of Political Economy* (1821); David Ricardo, *On the Principles of Political Economy and Taxation* (1817).

<sup>48</sup> See JAMES BENIGER, *THE CONTROL REVOLUTION* (1986). Among the innovations of industrialization, perhaps the most successful is that of the modern bureaucracy. Rapid advances in manufacturing and transportation technologies brought an abrupt end to

out, advances in the management of information enabled organizations to form more effective bureaucratic structures, and gave these budding bureaucracies more control over the “timing and spacing” of human activities.<sup>49</sup> These advances, joined with the modern bureaucracy’s growing appetite for information ultimately led to the surveillant assemblage as integrated into our contemporary concept of governance.<sup>50</sup>

In the mid-1990s, a movement among military theorists began to develop around the concept of exploiting a technological and communications advantage to create a new kind of army, where every soldier and piece of materiel was equipped with sensors that would allow direct communication of information at the lowest organizational levels, but would also pass this information up the chain of command to give military leaders a “god’s-eye view” of the battlespace, allowing for even tighter OODA loops.<sup>51</sup> This concept, generally known as network-centric warfare, envisioned the sort of

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millennia of primarily agricultural societies, and thus required new modes of thought around societal, economic, and political questions. New means of social control were necessary, as the dramatic increase in transactional speed brought about by industrialization quickly outpaced existing modes of control and interaction, and began to threaten the viability of existing institutions. Beniger characterizes this phenomenon as a “crisis of control,” a period in which a society’s organizational, information processing, and communication capabilities are outpaced by manufacturing and transportation technologies, resulting in a systemic loss of political and economic control which threatens existing social and governmental institutions and structures. See Beniger, *Control Revolution*, supra at 7-9.

<sup>49</sup> See Anthony Giddens, *The Nation-State and Violence* (2013) 46-48.

<sup>50</sup> See Kevin D Haggerty Richard V Ericson, *The surveillant assemblage*, 51 *British Journal of Sociology* 605–622 (2000); S P Hier, *Probing the Surveillant Assemblage: on the dialectics of surveillance practices as processes of social control*, *Surveillance & Society* (2002). For a more complete analysis of this phenomenon, see Jeffrey L Vagle, *The History, Means, and Effects of Structural Surveillance* University of Pennsylvania Law School Faculty Scholarship 1–65 (2016), [http://scholarship.law.upenn.edu/faculty\\_scholarship/1625](http://scholarship.law.upenn.edu/faculty_scholarship/1625).

<sup>51</sup> See Arthur K. Cebrowski & John J. Garstka, *Network-centric warfare: Its origin and future*, 124 *in* US NAVAL INSTITUTE PROCEEDINGS 28–35 (1998), [http://mattcegelske.com/wp-content/uploads/2012/04/ncw\\_origin\\_future.pdf](http://mattcegelske.com/wp-content/uploads/2012/04/ncw_origin_future.pdf) (last visited Sep 20, 2015).

information-driven military hitherto impossible, now enabled by smaller, faster, and cheaper technology that was starting to drive American businesses, and especially advances in networking and communications.<sup>52</sup> Military strategists picked up on the new style of “bottom-up” management enabled through these technological advances, where information, gathered from the very edges of an organization and passed to leadership in near real time, could allow leaders of even the very largest of businesses to view, analyze, and make decisions about detailed data—actionable intelligence—that Weber, Bentham, Mill, and their contemporaries could only dream of.<sup>53</sup> Following this model, an information- and network-centric military could be more agile and aware than its adversaries, thus allowing fewer troops to cover much wider geographic areas, with less equipment, and with dynamic, ad-hoc supply chains that could place materiel in the right place at the right time, a philosophy at the center of Secretary of Defense Donald Rumsfeld’s wholesale “force transformation” program of the early- and mid-2000s.<sup>54</sup>

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<sup>52</sup> Id.

<sup>53</sup> One of the better known examples of early business adopters of this new information-centric management style is Wal-Mart, which pioneered the concept of “precision retailing,” where a competitive advantage is created through their network of sensors deployed throughout all levels of their organization. This infrastructure fed real-time information through Wal-Mart’s networks, giving them the ability to make very well-informed decisions on extremely accurate and fresh data, a concept whose usefulness was not lost on military planners. See DAVID S. ALBERTS, JOHN GARSTKA & FREDERICK P. STEIN, *NETWORK CENTRIC WARFARE: DEVELOPING AND LEVERAGING INFORMATION SUPERIORITY* (1999).

<sup>54</sup> While a full exploration of the history Rumsfeld’s Office of Force Transformation is well beyond the scope of this Article, it is relevant and worth noting that a wide array of analysis of the performance of the “transformed” military in Afghanistan and (especially) Iraq, led many to observe that the optimism about a small, lighter, network-centric military was, at best, misplaced or premature, and at worst, willfully negligent. See also Jeffrey L. Groh, *Network-centric warfare: Leveraging the power of information*, 1 USAWC GUIDE TO NATIONAL SECURITY ISSUES. THEORY OF WAR AND STRATEGY 323–338 (2008); How Technology Almost Lost the War: In Iraq, the Critical Networks Are Social — Not

The Bush administration's focus on transforming the military through a network-centric shift from platforms to networks, while viewed with skepticism by rank-and-file troops, was enthusiastically accepted by the U.S. military's civilian and political leadership, and opened up a wide array of new business opportunities for contractors willing to help implement this vision.<sup>55</sup> Many of these new programs concentrated on

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Electronic, WIRED, [http://archive.wired.com/politics/security/magazine/15-12/ff\\_futurewar?currentPage=all](http://archive.wired.com/politics/security/magazine/15-12/ff_futurewar?currentPage=all) (last visited Sep 20, 2015); REVOLUTIONARY CHANGE, *Military organization in the information age: Lessons from the world of business*, 1016 STRATEGIC APPRAISAL: THE CHANGING ROLE OF INFORMATION IN WARFARE 327 (1999).

<sup>55</sup> In his 2003 Annual Report to the President and Congress, Secretary of Defense Rumsfeld articulated his vision for a network-centric military, and laid out the plans—and associated risks—for force transformation. See DONALD H. RUMSFELD, ANNUAL REPORT TO THE PRESIDENT AND THE CONGRESS (2003), <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA423423> (last visited Sep 20, 2015). The proposed transition to a “21<sup>st</sup> century military” was sweeping, with a greater reliance on small, technology-equipped special forces teams, and a move away from the large, heavy army divisions built up over the Cold War. Rumsfeld estimated the initial cost of this transformation to be \$24.3 billion, and \$239 billion over all phases. *Id.* Later estimates, however, put the figure nearer to \$1 trillion by 2010, with program costs continuing long into the future. See RUSSELL RUMBAUGH & HENRY L. STIMSON CENTER, WHAT WE BOUGHT: DEFENSE PROCUREMENT FROM FY01 TO FY10 (2011), [http://kms1.isn.ethz.ch/serviceengine/Files/ISN/134554/ipublicationdocument\\_singledocument/f70118aa-be15-45be-ae5f-aa9930d003d8/en/Contentv2.pdf](http://kms1.isn.ethz.ch/serviceengine/Files/ISN/134554/ipublicationdocument_singledocument/f70118aa-be15-45be-ae5f-aa9930d003d8/en/Contentv2.pdf) (last visited Sep 20, 2015). For example, the F-35A Joint Strike Fighter, expected to cost \$1.5 trillion alone over the life of the program, and has been questioned as an effective fighting platform. See The \$1.5 trillion plane that broke the Air Force, CNBC, <http://www.cnbc.com/2014/07/31/how-dods-15-trillion-f-35-broke-the-air-force.html> (last visited Sep 20, 2015); Air Force Admits: Our New Stealth Fighter Can't Fight - The Daily Beast, <http://www.thedailybeast.com/articles/2015/09/17/air-force-admits-our-new-stealth-fighter-can-t-fight.html> (last visited Sep 20, 2015). Funding for force transformation, coupled with the need to fight simultaneous wars in Afghanistan and Iraq, fueled an explosion of contractor business, with some programs continuing long past the point where military analysts could see value in them. See Peter J. Dombrowski, Eugene Gholz & Andrew L. Ross, *Selling military transformation: The defense industry and innovation*, 46 ORBIS 523–536 (2002); Clay Wilson, *Network Centric Warfare: Background and Oversight Issues for Congress*, (2004), <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA476256> (last visited Sep 20, 2015); MICHAEL J. SIMMERING, TECHNOLOGICAL ILLUSIONS AND THE ENTROPY OF AMERICAN DEFENSE (2014), <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA600194> (last visited Sep 20, 2015).

the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C<sup>4</sup>ISR) space, where the true power of distributed information superiority could be fully realized.<sup>56</sup> Key programs quickly emerged to build survivable, robust communications and sensor networks, information operations (IO) platforms, geospatial analysis tools, computer-assisted targeting platforms, and unmanned intelligence gathering platforms (colloquially known as drones, and later equipped with weapons systems of their own), all of which were designed to support an agile force far superior to the “muscle-bound and clumsy” “industrial-age dinosaurs” which were the legacy of outmoded Cold War thinking.<sup>57</sup>

As the U.S. military began to withdraw from their engagements in Afghanistan and Iraq, funding streams for contractors who had tooled up in support for network-centric warfare and force transformation also began to evaporate, and businesses looking for alternative markets for their C<sup>4</sup>ISR platforms found a ready partner in

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<sup>56</sup> See Jeffrey L. Groh, *Network-centric warfare: Leveraging the power of information*, 1 USAWC GUIDE TO NATIONAL SECURITY ISSUES. THEORY OF WAR AND STRATEGY 323–338 (2008); ANTHONY DEKKER, A TAXONOMY OF NETWORK CENTRIC WARFARE ARCHITECTURES (2008), <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA488254> (last visited Sep 20, 2015); PETER J. DOMBROWSKI, EUGENE GHOLZ & ANDREW L. ROSS, MILITARY TRANSFORMATION AND THE DEFENSE INDUSTRY AFTER NEXT: THE DEFENSE INDUSTRIAL IMPLICATIONS OF NETWORK-CENTRIC WARFARE (2003).

<sup>57</sup> See John Ferris, *Netcentric Warfare, C<sup>4</sup>ISR and Information Operations: Towards a Revolution in Military Intelligence?*, 19 INTELLIGENCE AND NATIONAL SECURITY 199–225 (2004); PETER J. DOMBROWSKI, EUGENE GHOLZ & ANDREW L. ROSS, MILITARY TRANSFORMATION AND THE DEFENSE INDUSTRY AFTER NEXT: THE DEFENSE INDUSTRIAL IMPLICATIONS OF NETWORK-CENTRIC WARFARE (2003); Steve Niva, *Disappearing violence: JSOC and the Pentagon’s new cartography of networked warfare*, 44 SECURITY DIALOGUE 185–202 (2013); Peter J. Dombrowski, Eugene Gholz & Andrew L. Ross, *Selling military transformation: The defense industry and innovation*, 46 ORBIS 523–536 (2002); Clay Wilson, *Network Centric Warfare: Background and Oversight Issues for Congress*, (2004), <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA476256> (last visited Sep 20, 2015).

civilian law enforcement agencies.<sup>58</sup> Like the military of the mid-1990s, police departments had also discovered the the promise of network-centricity, a concept that fit well within the quasi-military organizational structures found in most police organizations.<sup>59</sup> Beginning in the mid-1970s, police departments, especially those in larger U.S. cities, began to feel political pressure to address what was widely seen as a crime epidemic and the “downward spiral of urban decay” that accompanied a post-industrial economic slowdown.<sup>60</sup> The standard tactics built around the police patrol car did not seem to be having any real success in reducing the crime rate, and law enforcement agencies were looking for alternatives.

In 1982, *The Atlantic Monthly* published an article written by two social scientists who, after studying the tactics of police departments, concluded that disorder and crime are inextricably linked, and therefore addressing the petty crimes associated with community disorder—such as loitering, vandalism, and public intoxication, “humble” crimes that were generally considered unworthy of police attention—law enforcement agencies will in turn prevent the more serious crimes from flourishing in those areas.<sup>61</sup> The approach became known as “broken windows policing,” named for the tendency for buildings with a broken window to implicitly encourage further window breaking and

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<sup>58</sup> See Peter Andreas & Richard Price, *From war fighting to crime fighting: transforming the American national security state*, 3 *INTERNATIONAL STUDIES REVIEW* 31–52 (2001).

<sup>59</sup> *Id.*

<sup>60</sup> See George L. Kelling & William J. Bratton, *Declining Crime Rates: Insiders’ Views of the New York City Story*, 88 *THE JOURNAL OF CRIMINAL LAW AND CRIMINOLOGY* (1973-) 1217 (1998); James Q. Wilson & George L. Kelling, *Broken windows*, 249 *ATLANTIC MONTHLY* 29–38 (1982).

<sup>61</sup> See James Q. Wilson & George L. Kelling, *Broken windows*, 249 *ATLANTIC MONTHLY* 29–38 (1982).

other forms of vandalism, a phenomenon described by Stanford psychologist Philip Zimbardo in his well-known abandoned car experiment.<sup>62</sup>

Police departments in large American cities began to take an active interest in the broken windows theory, and by the late 1980s and early 1990s, police departments in New York City, Chicago, and Los Angeles had all implemented some version of this model.<sup>63</sup> In New York, then-mayor Rudy Giuliani introduced a version of broken windows known as “zero-tolerance” policing, which placed a greater emphasis the sort of “quality of life” issues that Wilson and Kelling pointed out in their original work.<sup>64</sup> As an early adopter of the broken windows model, the New York Police Department (NYPD) quickly discovered that any effective implementation of such a program would require curbing disorder not only on the streets, but also within the police department itself, which had been in a decades-long decline of poor leadership, corruption, and an

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<sup>62</sup> Zimbardo established a field study to demonstrate the effects of decaying community on crime. In his experiment, Zimbardo “abandoned” cars in generally good condition in multiple locations in The Bronx and Palo Alto. While the cars left in Palo Alto were generally reported to police and left unmolested, the cars in the Bronx were almost immediately vandalized and stripped of valuable parts. The key difference between these two cities, observed Zimbardo, was the strong sense of community in Palo Alto, where people cared about what happened in their neighborhood, and the comparative lack of such a community sentiment in The Bronx. Zimbardo concluded that a breakdown of shared community values could lead to a certain anonymity that allowed for petty and serious crime to take hold. See *Diary of a Vandalized Car*, 93 *TIME* 68 (1969).

<sup>63</sup> See Bernard E. Harcourt & Jens Ludwig, *Broken windows: New evidence from New York City and a five-city social experiment*, *THE UNIVERSITY OF CHICAGO LAW REVIEW* 271–320 (2006).

<sup>64</sup> Giuliani’s NYPD put special emphasis on prostitution, graffiti, low-level drug offences, and “aggressive” panhandling as symptoms of urban decay and disorder. These petty offenses had been largely ignored by police in all but the most extreme cases up to this point, and Giuliani promulgated this no-tolerance approach as a method of “reclaiming the open spaces of New York.” See Judith Greene, *Zero Tolerance: A Case Study of Police Policies and Practices in New York City*, 45 *CRIME & DELINQUENCY* 171–187 (1999).



overall breakdown of discipline.<sup>65</sup> Addressing these (not unrelated) problems in a city the size of New York, with a sworn police force numbering in the tens of thousands, would require an approach that could go beyond classical organizational techniques.<sup>66</sup> The data- and network-centric approaches made possible by the rapid technological advances beginning in the late 1980s and early 1990s, and implemented as a successful proof-of-concept by Wal-Mart during this time, began to instill in the NYPD—and other, similarly situated police departments—a growing faith in algorithms and automated decision support tools as their Rosetta Stone.<sup>67</sup>

### **C. Drugs, Terrorism, and the Blurring of Military and Civilian Spheres**

The confluence of military and police use of data- and network-centric approaches in their hitherto separate spheres can be traced in its earliest forms to the war on drugs.<sup>68</sup> As drug trafficking began to be seen not only as a law enforcement issue, but also a threat to national security, military and police agencies began to engage as partners in this effort, sometimes through the exchange of ideas, sometimes quite

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<sup>65</sup> See John A. Eterno & Eli B. Silverman, *The New York City police department's Compstat: dream or nightmare?*, 8 INTERNATIONAL JOURNAL OF POLICE SCIENCE & MANAGEMENT 218–231 (2006).

<sup>66</sup> The NYPD had 31,236 full-time sworn officers in 1990. This number does not include part-time and administrative staff. See BRIAN A. REAVES, POLICE DEPARTMENTS IN LARGE CITIES, 1990-2000 (2011).

<sup>67</sup> See John A. Eterno & Eli B. Silverman, *The New York City police department's Compstat: dream or nightmare?*, 8 INTERNATIONAL JOURNAL OF POLICE SCIENCE & MANAGEMENT 218–231 (2006); Peter K. Manning, *Information technologies and the police*, CRIME AND JUSTICE 349–398 (1992). We will examine the details of this new approach in Section III, *infra*.

<sup>68</sup> Early manifestations of police militarization took traditional forms, where military equipment, such as assault rifles and armored personnel carriers, and their associated tactics were adopted by civilian police departments, justified by the increased threat (real or perceived) from drug trafficking in major U.S. cities. See Sandra Bass, *Policing Space, Policing Race: Social Control Imperatives and Police Discretionary Decisions*, 28 SOCIAL JUSTICE 156–176 (2001).

literally, through interagency actions.<sup>69</sup> These activities were complicated by the fact that the 1878 Posse Comitatus Act generally prohibited the use of federal military forces for domestic law enforcement purposes.<sup>70</sup> To address this legal obstacle, Congress amended the Posse Comitatus Act in 1981 to allow for military support of civilian law enforcement agencies, with the clear legislative intent that this military-law enforcement cooperation be employed in counterdrug operations.<sup>71</sup>

A vivid example of the literal law enforcement-military partnership in the drug war can be found in the 1988 formation of Joint Task Force-6, now known as Joint Task Force-South (JTF-South), which combined combat and reconnaissance forces from the Department of Defense (DoD), intelligence services, and civilian law enforcement agencies to patrol sections of the U.S.-Mexican border on drug interdiction missions. The regular armed border patrols by military personnel abruptly stopped in 1997, after a young U.S. Marine shot and killed an unarmed civilian. The American public's appetite for the use of military troops within its borders evaporated after this incident, only to be revived on September 11, 2001.<sup>72</sup>

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<sup>69</sup> See EVAN MUNSING & CHRISTOPHER J. LAMB, JOINT INTERAGENCY TASK FORCE-SOUTH: THE BEST KNOWN, LEAST UNDERSTOOD INTERAGENCY SUCCESS (2011).

<sup>70</sup> Sean J. Kealy, *Reexamining the Posse Comitatus Act: Toward a Right to Civil Law Enforcement*, YALE LAW & POLICY REVIEW 383–442 (2003).

<sup>71</sup> The 1981 Military Cooperation with Law Enforcement Officials Act encouraged military agencies to supply intelligence, equipment, and training to civilian police departments. In the 1980s and 1990s, Congress continued to expand the military's ability to work directly with civilian law enforcement, through such legislation as the National Defense Authorization Act, which authorized and funded direct National Guard participation in drug operations. See EVAN MUNSING & CHRISTOPHER J. LAMB, JOINT INTERAGENCY TASK FORCE-SOUTH: THE BEST KNOWN, LEAST UNDERSTOOD INTERAGENCY SUCCESS (2011), <http://cpluslab.in/opp/archi.pdf> (last visited Sep 24, 2015); Sean J. Kealy, *Reexamining the Posse Comitatus Act: Toward a Right to Civil Law Enforcement*, YALE LAW & POLICY REVIEW 383–442 (2003).

<sup>72</sup> The circumstances of the civilian shooting by JTF-6 personnel are quite tragic, yet should have been foreseeable under the circumstances. The shooting took place at night,

The terrorist attacks of 9/11 opened the floodgates on law enforcement-military cooperation, with many of the political and legal objections to such partnerships disappearing almost overnight.<sup>73</sup> This sudden paradigm shift, brought on by a level of terroristic violence previously unthinkable in the United States, created an environment within which the traditionally separate spheres of military and civilian law enforcement began to significantly blur.<sup>74</sup> The military contractors, large and small, that tooled up to support the war effort—both the literal combat operations in Afghanistan and Iraq, as

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when JTF-6 Marines were using night vision equipment to patrol a section of the U.S.-Mexican border. Though every Marine was armed, their explicit orders were to limit their operations to observation and reconnaissance, relaying all suspicious activity to civilian law enforcement for possible action. When the JTF-6 Marines thought they heard gunfire in the area, they immediately returned fire, killing a civilian. As commentators later pointed out, this sort of tragedy was inevitable, when you put armed marines, trained for combat, in a law enforcement role. JTF-6 further exacerbated the inherent problems of military-civilian law enforcement activities through their direct involvement in the 1993 siege of the Branch Davidian compound in Waco, TX. See EVAN MUNSING & CHRISTOPHER J. LAMB, *JOINT INTERAGENCY TASK FORCE-SOUTH: THE BEST KNOWN, LEAST UNDERSTOOD INTERAGENCY SUCCESS* (2011), <http://cpluslab.in/opp/archi.pdf> (last visited Sep 24, 2015); EVAN MUNSING & CHRISTOPHER J. LAMB, *JOINT INTERAGENCY TASK FORCE-SOUTH: THE BEST KNOWN, LEAST UNDERSTOOD INTERAGENCY SUCCESS* (2011), <http://cpluslab.in/opp/archi.pdf> (last visited Sep 24, 2015).

<sup>73</sup> Anti-terrorism military cooperation programs within U.S. civilian law enforcement agencies had, of course, existed prior to the events of 9/11, with some commentators arguing that the fight against terrorism was a far better use of military-law enforcement partnerships than the war on drugs, since military units were far better trained and equipped to address the special needs of counter-terror operations. See Sean J. Kealy, *Reexamining the Posse Comitatus Act: Toward a Right to Civil Law Enforcement*, *YALE LAW & POLICY REVIEW* 383–442 (2003). In fact, terrorism was widely seen as a critical facet of Fourth Generation Warfare, which seemed to justify these military-civilian law enforcement partnerships even further. See text accompanying note XX, *supra*. These early efforts remained somewhat controversial, however, even among military leaders prior to 2001. These controversies ended quite abruptly after 9/11. As Cofer Black, the former head of the CIA's Counterterrorism Center put it when he appeared before the Senate Intelligence Committee, “[T]here was ‘before’ 9/11 and ‘after’ 9/11. After 9/11 the gloves come off.” See Statement of Cofer Black: Joint Investigation Into September 11: September 26, 2002, , [http://fas.org/irp/congress/2002\\_hr/092602black.html](http://fas.org/irp/congress/2002_hr/092602black.html) (last visited Sep 24, 2015).

<sup>74</sup> See P. B. Kraska, *Militarization and Policing--Its Relevance to 21st Century Police*, 1 *POLICING* 501–513 (2007).

well as the larger, more metaphorical sense—began making much of this materiel available to civilian law enforcement agencies, including machine guns, semiautomatic shotguns, night vision equipment, sniper rifles, combat uniforms, grenades, and high-tech surveillance gear.<sup>75</sup> Many civilian police departments were especially appreciative of the expansion of two DoD programs designed to equip law enforcement agencies with military gear through the transfer or direct purchase of materiel.<sup>76</sup> Because of the highly visible nature of military equipment such as armored personnel carriers, flash-bang grenades, and sniper rifles, much of the subsequent attention from those examining the increased militarization of civilian police forces has been focused on these items.<sup>77</sup> But the use of this sort of military gear by civilian law enforcement is largely limited to special police units, and is not typically found on the average patrol officer.<sup>78</sup> It is the widespread and increased adoption by civilian police agencies of military intelligence

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<sup>75</sup> See Peter B. Kraska & Louis J. Cubellis, *Militarizing mayberry and beyond: Making sense of American paramilitary policing*, 14 JUSTICE QUARTERLY 607–629 (1997).

<sup>76</sup> See Karena Rahall, *The Green to Blue Pipeline: Defense Contractors and the Police Industrial Complex*, 36 CARDOZO LAW REVIEW (2015).

<sup>77</sup> See Karena Rahall, *The Green to Blue Pipeline: Defense Contractors and the Police Industrial Complex*, 36 CARDOZO LAW REVIEW (2015); P. B. Kraska, *Militarization and Policing--Its Relevance to 21st Century Police*, 1 POLICING 501–513 (2007); Peter B. Kraska & Louis J. Cubellis, *Militarizing mayberry and beyond: Making sense of American paramilitary policing*, 14 JUSTICE QUARTERLY 607–629 (1997); Peter B. Kraska & Victor E. Kappeler, *Militarizing American Police: The Rise and Normalization of Paramilitary Units*, 44 SOCIAL PROBLEMS 1–18 (1997).

<sup>78</sup> While this is still true in general, there has been a disturbing trend across police departments to deploy military gear more widely and in more situations. This topic goes beyond the scope of this Article, but to explore this topic further, see P. B. Kraska, *Militarization and Policing--Its Relevance to 21st Century Police*, 1 POLICING 501–513 (2007); Peter B. Kraska & Louis J. Cubellis, *Militarizing mayberry and beyond: Making sense of American paramilitary policing*, 14 JUSTICE QUARTERLY 607–629 (1997); Peter B. Kraska & Victor E. Kappeler, *Militarizing American Police: The Rise and Normalization of Paramilitary Units*, 44 SOCIAL PROBLEMS 1–18 (1997); Karena Rahall, *The Green to Blue Pipeline: Defense Contractors and the Police Industrial Complex*, 36 CARDOZO LAW REVIEW (2015).

technologies, many of which are integrated invisibly into existing police information and decision support tools, which is likely to have a more dramatic impact across entire police departments. This invisibility, coupled with an unproven—or misplaced—faith in these technologies, has led to a growing system of structural surveillance that has had a disparate racial impact in many cases.

### **III. The Expansion of Algorithmic Policing Strategies**

#### **A. Early Data-Centric Efforts: Compstat and Its Kin**

When then-mayor Rudy Giuliani first began implementing New York City's version of broken windows policing in the early 1990s, he recognized that the disorder to be addressed could be found not only on the city's streets, but also within the ranks of the NYPD.<sup>79</sup> Significantly changing the direction of an organization the size of the NYPD—as a shift to a broken windows policing model surely would—would be a difficult task in even the most functional of police departments, something New York City had not seen for decades.<sup>80</sup> The organizational management tools necessary for such an endeavor simply did not exist until advances in information technology opened up the possibility of automated, data- and network-centric decision support systems that could take vast amounts of raw data as input, analyze those data, and provide critical insights to its human users, all within a relative blink of an eye—the promise of such systems bordered on the magical.<sup>81</sup> It was exactly this sort of tool kit that a few forward thinkers

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<sup>79</sup> See note XX and accompanying text, *supra*.

<sup>80</sup> *Id.*

<sup>81</sup> While the term big data analytics hadn't yet made its way into our lexicon in the early 1990s, the concepts and principles therein had begun to take form. While the hopes of the 1970s for advances in artificial intelligence had been depleted as naïve, a great deal of enthusiasm emerged for automated decision support tools, expert systems, and other data intelligence tools—especially in military applications, where critical decisions based on unmanageable information loads had to be made within a time span that was too

within the NYPD proposed as a solution to their burgeoning organizational management problem.

In 1994 NYPD Commissioner William Bratton revealed the Compstat program as a centralized solution to the department's organizational dilemma.<sup>82</sup> The goal of the program was to obtain accurate, up-to-date crime statistics at every level within the department, something that had proven impossible up to that point.<sup>83</sup> By requiring patrol officers to keep records of their daily activities, including stops, arrests, and the details of each incident, the NYPD could collect these data on a computer database, which allowed them to generate weekly books of city-wide statistics they could slice and dice as they saw fit: if they wanted statistics on gun crimes specifically, or wished to

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short for human reasoning. See Jeung Choi, Jae Joo & Dong Cho, *Situation/threat assessment fusion system (STAFS)*, 2 in INFORMATION FUSION, 2002. PROCEEDINGS OF THE FIFTH INTERNATIONAL CONFERENCE ON 1374–1380 (2002); P. Shim et al., *Past, present, and future of decision support technology*, 33 DECISION SUPPORT SYSTEMS 111–126 (2002); Heath A. Ruff, Sundaram Narayanan & Mark H. Draper, *Human interaction with levels of automation and decision-aid fidelity in the supervisory control of multiple simulated unmanned air vehicles*, 11 PRESENCE: TELEOPERATORS AND VIRTUAL ENVIRONMENTS 335–351 (2002).

<sup>82</sup> The system's name, an abbreviation of "compare stats," is sometimes referred to as COMPSTAT. There does not appear to be any rhyme or reason to the different representations, so I have arbitrarily elected to use Compstat. There does appear to be a relevant disagreement over the meaning behind the name, however. Many authors have claimed the name is a shortening of "computer statistics," which Eterno and Silverman demonstrate is incorrect. Eterno and Silverman point out that this distinction is not unimportant, as the implication behind the incorrect "computer statistics" leads to an unsupported linkage between computer automation and effective crime control. See James J. Willis, Stephen D. Mastrofski & David Weisburd, *Making sense of COMPSTAT: A theory-based analysis of organizational change in three police departments*, 41 LAW & SOCIETY REVIEW 147–188 (2007); K. J. Walsh & V. E. Henry, *Compstat, OODA Loops and Police Performance Management*, 2 POLICING 349–358 (2008); John A. Eterno & Eli B. Silverman, *The New York City police department's Compstat: dream or nightmare?*, 8 INTERNATIONAL JOURNAL OF POLICE SCIENCE & MANAGEMENT 218–231 (2006).

<sup>83</sup> See John A. Eterno & Eli B. Silverman, *The New York City police department's Compstat: dream or nightmare?*, 8 INTERNATIONAL JOURNAL OF POLICE SCIENCE & MANAGEMENT 218–231 (2006).

compare precinct activity, they could do so with relative ease.<sup>84</sup> With these data and analysis tools, the NYPD could now begin to efficiently address the city's broken windows trouble spots, and do so by directing the minimum amount of manpower to the right place at the right time, which was exactly the outcome of this crisis of control Giuliani and Bratton sought.<sup>85</sup>

The NYPD began to see a significant amount of success with the Compstat system, both with their ability to address the "quality of life crimes" highlighted by broken windows policing, as well as in their ability to effectively manage a large and growing police force.<sup>86</sup> Soon, other cities began to emulate and adapt Compstat systems within their own police departments, and this successful adoptions gave Compstat a fair amount of national publicity, and was touted, along with broken windows policing, as the new paradigm of crime prevention in the United States.<sup>87</sup>

With the early success of Compstat also came a redoubled faith in the possibilities of automated law enforcement intelligence systems, allowing police departments to do more with less.<sup>88</sup> As police departments became increasingly convinced that the broken

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<sup>84</sup> See *Id.*

<sup>85</sup> See James J. Willis, Stephen D. Mastrofski & David Weisburd, *Making sense of COMPSTAT: A theory-based analysis of organizational change in three police departments*, 41 LAW & SOCIETY REVIEW 147–188 (2007); JAMES BENIGER, THE CONTROL REVOLUTION (1986), [http://monoskop.org/images/e/e5/Beniger\\_James\\_The\\_Control\\_Revolution.pdf](http://monoskop.org/images/e/e5/Beniger_James_The_Control_Revolution.pdf) (last visited Apr 16, 2015).

<sup>86</sup> See K. J. Walsh & V. E. Henry, *Compstat, OODA Loops and Police Performance Management*, 2 POLICING 349–358 (2008). By 2000, the number of full-time sworn officers in the NYPD rose to 40,435. See BRIAN A. REAVES, POLICE DEPARTMENTS IN LARGE CITIES, 1990-2000 (2011).

<sup>87</sup> See David Weisburd et al., *Reforming to preserve: Compstat and strategic problem solving in American policing*, 2 CRIMINOLOGY & PUB. POL'Y 421 (2002).

<sup>88</sup> In 1996, the Compstat system was given the Innovations in American Government Award, a prestigious honor granted by the Ford Foundation and Harvard University's John F. Kennedy School of Government. See William F. Walsh, *Compstat: an analysis of an*

windows model of policing, with its dynamic, problem-oriented approach, would replace the old, static bureaucratic model that police agencies had relied on for generations, they began to accept and explore more deeply the managerial tools and techniques offered by algorithmic, data-driven systems.<sup>89</sup> This new thinking sparked a flurry of data- and network-centric experiments in law enforcement agencies around the world, and revived a global interest in an intelligence-based model of policing that had been deployed by British police departments since the 1980s.<sup>90</sup>

### **B. The Rise of Intelligence-Led Policing**

The British model of “intelligence led policing” was developed in part as a response to the privatization initiatives in the UK in the 1980s and 1990s, where portions of government services were either taken over by private companies, or adopted a private business model within their organizations, effectively becoming quasi-private agencies.<sup>91</sup> The British National Criminal Intelligence Service (NCIS), originally organized to address drug trafficking, and later expanded to include organized crime generally, adopted a business data processing model to develop the National Intelligence Model (NIM), a nationwide system for use by all police agencies across the UK, replacing their existing bureaucratic management processes with an intelligence-led policing model.<sup>92</sup> This model had been developed by British authorities to mimic the

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*emerging police managerial paradigm*, 24 POLICING: AN INTERNATIONAL JOURNAL OF POLICE STRATEGIES & MANAGEMENT 347–362 (2001).

<sup>89</sup> *Id.*

<sup>90</sup> See David L. Carter & Jeremy G. Carter, *Intelligence-Led Policing Conceptual and Functional Considerations for Public Policy*, 20 CRIMINAL JUSTICE POLICY REVIEW 310–325 (2009).

<sup>91</sup> See David L. Carter & Jeremy G. Carter, *Intelligence-Led Policing Conceptual and Functional Considerations for Public Policy*, 20 CRIMINAL JUSTICE POLICY REVIEW 310–325 (2009).

<sup>92</sup> *Id.*



traditional military intelligence model, where data are collected and analyzed in order to identify patterns and generate actionable intelligence to best prioritize the deployment of patrols based on a set of problem-oriented goals.<sup>93</sup>

It is not difficult to see the allure of such a system. The combination of tightened budgets, increased public concern over crime and disorder, and a rising perception that the world had become a more dangerous place due in large part to drug trafficking, terrorism, and a general breakdown of civil order, created an environment that made automated solutions to these problems all the more credible. Rapid advances in technology and research into data mining and automated, intelligent decision support systems began to instill in police departments a newfound enthusiasm for technological methods not generally seen since the days of Sputnik and the space race. Researchers began looking for existing mathematical and physical models which could be leveraged to provide even faster and more accurate intelligence solutions.<sup>94</sup> By the late 1990s,

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<sup>93</sup> One can see very similar lines of thinking between the British intelligence-led policing model and the American Compstat model, where automated systems backed by advanced technology would deliver the “right information...to the right people at the right time.” See Nina Cope, “*Intelligence led policing or policing led intelligence?*” *Integrating volume crime analysis into policing*, 44 BRITISH JOURNAL OF CRIMINOLOGY 188–203 (2004). Perhaps unsurprisingly, this almost exactly echoes the oft-stated goals for the military’s network-centric warfare transformation, where the goal is “getting the right information, faster, to the right forces -- who in turn can take the right action, faster, against the right objective.” See JOHN LUDDY, *THE CHALLENGE AND PROMISE OF NETWORK-CENTRIC WARFARE* (2005), <http://lex2015.borczdixon.com/wp-content/uploads/challenge-promise-network-centric-warfare.pdf>.

<sup>94</sup> This analytical method was not necessarily new in the 1990s, since Boyd and others had been applying these techniques since the 1950s, albeit without the benefit of the technology available to analysts and researchers toward the end of the 20<sup>th</sup> century. But because of these new technological tools, methods that required a great deal of processing power were now available outside of supercomputing centers. Complicated models and techniques such as simulated annealing were explored for their ability to arrive at solutions through complex analytical methods. See Steven J. D’Amico et al., *A simulated annealing approach to police district design*, 29 COMPUTERS & OPERATIONS RESEARCH 667–684 (2002).

police departments began to consider the possibility that intelligence led policing, coupled with advanced technologies and analytical tools, could move law enforcement agencies beyond mere crime fighting into the realm of crime prevention.<sup>95</sup>

### **C. The Tantalizing Prospect of Predictive Policing**

Organizations seeking to minimize their respective OODA loops have followed Boyd's logic to an inevitable conclusion: Instead of merely seeking methods to shrink the OODA loop, find ways to tighten the loop to a point where it has "inverted into itself"—that is, modify the decision cycle to be *predictive*, rather than *reactive*.<sup>96</sup> The possibility of preventing crime before it actually happens has been the Holy Grail of police departments, especially when local, state, and federal governments were actively looking for ways to cut back on police budgets.<sup>97</sup> The apparent successes of broken windows and zero tolerance policing backed by sophisticated decision support systems like Compstat and intelligence led policing, gave many in law enforcement the firm

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<sup>95</sup> See Charlie Beck & Colleen McCue, *Predictive Policing: What Can We Learn from Wal-Mart and Amazon about Fighting Crime in a Recession*, 76 *The Police Chief* 18 (2009). Beth Pearsall, *Predictive policing: The future of law enforcement*, 266 *National Institute of Justice Journal* 16–19 (2010).

<sup>96</sup> Mathematical modeling has long been employed in this manner, using data-fed simulations to mimic or predict real-world phenomena. Statistical methods such as Bayesian analysis and Markov chain Monte Carlo (MCMC) simulations have driven enormous advances in the fields of computer science, theoretical and applied physics, and the social sciences. See A.F.M. Smith & G.O. Roberts, *Bayesian Computation Via the Gibbs Sampler and Related Markov Chain Monte Carlo Methods*, 55 *JOURNAL OF THE ROYAL STATISTICAL SOCIETY* 3–23 (1993); Bradley P. Carlin & Siddhartha Chib, *Bayesian Model Choice via Markov Chain Monte Carlo Methods*, 57 *JOURNAL OF THE ROYAL STATISTICAL SOCIETY* 473–484 (1995). These and related methods have been combined with research in information theory, decision theory, and neural networks to create successful extrapolation and predictive systems across a wide range of fields and problems. See CHRISTOPHER M. BISHOP, *PATTERN RECOGNITION AND MACHINE LEARNING* (2006).

<sup>97</sup> See Charlie Beck & Colleen McCue, *Predictive Policing: What Can We Learn from Wal-Mart and Amazon about Fighting Crime in a Recession*, 76 *THE POLICE CHIEF* 18 (2009); Beth Pearsall, *Predictive policing: The future of law enforcement*, 266 *NATIONAL INSTITUTE OF JUSTICE JOURNAL* 16–19 (2010).

belief that these systems and methodologies would eventually yield tools that would collect the massive amounts of data now available from inside and outside of police departments, swiftly store and analyze those data, and produce results “to anticipate, prevent and respond more effectively to future crime.”<sup>98</sup>

A common trope among police department is that an experienced and talented officer can apply their knowledge and analytical skills to attain an imperfect version of predictive policing, but that model does not scale well.<sup>99</sup> The benefit these new analytical tools and methods could bring to these officers could mean the difference between investigating a crime that just occurred versus preventing the crime from happening in the first place.<sup>100</sup> The savings to society in administrative costs, property damage, and human lives alone make this a worthy goal for a data- and network-centric police force.

But for such a police intelligence system to work as advertised, one needs to provide it with as much good data as possible from as broad a sampling as possible so the pattern recognition models can achieve the nearest thing to a god’s-eye view, and allowing the analyst to find the proverbial needle in the haystack.<sup>101</sup> This means police

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<sup>98</sup> See Beth Pearsall, *Predictive policing: The future of law enforcement*, 266 NATIONAL INSTITUTE OF JUSTICE JOURNAL 16–19 (2010).

<sup>99</sup> See Nina Cope, “*Intelligence led policing or policing led intelligence?*” *Integrating volume crime analysis into policing*, 44 BRITISH JOURNAL OF CRIMINOLOGY 188–203 (2004).

<sup>100</sup> See Samuel Greengard, *Policing the future*, 55 COMMUNICATIONS OF THE ACM 19 (2012).

<sup>101</sup> See Beth Pearsall, *Predictive policing: The future of law enforcement*, 266 NATIONAL INSTITUTE OF JUSTICE JOURNAL 16–19 (2010). **For those who have followed the national security version of this debate, this logical progression will seem quite familiar. In government hearings across Europe and America, intelligence agencies have argued that in order to find needles, they need access to the entire data haystack. See Patrick Wintour Political editor, *New spying legislation is needed, intelligence committee will say*, THE GUARDIAN, March 12, 2015, <http://www.theguardian.com/uk-news/2015/mar/12/intelligence-committee-to-report-new-spying-legislation-is-needed> (last visited Sep 25, 2015).**

agencies need to turn to nontraditional sources of information as well as developing and refining internal data sources.<sup>102</sup> The risks inherent in such an approach—especially if implementations and approaches are rushed or otherwise undertaken without a full understanding of the implications – can include not only the more obvious issues of privacy and fairness, but also technical liabilities attributable to cybersecurity and the long-term effects on due process, all of which present serious ethical questions and responsibilities.<sup>103</sup>

#### **IV. The Enhancement of Structural Surveillance and De Facto Race Bias**

##### **A. Criticisms of the Broken Windows Policing Model**

The broken windows policing model, along with the collection of technologies and techniques supporting this approach, have met with a growing body of criticisms, even as police departments continue to adopt and promote these methods.<sup>104</sup> Core to many of these criticisms is the central role “disorder” plays in the broken windows model,

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<sup>102</sup> Id.

<sup>103</sup> See, e.g., K K Waterman & P J Bruening, *Big Data analytics: risks and responsibilities*, International Data Privacy Law (2014);

<sup>104</sup> As crime rates began to drop in cities like New York in the late 1990s, proponents of broken windows policing claimed this as evidence that this new policing paradigm was working. See George L. Kelling & William J. Bratton, *Declining Crime Rates: Insiders’ Views of the New York City Story*, 88 THE JOURNAL OF CRIMINAL LAW AND CRIMINOLOGY (1973-) 1217 (1998). In fact, the drop in crime rates in New York City were double the national average at the time. See Dan M. Kahan, *Social Influence, Social Meaning, and Deterrence*, 83 VIRGINIA LAW REVIEW 349 (1997). Critics of the broken windows model, however, argued that its proponents were too quick to claim responsibility for the drop in crime rates, asserting that other factors are just as likely—or more likely—to explain this decline, such as more favorable economic conditions, shifts in drug use, and the general increase in the New York police force. See Joshua C. Hinkle & David Weisburd, *The irony of broken windows policing: A micro-place study of the relationship between disorder, focused police crackdowns and fear of crime*, 36 JOURNAL OF CRIMINAL JUSTICE 503–512 (2008); Joshua C. Hinkle & Sue-Ming Yang, *A New Look into Broken Windows: What Shapes Individuals’ Perceptions of Social Disorder?*, 42 JOURNAL OF CRIMINAL JUSTICE 26–35 (2014); Aaron R. S. Lorenz, *The Windows Remain Broken: How Zero Tolerance Destroyed Due Process*, 12 PUBLIC INTEGRITY 247–260 (2010).

specifically, the subjective definition and measurement of the term, as well as the limited beneficiaries of this approach.<sup>105</sup> These criticisms have seriously questioned the the premise of broken windows, citing statistics that indicate that the broken windows model has a measureable, direct negative effect on the very neighborhoods and communities whose “hot spots” were supposedly the beneficiaries of increased police focus.<sup>106</sup>

Among the sharpest of criticisms of the broken windows policing model is based on evidence that, whatever the original intent was of such programs, their implementations have been less about policing disorder than the control of poor neighborhoods and poor people, most of whom are racial minorities.<sup>107</sup> The combination of the longstanding practice within the American legal system of using race

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<sup>105</sup> See Jacinta M. Gau & Travis C. Pratt, *Revisiting Broken Windows Theory: Examining the Sources of the Discriminant Validity of Perceived Disorder and Crime*, 38 JOURNAL OF CRIMINAL JUSTICE 758–766 (2010); Bernard E. Harcourt, *Reflecting on the Subject: A Critique of the Social Influence Conception of Deterrence, the Broken Windows Theory, and Order-Maintenance Policing New York Style*, 97 MICHIGAN LAW REVIEW 291 (1998).

<sup>106</sup> See Jacinta M. Gau & Travis C. Pratt, *Revisiting Broken Windows Theory: Examining the Sources of the Discriminant Validity of Perceived Disorder and Crime*, 38 JOURNAL OF CRIMINAL JUSTICE 758–766 (2010); Joshua C. Hinkle & David Weisburd, *The irony of broken windows policing: A micro-place study of the relationship between disorder, focused police crackdowns and fear of crime*, 36 JOURNAL OF CRIMINAL JUSTICE 503–512 (2008).

<sup>107</sup> **Empirical evidence collected in cities that have implemented versions of broken windows policing strongly indicates a race bias in its execution.** See Jeffrey Fagan & Garth Davies, *Street stops and broken windows: Terry, race and disorder in New York City*, 28 FORDHAM URBAN LAW JOURNAL 457 (2000); Mike King, “Broken Windows,” *Urban Policing, and the Social Contexts of Race and Neighborhood (Dis-)Empowerment*, 21 CRITICAL CRIMINOLOGY 533–538 (2013); Robert J. Sampson & Stephen W. Raudenbush, *Seeing Disorder: Neighborhood Stigma and the Social Construction of “Broken Windows,”* 67 SOCIAL PSYCHOLOGY QUARTERLY 319–342 (2004); Forrest Stuart, *Race, Space, and the Regulation of Surplus Labor: Policing African Americans in Los Angeles’s Skid Row*, 13 SOULS 197–212 (2011); Jamila Michener, *Neighborhood Disorder and Local Participation: Examining the Political Relevance of “Broken Windows,”* 35 POLITICAL BEHAVIOR 777–806 (2013); Steve Herbert, *Policing the contemporary city: Fixing broken windows or shoring up neo-liberalism?*, 5 THEORETICAL CRIMINOLOGY 445–466 (2001).

as a signal of increased risk of criminal behavior with the incentivizing of police officers to gather “intelligence” data through arbitrary stop and frisk programs (sometimes referred to as “enhanced *Terry* stops”) to feed into automated intelligence systems, has created an environment where racial minorities end up bearing the costs of broken windows, while wealthy, white communities tend to see the majority of its benefits.<sup>108</sup>

The societal disorder that broken windows policing targets has been shown to be a very fluid concept, where the perceptions of a minority neighborhood’s residents are often far different than those of the police officers patrolling those neighborhoods, who frequently come from other, wealthier neighborhoods.<sup>109</sup>

The result of the intelligence data collected based on race or class bias, or parochial perceptions of the definition of societal disorder, creates an inherent bias in automated decision support systems that tends to be reinforced with every trip around the OODA loop.<sup>110</sup> This result can be directly traced to the sort of feedback loops data-

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<sup>108</sup> See Jeffrey Fagan & Garth Davies, *Street stops and broken windows: Terry, race and disorder in New York City*, 28 FORDHAM URBAN LAW JOURNAL 457 (2000). It is worth noting that the facts behind *Terry v. Ohio*, 392 U.S. 1 (1968), which allowed a police officer’s “professional judgment” to serve as basis for a warrantless stops and searches, involve a race-based decision by a police officer. Specifically, Detective McFadden, who was white, stopped the defendant, Terry, who was African American, based on McFadden’s sole observation that Terry was seen in a commercial district far from an area of the city where most African Americans lived. As McFadden put it, Terry’s presence “didn’t look right to [him] at the time.” *Id.*

<sup>109</sup> See Joshua C. Hinkle & Sue-Ming Yang, *A New Look into Broken Windows: What Shapes Individuals’ Perceptions of Social Disorder?*, 42 JOURNAL OF CRIMINAL JUSTICE 26–35 (2014).

<sup>110</sup> Some officers within police organizations have also expressed levels of dissatisfaction with algorithmic tools like Compstat, indicating that the pressures on lower-level officers within departments from upper management result in a system of perverse incentives, where the rank-and-file tend to be rewarded only if they continue to propagate and support the system’s existing structure. See John A. Eterno & Eli B. Silverman, *Understanding police management: A typology of the underside of compstat*, 5 PROFESSIONAL ISSUES IN CRIMINAL JUSTICE: A PROFESSIONAL JOURNAL 11–28 (2010).

centric decision support systems like Compstat are prone to encounter.<sup>111</sup> That is, if the data used to initiate an automated decision support tool is biased or otherwise flawed, the “actionable intelligence” that emerges will likely also be biased or flawed. If this bad intelligence is then acted upon, the resulting stops or arrests will likely generate even more bad data, which is then fed back into the decision support system, and so on.<sup>112</sup>

## **B. Algorithms, Data, Neutrality, and Bias**

What makes automated, predictive policing systems so attractive as a solution for law enforcement agencies seeking increased efficiencies, is the same thing that makes them potentially dangerous: We tend to trust algorithms and data implicitly, since we assume that computers have no bias, and numbers do not lie.<sup>113</sup> This common misconception is based upon two fundamental misunderstandings of automated decision support or expert systems. First, while it is true that computers, as finite state machines that at their core (no pun intended) are strictly limited to the instructions we give them through their programming, it does not follow that the algorithms we run on these computers are necessarily unbiased. Computer programs—algorithms coded by humans into a form a computer’s chipset can interpret—are written with the objectives,

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<sup>111</sup> Negative feedback loops in police decision support tools have been a concern for some time, especially if data collection processes are not updated to fit the goals of the community. See J. J. Willis, S. D. Mastroski & T. Rinehart Kochel, *Recommendations for Integrating Compstat and Community Policing*, 4 POLICING 182–193 (2010).

<sup>112</sup> See, e.g., Thomas Oommen, Laurie G Baise & Richard M Vogel, *Sampling Bias and Class Imbalance in Maximum-likelihood Logistic Regression*, 43 Math Geosci 99–120 (2010); Christopher M Bishop, *Pattern recognition and machine learning* (2006); Brian Mac Namee et al., *The problem of bias in training data in regression problems in medical decision support*, 24 Artificial intelligence in medicine 51–70 (2002).

<sup>113</sup> See J Elin Bahner, Anke-Dorothea Hüper & Dietrich Manzey, *Misuse of automated decision aids: Complacency, automation bias and the impact of training experience*, 66 International Journal of Human-Computer Studies 688–699 (2008); L J Skitka, K L Mosier & M Burdick, *Does automation bias decision-making?* 51 International Journal of Human-Computer ... 991–1006 (1999).

design choices, and general experiences of the programmer as background. The series of instructions, data structures, and design choices that end up in a finished computer program can often translate subtle biases, often in unexpected ways.<sup>114</sup> [Complete section on NFL theorems—working on appropriate way to represent them here]

For example, from an algorithmic modeling perspective, incorrect or imbalanced input data has long been shown to lead to biased results.<sup>115</sup> Perhaps the most commonly used statistical method used in predictive modeling systems is linear regression.<sup>116</sup> The most widely used method for parameter estimation in this category is maximum likelihood linear regression, a technique employed across many domains, including military and police predictive intelligence systems.<sup>117</sup> In systems such as these, the data used often contain a large number of events belonging to one class, while the other class

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<sup>114</sup> This concept has been generalized into what are known as the “no free lunch” (NFL) theorems, which state that bias-free learning is futile. See David H. Wolpert & William G. Macready, *No free lunch theorems for optimization*, 1 EVOLUTIONARY COMPUTATION, IEEE TRANSACTIONS ON 67–82 (1997); DAVID H. WOLPERT & WILLIAM G. MACREADY, NO FREE LUNCH THEOREMS FOR SEARCH (1995).

<sup>115</sup> See, e.g., S R Cosslett, *Maximum likelihood estimator for choice-based samples*, *Econometrica: Journal of the Econometric Society* (1981); V García, R A Mollineda & J S Sánchez, *On the k-NN performance in a challenging scenario of imbalance and overlapping*, 11 *Pattern Anal Applic* 269–280 (2007); X Y Liu, J Wu & Z H Zhou, *Exploratory undersampling for class-imbalance learning*, *Systems* (2009); Y Tang, Y Q Zhang & N V Chawla, *SVMs modeling for highly imbalanced classification*, *Systems* (2009); D P Williams & V Myers, *Mine classification with imbalanced data*, *Geoscience and Remote ...* (2009).

<sup>116</sup> Logistic regression, a variant of statistical linear regression used when the dependent variable is not continuous, but is instead a binary value (e.g., “yes/no”), is often used to predict the probability of an event on a range from [0..1]. See Alan Agresti, *Categorical Data Analysis* (2013). As of February 2016, a *Web of Science* search yields 22,773 papers that include “linear regression” in their title or topic published since 2013 alone.

<sup>117</sup> See G King & L Zeng, *Explaining rare events in international relations*, International Organization (2001); J Cohen, W L Gorr & A M Olligschlaeger, *Leading indicators and spatial interactions: A crime-forecasting model for proactive police deployment*, *Geographical Analysis* (2007); Alex Hirschfield & Kate Bowers, *Mapping and Analysing Crime Data* (2003); Tansel Özyer et al., *The Influence of Technology on Social Network Analysis and Mining* (2013).



contains only a few data points, a data disparity known as class imbalance.<sup>118</sup> This phenomenon often occurs in crime data where the event of interest (the crime) is sampled far more frequently than non-events. This problem also manifests itself in the differences in class data representations between the sample set and the actual population, known as sampling bias.<sup>119</sup> There are, of course, statistical sampling methods to mitigate these effects, but there is no clear consensus as to which method of class distribution sampling will work best in all—or even most—situations.<sup>120</sup> The best solutions tend to be those that are specially selected based on such factors as the statistical methods employed, the population size, the sample size, and specifics regarding the event in question.<sup>121</sup> In plain language, this means that a one-size-fits-all solution is likely to produce questionable results, at best, and at worst, dangerously biased results. This danger becomes increasingly amplified when one examines the trend of police analysis being extended from the realm of geospatial analysis—predicting which neighborhoods are most likely to be crime hot spots—to the individual, where

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<sup>118</sup> See G Forman, *Quantifying trends accurately despite classifier error and class imbalance*, (2006); Thomas Oommen, Laurie G Baise & Richard M Vogel, *Sampling Bias and Class Imbalance in Maximum-likelihood Logistic Regression*, 43 *Math Geosci* 99–120 (2010).

<sup>119</sup> See, e.g., H Zhou & W Du, *Studying the Sampling Bias of Network Topology Discovery*, International Information Institute (Tokyo) ... (2012); Paul Gustafson, *Measurement Error and Misclassification in Statistics and Epidemiology* (2003); Kenneth P Burnham & David R Anderson, *Model Selection and Inference* (2013); David A Freedman, David Collier & Jasjeet S Sekhon, *Statistical Models and Causal Inference* (2010); Russell B Millar, *Maximum Likelihood Estimation and Inference* (2011); Douglas C Montgomery, Elizabeth A Peck & G Geoffrey Vining, *Introduction to Linear Regression Analysis* (2015); Yoav Freund, László Györfi & György Turán, *Algorithmic Learning Theory* (2008).

<sup>120</sup> See G M Weiss & F Provost, *Learning when training data are costly: the effect of class distribution on tree induction*, *Journal of Artificial Intelligence Research* (2003).

<sup>121</sup> See Thomas Oommen, Laurie G Baise & Richard M Vogel, *Sampling Bias and Class Imbalance in Maximum-likelihood Logistic Regression*, 43 *Math Geosci* 99–120 (2010).

police keep close tabs on people who, according to predictive algorithms, are more likely to be involved in future crimes.<sup>122</sup>

### **C. The Introduction of Automation Bias**

The rise of the information and audit society and the associated increase in the use of automated information systems in organizational decision making often leads to an overreliance on—and overconfidence in—the results of these systems. This automation bias leads to misuse of automated intelligence systems combined with automation induced user complacency.<sup>123</sup> The negative effects of this automation bias have been seen in healthcare, transportation, power distribution, defense, and space exploration domains, often with serious, life-threatening consequences.<sup>124</sup> There are multiple reasons for this behavior, including our natural tendencies to seek out paths of least cognitive effort, to expend less energy when part of a team (including teams with automated members), and to treat computers as decision-making authorities.<sup>125</sup> These

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<sup>122</sup> See John Eligon & Timothy Williams, *Police Program Aims to Pinpoint Those Most Likely to Commit Crimes*, THE NEW YORK TIMES, September 24, 2015, <http://www.nytimes.com/2015/09/25/us/police-program-aims-to-pinpoint-those-most-likely-to-commit-crimes.html> (last visited Sep 25, 2015).

<sup>123</sup> See John D Lee & Katrina A See, *Trust in Automation: Designing for Appropriate Reliance*, 46 Human Factors: The Journal of the Human Factors and Ergonomics Society 50–80 (2004); J E Bahner, M F Elepfandt & D Manzey, *Misuse of diagnostic aids in process control: The effects of automation misses on complacency and automation bias*, (2008); E Alberdi et al., *Why are people's decisions sometimes worse with computer support?* 5775 Computer Safety 18–31 (2009).

<sup>124</sup> See LINDA J SKITKA, KATHLEEN MOSIER & MARK D BURDICK, *Accountability and automation bias*, 52 International Journal of Human-Computer Studies 701–717 (2000); M D Burdick et al., *The ameliorating effects of accountability on automation bias*, hics (1996); Kate Goddard, Abdul Roudsari & Jeremy C Wyatt, *Automation bias: Empirical results assessing influencing factors*, 83 International Journal of Medical Informatics 368–375 (2014); John D Lee & Katrina A See, *Trust in Automation: Designing for Appropriate Reliance*, 46 Human Factors: The Journal of the Human Factors and Ergonomics Society 50–80 (2004).

<sup>125</sup> In addition to empirical studies on this topic, scholars have collected a number of anecdotal examples of this phenomenon to better illustrate the point. One of the earliest

errors have been further categorized into two classes that manifest in automated environments: *omission* errors, where operators fail to respond to system anomalies because the automated system fails to detect or warn of them; and *commission* errors, where users blindly follow incorrect guidance from automated systems in spite of contraindications from other information sources.<sup>126</sup> Studies have repeatedly shown that automation bias of both types leads to users making incorrect decisions at a rate as high as 75%, even when the information they needed to make the correct decision was readily available.<sup>127</sup>

Automation bias becomes especially dangerous when life or liberty is at stake. Multiple studies in domains such as health care, air transportation, and military command and control have repeatedly shown how bias and complacency lead users of automated systems to make very costly mistakes.<sup>128</sup> In military environments especially,

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identified examples of this can be found in the 1983 Korean Airlines incident, where one of their passenger aircraft was shot down by Soviet fighters. Forensic examinations and experiments showed that the KAL crew had grown complacent in their reliance on the aircraft's automated navigation systems, and followed the system's recommended headings rather than crosschecking its results against other navigation methods, as is typically required. Due to the crew's lack of vigilance and deep trust in the automated systems, the flight path given by the automated navigation systems led the crew well into Soviet airspace See L J Skitka, K L Mosier & M Burdick, *Does automation bias decision-making?* 51 *International Journal of Human-Computer ...* 991–1006 (1999).

<sup>126</sup> See LINDA J SKITKA, KATHLEEN MOSIER & MARK D BURDICK, *Accountability and automation bias*, 52 *International Journal of Human-Computer Studies* 701–717 (2000); L J Skitka, K L Mosier & M Burdick, *Does automation bias decision-making?* 51 *International Journal of Human-Computer ...* 991–1006 (1999).

<sup>127</sup> See LINDA J SKITKA, KATHLEEN MOSIER & MARK D BURDICK, *Accountability and automation bias*, 52 *International Journal of Human-Computer Studies* 701–717 (2000).

<sup>128</sup> See, e.g., R Parasuraman & D H Manzey, *Complacency and Bias in Human Use of Automation: An Attentional Integration*, 52 *Human Factors: The Journal of the Human Factors and Ergonomics Society* 381–410 (2010); R J de Boer, W Heems & K Hurts, *The duration of automation bias in a realistic setting*, *The International Journal of ...* (2014); J M McGuirl & N B Sarter, *Supporting trust calibration and the effective use of decision aids by presenting dynamic system confidence information*, *Human Factors:*

overconfidence in the authority of automated decision support systems can be particularly catastrophic, where the importance of situational awareness is paramount.<sup>129</sup> The average person is well equipped to engage in naturalistic decision making processes, where one is expected to solve real-world problems under a certain amount of stress.<sup>130</sup> We are, however, prone to overreliance on sources of information guidance that we regard as authoritative.<sup>131</sup> Military intelligent decision support systems operate within organizational hierarchies wherein users are predisposed, through their training, to defer to authorities within their supervisory structure, a trait that remains in effect when users of these systems seek guidance from algorithms and data structures.<sup>132</sup> The natural result is an amplification of automation bias in these overtly hierarchical environments, where users exhibit tendencies to rely exclusively on automated systems, even when conflicting information is presented by other available systems.<sup>133</sup> The transfer of military intelligent decision support systems to civilian law enforcement organizations, where the paramilitary organizational structure closely resembles that of the military, makes police susceptible to the same dangerous automation bias exhibited

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The Journal of the Human ... (2006); G P Noone & D C Noone, *Debate over Autonomous Weapons Systems*, *The Case W Res J Int'l L* (2015); E Rovira & K McGarry, *Effects of imperfect automation on decision making in a simulated command and control task*, *Human Factors: The ...* (2007); W M Crocoll & B G Coury, *Status or recommendation: Selecting the type of information for decision aiding*, (1990); M L Cummings, *Automation bias in intelligent time critical decision support systems*, AIAA 1st Intelligent Systems Technical Conference (2004).

<sup>129</sup> See E Rovira & K McGarry, *Effects of imperfect automation on decision making in a simulated command and control task*, *Human Factors: The ...* (2007).

<sup>130</sup> See G Klein, *Naturalistic Decision Making*, 50 *Human Factors: The Journal of the Human Factors and Ergonomics Society* 456–460 (2008).

<sup>131</sup> See M L Cummings, *Automation bias in intelligent time critical decision support systems*, AIAA 1st Intelligent Systems Technical Conference (2004).

<sup>132</sup> *Id.*

<sup>133</sup> See E Rovira & K McGarry, *Effects of imperfect automation on decision making in a simulated command and control task*, *Human Factors: The ...* (2007).

in military environments. So how do law enforcement organizations take advantage of continued advances in automated intelligence and decision support techniques without either further alienating the communities they serve or succumbing to various data- and algorithm-based biases?

## **V. A Community Policing Solution to Algorithmic Race Bias**

Of course, to completely ignore the opportunities presented by advances in automation makes no sense. There are many tasks that computers simply do better than humans, such as repetitive tasks, rapid response to control tasks, rule-based deductive reasoning, and simultaneous task handling.<sup>134</sup> As our systems—both human and computer—grow increasingly complex, we need automation to give us the enhanced capabilities to handle time-critical and complex control environments. The trick, then, is to recognize the critical role automated information systems play in these domains, but at the same time, maintain an informed awareness of the pitfalls an overreliance on automated decision support can bring. This is of special import to law enforcement agencies, who have a special duty to their communities not only to enforce the laws, but to protect and maintain the health and safety of their everyone in those communities. Allocating the appropriate amount of functionality between police officers and automated systems is critical to this role. In this section, I recommend a two element approach to this problem that takes into account both the important social role police play within their communities as well as the phenomenon of automation and data bias that can artificially reinforce racial disparities in police treatment.

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<sup>134</sup> See M L Cummings, *Automation bias in intelligent time critical decision support systems*, AIAA 1st Intelligent Systems Technical Conference (2004).

### **A. A Return to the Original Intent of Community Policing**

A significant part of the original broken windows policing concept articulated by Wilson and Kelling was the role of the police officer in reassuring community members of their safety, and maintaining a high degree of sensitivity to signaling by community residents, with respect not only to criminal activity, but also with their comfort with the police agency itself.<sup>135</sup> Community policing requires a more holistic approach to the problem of public safety that goes beyond mere crime fighting to encompass overall community health, safety, and quality of life.<sup>136</sup> Under this model, crime fighting was not an end in itself, but the means toward healthier communities, and was seen as a more modern, inclusive method of policing.<sup>137</sup>

Too many implementations of broken windows and intelligence led policing models, however, failed to follow through on this part of the theory. Rather than measure their performance—and direct their activities—using data that reflected a community’s overall health and quality of life, systems like Compstat relied heavily, sometimes exclusively, on traditional crime statistics, such as the number of stops, arrests, and clearance rates, despite the fact that these metrics have repeatedly been shown to have little to no bearing on overall community safety.<sup>138</sup> Sadly, the reasoning behind this flawed approach to the original community policing concept lies in the fact

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<sup>135</sup> See P.A.J. Waddington, *Community Policing*, 1 POLICING 129–131 (2007).

<sup>136</sup> See David L. Carter & Allen D. Sapp, *Issues and Perspectives of Law Enforcement Accreditation: A National Study of Police Chiefs*, 22 JOURNAL OF CRIMINAL JUSTICE 195–204 (1994); GEORGE L. KELLING & CATHERINE M. COLES, *FIXING BROKEN WINDOWS: RESTORING ORDER AND REDUCING CRIME IN OUR COMMUNITIES* (1997); WESLEY G. SKOGAN, *POLICE AND COMMUNITY IN CHICAGO: A TALE OF THREE CITIES* (2006).

<sup>137</sup> *Id.*

<sup>138</sup> See PETER W. GREENWOOD, JOAN PETERSILIA & JAN M. CHAIKEN, *THE CRIMINAL INVESTIGATION PROCESS* (1975); JEROME H. SKOLNICK, *JUSTICE WITHOUT TRIAL: LAW ENFORCEMENT IN DEMOCRATIC SOCIETY* (2011).

that these crime statistics are easy to collect and measure, and police departments have developed a high degree of comfort with these metrics over the years.<sup>139</sup> Thus, the most direct approach to solving the problem of bad data leading to biased results from data-centric decision support tools is to require that police departments retool their data collection and analysis efforts toward more meaningful metrics.

Another misinterpreted requirement of the original Wilson and Kelling model is the concept of proactive policing. Most police departments implementing broken windows models have designed their systems as incident-oriented frameworks, which do a poor job at addressing levels of criminality in a community, and serve mainly to feed a cycle of incarceration.<sup>140</sup> The Wilson and Kelling method of proactive policing focuses instead on the root causes of criminality, such as poverty, economic and ecological injustice, and racism, where police departments form part of a larger community team to go beyond the punishing of window breakers, and actually fix the broken windows.<sup>141</sup>

Finally, community policing requires police departments to hone their sensitivities to community and cultural norms, since perceptions of social disorder can be highly dependent upon time, place, and circumstance, and most police officers are

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<sup>139</sup> See VICTOR E. KAPPELER & LARRY K. GAINES, *COMMUNITY POLICING: A CONTEMPORARY PERSPECTIVE* (2012).

<sup>140</sup> See Mike King, “*Broken Windows, Urban Policing, and the Social Contexts of Race and Neighborhood (Dis-)Empowerment*,” 21 *Critical Criminology* 533–538 (2013); Jeffrey Fagan et al., *Street stops and broken windows revisited: The demography and logic of proactive policing in a safe and changing city*, RACE, ETHNICITY, AND POLICING: NEW AND ESSENTIAL READINGS, Stephen K. Rice and Michael D. White, eds., New York University Press 09–203 (2009).

<sup>141</sup> Wesley G Skogan, *Broken windows: Why—and how—we should take them seriously*, 7 *Criminology & Public Policy* 195–201 (2008).

not residents of the communities they patrol.<sup>142</sup> Public perceptions can also vary over time, so definitions of disorder often fall into the “I can’t define it, but I know it when I see it” category.<sup>143</sup> When police officers develop a feel for their communities they patrol, they will also benefit their departments by providing better, more meaningful intelligence data, which can then be used to improve their decision support outcomes.<sup>144</sup>

Failure to adhere to these original community policing standards has had a disproportionate negative impact on poor and minority communities. The policies and procedures put in place by police departments using automated decision support tools like compstat in support of broken windows policing regimes had a distinctly negative effect in minority communities.<sup>145</sup> As discussed in Section III above, this problem is not a new one, but has instead one that has been exacerbated by the use of military tactics

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<sup>142</sup> See William J Chambliss, *Policing the Ghetto Underclass: The Politics of Law and Law Enforcement*, 41 *Social Problems* 177–194 (1994).

<sup>143</sup> See Joshua C Hinkle & Sue-Ming Yang, *A New Look into Broken Windows: What Shapes Individuals’ Perceptions of Social Disorder?* 42 *Journal of Criminal Justice* 26–35 (2014); Robert J Sampson & Stephen W Raudenbush, *Seeing disorder: Neighborhood stigma and the social construction of “broken windows,”* 67 *Social psychology quarterly* 319–342 (2004); Ioanna Gouseti, *Psychological Distance and the Fear of Crime*, Chadee, D., (2015). *Psychology of Fear, Crime and the Media. International Perspectives*. Routledge, Forthcoming (2015).

<sup>144</sup> Craig Paterson, *“Street-level Surveillance”: Human Agency and the Electronic Monitoring of Offenders*, 4 *Surveillance & Society* (2007); William J Bratton & Sean W Malinowski, *Police Performance Management in Practice: Taking COMPSTAT to the Next Level*, 2 *Policing* 259–265 (2008).

<sup>145</sup> See Jeffrey Fagan et al., *Street stops and broken windows revisited: The demography and logic of proactive policing in a safe and changing city*, RACE, ETHNICITY, AND POLICING: NEW AND ESSENTIAL READINGS, Stephen K. Rice and Michael D. White, eds., New York University Press 09–203 (2009); Y Xu, *Discovering the Impact of Community Policing: The Broken Windows Thesis, Collective Efficacy, and Citizens’ Judgment*, 42 *Journal of Research in Crime and Delinquency* 147–186 (2005); Jeffrey Fagan & Garth Davies, *Street Stops and Broken Windows: Terry, Race, and Disorder in New York City*, 28 *Fordham Urban Law Journal* 457 (2000).



and technologies.<sup>146</sup> The rush by information societies to observe, collect, record, and evaluate all available data from our environments is especially felt by law enforcement agencies, who are already obligated to collect evidence.<sup>147</sup> This predilection leads police to treat their communities as intelligence landscapes, where people are viewed as “data elements” to be analyzed, resulting in dissociative or adversarial relationships between cop and citizen.<sup>148</sup>

This result is counter to the original intent behind community policing.<sup>149</sup> In hindsight, a certain level of disconnect between the algorithmic policing model and the community policing model, since algorithmic policing seeks to build a centralized, automated police force that operates from the inside out, and the community policing model requires a process that begins and ends with the citizen.<sup>150</sup> But a key driver behind broken windows and algorithmic policing is a heightened fear of crime and

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<sup>146</sup> See Richard L Block, *Fear of Crime and Fear of the Police*, 19 *Social Problems* 91–101 (1971); P B Kraska, *Militarization and Policing--Its Relevance to 21st Century Police*, 1 *Policing* 501–513 (2007); William Bloss, *Escalating US Police Surveillance after 9/11: an Examination of Causes and Effects*, 4 *Surveillance & Society* (2007); Peter B Kraska & Louis J Cubellis, *Militarizing mayberry and beyond: Making sense of American paramilitary policing*, 14 *Justice Quarterly* 607–629 (1997).

<sup>147</sup> See Michael Power, *Evaluating the audit explosion*, 25 *Law & policy* 185–202 (2003).

<sup>148</sup> See Craig Willse, “*Universal Data Elements,*” or the *Biopolitical Life of Homeless Populations*, 5 *Surveillance & Society* (2008); Craig Paterson, “*Street-level Surveillance*”: *Human Agency and the Electronic Monitoring of Offenders*, 4 *Surveillance & Society* (2007). Alistair Fraser & Colin Atkinson, *Making Up Gangs: Looping, Labelling and the New Politics of Intelligence-led Policing*, 14 *Youth Justice* 154–170 (2014).

<sup>149</sup> As originally envisioned in the early 1970s, the core community policing concept requires police officers to develop a sensitivity to community signaling regarding crime and disorder. Under this theory, this can only be done by establishing police foot patrols in neighborhoods, so that individual police officers can foster close working relationships with the citizens in those communities. See P A J Waddington, *Community Policing*, 1 *Policing* 129–131 (2007).

<sup>150</sup> See J J Willis, S D Mastrofski & T Rinehart Kochel, *Recommendations for Integrating Compstat and Community Policing*, 4 *Policing* 182–193 (2010).

disorder, a fear that has not diminished significantly over the past few decades, despite the nearly universal drop in crime rates nationally.<sup>151</sup> A necessary part of this transformation, therefore, is to cultivate a base level of trust within police organizations as well as every stakeholder community. One method of building this trust is to continue to use the automated policing systems, but reengineer them to focus on local community goals rather than those of police departments or outside interests. Transparency is critical to this step's success—police management must create a system through which community members can not only seek police assistance, but can examine the systems and goals the police themselves use to guide their day-to-day patrol activities. Another critical part of this transformation is an immediate increase in accountability within police departments. Automation bias, data bias, and corrupted procedures and goals often give police departments a certain amount of artificial cover when things go badly. Technological opacity is no substitute for human accountability up and down the management chain within law enforcement agencies. Finally, law enforcement resources must be shifted towards a citizen-focused organization, giving rank-and-file police

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<sup>151</sup> See David Weisburd et al., *The possible “backfire” effects of hot spots policing: an experimental assessment of impacts on legitimacy, fear and collective efficacy*, 7 *Journal of Experimental Criminology* 297–320 (2011); David Weisburd & John E Eck, *What Can Police Do to Reduce Crime, Disorder, and Fear?* 593 *The Annals of the American Academy of Political and Social Science* 42–65 (2004); Yung-Lien Lai & Jihong Solomon Zhao, *The impact of race/ethnicity, neighborhood context, and police/citizen interaction on residents' attitudes toward the police*, 38 *Journal of Criminal Justice* 685–692 (2010); Mengyan Dai & Richard R Johnson, *Is neighborhood context a confounder?: Exploring the effects of citizen race and neighborhood context on satisfaction with the police*, 32 *Policing: An International Journal of Police Strategies & Management* 595–612 (2009); Ioanna Gouseti, *Psychological Distance and the Fear of Crime*, Chadee, D., (2015). *Psychology of Fear, Crime and the Media. International Perspectives*. Routledge, Forthcoming (2015).

officers the power to help drive automation policy, while giving them the ability to use their own problem solving skills outside of the automated process.

## **B. Incorporate Outcome and Process Feedback Into Existing Systems**

We live in a time in which our lives are increasingly influenced and affected—whether we know it or not—by data, algorithms, and machine learning.<sup>152</sup> It would be a mistake to believe that police departments would somehow be immune to this trend. Therefore, the solution to modern (or post-modern) problems of public safety is not to go the way of Ned Ludd, but to develop police decision support systems with an eye toward civil rights, and avoiding race discrimination and economic injustice.

The key principle in developing any of these systems is transparency. As we saw in *Floyd et al. v. City of New York*,<sup>153</sup> the case that held the NYPD's stop and frisk program violated the Fourth Amendment by systematically conducting warrantless searches of pedestrians, the majority of which were African-American or Hispanic, opaque police policy decisions implementing a broken windows policing model create an insular environment that often fails to punish bad actors and creates perverse incentives.<sup>154</sup> Further, since most police departments do not employ software developers

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<sup>152</sup> See PEDRO DOMINGOS, *THE MASTER ALGORITHM: HOW THE QUEST FOR THE ULTIMATE LEARNING MACHINE WILL REMAKE OUR WORLD* (2015); FRANK PASQUALE, *THE BLACK BOX SOCIETY: THE SECRET ALGORITHMS THAT CONTROL MONEY AND INFORMATION* (2015).

<sup>153</sup> 959 F. Supp. 2d 540 (S.D.N.Y. 2013).

<sup>154</sup> See David Weisburd & John E Eck, *What Can Police Do to Reduce Crime, Disorder, and Fear?* 593 *The Annals of the American Academy of Political and Social Science* 42–65 (2004); Jeremy D Finn & Timothy J Servoss, *Misbehavior, Suspensions, and Security Measures in High School: Racial/Ethnic and Gender Differences*, 5 *Journal of Applied Research on Children* 1–52 (2015); Bernard E Harcourt, *Reflecting on the Subject: A Critique of the Social Influence Conception of Deterrence, the Broken Windows Theory, and Order-Maintenance Policing New York Style*, 97 *Michigan Law Review* 291 (1998).

or statisticians, they are forced to purchase their decision support systems from third party contractors.<sup>155</sup> The same principles of transparency should apply to contractors so as to avoid these problems.

Next, algorithmic and predictive policing systems need to be based upon accurate and meaningful data. For example, police stop and frisk programs, despite criticisms and claims of racial bias inherent in these programs, have been widely supported by law enforcement agencies based on their assertions that, while more minorities are subject to these suspicionless stops, it is only because minorities commit disproportionately more crimes than whites, and not due to any particular bias of police officers and departments.<sup>156</sup> In support of these arguments, police often cite automated police intelligence systems, such as compstat, to justify these stops.<sup>157</sup> Statistical studies conducted on stop and frisk data, however, have shown that minorities are far more likely subjects of these programs, with statistical patterns pointing toward a structural racial bias, reinforced through automated decision support tools.<sup>158</sup>

Finally, recalling the no free lunch theorems,<sup>159</sup> we must be cognizant of the limitations of purely technical solutions to human problems. Mathematical and computer models of real-life systems can, of course, provide critical insights into complex systems, but they are imperfect. Algorithms for deriving patterns from large amounts of seemingly random data are getting better as research and technological

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<sup>155</sup> Phyllis P McDonald, *Implementing ComptStat: Critical Points to Consider*, 71 *The Police Chief* 33 (2004).

<sup>156</sup> See Andrew Gelman, Alex Kiss & Jeffrey Fagan, *An Analysis of the NYPD's Stop-and-Frisk Policy in the Context of Claims of Racial Bias*, Columbia Public Law Research Paper (2006).

<sup>157</sup> *Id.*

<sup>158</sup> *Id.*

<sup>159</sup> See note XX and accompanying text, *supra*.

advances progress, but their most effective use within the broken windows policing model is as a supplemental tool that informs human decision making, not as a digital crutch upon which bad practices and biased policing are allowed to rest.

Further, known biases in automation systems can be mitigated through a number of established means. For example, automation bias and automation complacency can be avoided by increasing accountability by the users of a system.<sup>160</sup> By requiring system operators to provide complete justifications for their decisions—beyond “the machine told me so”—users will be driven toward deeper cognitive engagement and awareness of alternative information sources.<sup>161</sup> The level of automation used in a situation should also be carefully assessed on a domain basis. That is, the level of automation available can exceed the level of automation necessary for a given situation.<sup>162</sup> Repetitive, rigid tasks that expect no user decision-making flexibility are often good candidates for a high degree of automation, while those tasks that rely on human intuition, pattern perception, and contextual reasoning, are best served with lower levels of automation.<sup>163</sup> Much of the work of law enforcement falls into this latter category.

For the time being, algorithmic and predictive approaches are only as useful as their human creators. Selecting the proper policing model that will work in every instance is likely impossible, so one of the most important decisions in the field of machine learning is the selection of the model that will provide superior results for a

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<sup>160</sup> See LINDA J SKITKA, KATHLEEN MOSIER & MARK D BURDICK, *Accountability and automation bias*, 52 *International Journal of Human-Computer Studies* 701–717 (2000).

<sup>161</sup> *Id.*; M D Burdick et al., *The ameliorating effects of accountability on automation bias*, *hics* (1996).

<sup>162</sup> See M L Cummings, *Automation bias in intelligent time critical decision support systems*, AIAA 1st Intelligent Systems Technical Conference (2004).

<sup>163</sup> *Id.*

particular problem, a task which still requires an experienced and informed human in the loop.<sup>164</sup> But this fact can be leveraged as a benefit, rather than a liability, by using predictive systems to decentralize police command structures, and allow more creativity and initiative among rank-and-file patrol officers, characteristics which are critical to a true community policing model.<sup>165</sup>

## **VI. Conclusion**

The problem of bias in algorithmic policing has deep roots, as evidenced above. Solutions to this problem cannot ignore technological advances that can help us make better, more efficient decisions, but at the same time, they cannot allow these technologies to subvert the proper role of public safety in our communities. We live in an information society that is, once again, experiencing a crisis of control that we are naturally inclined to solve through data and analytic methods. But our approach must be based on lessons learned from our successes and failures in this arena. Many of these failures have led to a trust deficit between authorities and the communities they govern, especially where racial prejudices have been part of these failures. Addressing these disparities in algorithmic policing cannot solve all of these problems, but it is a good start.

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<sup>164</sup> See Christophe Giraud-Carrier, *Beyond predictive accuracy: what?*, in PROCEEDINGS OF THE ECML-98 WORKSHOP ON UPGRADING LEARNING TO META-LEVEL: MODEL SELECTION AND DATA TRANSFORMATION 78–85 (1998).

<sup>165</sup> See J. J. Willis, S. D. Mastrofski & T. Rinehart Kochel, *Recommendations for Integrating Compstat and Community Policing*, 4 POLICING 182–193 (2010).