Mark Wasiuta and Farzin Lotfi-Jam

Unstable Control

Information is still unstable, but the scene of its instability has shifted. Through loss, noise, entropy, and error, an informational predilection toward instability organized command and control theories in the postwar. In its earlier cybernetic manifestations, informational instability referred to linguistic and technical frailties imminent to communication and its electronic, radiophonic, telephonic, or digital translations and embodiments. In recent alignments of homes, cities, and data, the stresses, failures, and infelicities of information are linked to social behavior and economic signs as much as they are to signal interruption and degradation. The informational administration of cities is governed by a conception of urban space perpetually threatened by destabilizing disruptions.

The most recent incarnation – or involution – of mechanisms of control and informational instability are found within a military imaginary that returns technologies of remote sensing and remote control to the command center of the military base and its field operations. The 2015 Cisco white paper “Smart and Connected Bases” narrates the day of Master Sergeant Jones and Captain Williams – two US airmen stationed at an informationally enhanced airbase.[1] The paper begins with the conventional smart technology trope of improved efficiency. We learn that Jones and Williams are able to bypass time-consuming physical security checks by swiping onto the base electronically, and that integrated digital tracking allows for a more rapid ordering of replacement airplane parts. But we also learn of family strife, domestic disputes, missing children, AMBER Alerts, and how automated license plate tracking now helps manage such threats on the base. Building toward the discovery of a leaking fuel transport truck by smart light poles and infrared cameras, the Cisco narrative culminates with disaster digitally anticipated, perceived, and averted.

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Cover of Cisco, "Smart and Connected Bases," 2015.

The report is a sales pitch for the importation of smart city technology to US military bases. Its most striking feature is neither the normalizing portrayal of the military base as a city, nor even its image of quotidian routine and domestic life haunted by possible disaster, but rather its almost perfect similarity to hundreds of other narratives encountered in recent attempts to infiltrate, recode, and modulate urban space with sensing and reporting technologies. These attempts can be loosely assembled under the rubric of "data-driven decision making" – the most recent term crafted to extend and expand the domain of the financial, technical, urban product we know as the smart city.

The Cisco report follows a fusillade of similar arguments that attempt to locate the technical and military advantages of returning smart city technologies to the military. The US Intelligence Council predicts that Asia, Africa, and Latin America will soon lead smart city development globally. It argues that one consequence of smart internationalism is that the USA will inevitably find itself conducting military operations in a smart city in the near future. Moreover, as a recent RAND Corporation document claims, through their techniques of informational accumulation, "Smart Cities offer a potential windfall for intelligence for urban operations."[2]

These texts and reports collectively elide conventional smart city rhetoric – in which urban space is rendered more efficient – and a military logic that reads smart cities as the future physical, informational, and tactical territory of urban conflict. The militarization of smart city technologies anticipates and prepares for two initial forms of instability. The first is tied to the myriad sources of global financial and resource imbalance, geopolitical interests, and the local tensions and disputes that may lead to military intervention. The second is surprisingly not these sites of intervention and warfare, but the overwhelming abundance of information that will radiate from scenes of conflict and that will need to be smoothed and standardized in order to be operationally useful to the military.

The smart city as zone of future conflict requires a military doctrine of information excess adequate to the goal of ubiquitous monitoring and ceaseless global intelligence acquisition. It also requires the reconception and reconditioning of military personnel as information sensors.[3] Soldier-sensors will be trained to litter conflict zones with new sensing technologies and become active information relays rather than mere command receivers. The soldier-sensor will not only accelerate electronic monitoring capacity, but is also reimagined as a corporeal data vector – a perfect computational subject. Yet if the military comes to the smart city through an evaluation of asymmetrical informational advantage in future urban warfare, we came to the smart city through a distinct, but related, notion of informational poverty.

Two Experiences

Happy cartoons, dancing diagrams, and vast scale models animated by blinking LEDs; we are shuttled from one public relations nexus to the next. In Songdo, Korea's most enthusiastically promoted smart city enterprise, learning what makes the city smart is an arduous undertaking. Cisco's engineers refuse to speak to us, implying that what we are looking for is a trade secret. A contradiction forms between the perpetual exclamation of the innovations of this city and the secrecy of where this innovation lies. We start to suspect that the innovation belongs less to Songdo than to a standard, rehearsed set of descriptions and platitudes about integration, intelligence, and urban life enhanced by data. In the numerous dead-ends of this informational terrain vague, we seem to be repeating the experiences of other smart city pilgrims, researchers, and adventurers, lost in the zero panorama of the Songdo smart city tour.

The evasion encountered in Songdo is

entirely contrary to our reception at COR – Center of Operations Rio – the stout mirrored building that is the pulsing cybernetic heart of Rio de Janeiro's smart city network. There, we are met by COR's director who guides us through COR's mission and the structure of its algorithms. It is an elaborate demonstration of COR's decision protocols and the possibilities of a city viewed and organized through data extraction and sensors.

These contrasting experiences can be explained by distinct forms of civic government and the discrepant responsibilities of agencies operating in Songdo and Korea. Yet these two encounters illuminate ideas prevalent in smart city discourse. As the industry penetrates cities across Asia, Europe, and the Americas, it continues to predict massive growth and billions of dollars of smart city revenue. Grasped through this commercial logic, smart cities are proprietary technologies akin to industrial design artifacts, with complex supply chains, and whose technical composition and innovation paths are secrets to be protected from industrial espionage. The city appears as a sales object, a total urban commodity marketed through the jingoism of urban security and the jargon of urban sustainability.

The inverse of this economic logic is governmental innovation. Along with sensors and feedback channels, smart city algorithms are championed as components of an open source urban code that promises almost inconceivable citizen access to municipal data. In this argument, not only is the city enhanced, but so are the inhabitants: smart cities engender better, more politically active and engaged citizens. The smart city is the aggregate of technologies that foster smart citizens.

This distinction seems noteworthy, as though these arguments – as well as Songdo and Rio – help identify starkly different poles on a spectrum that spans civic benefit, global sales, and smart city hucksterism. Yet despite the varied reception we received, this helpful, diagrammatic opposition does not survive much scrutiny. Global commerce and municipal government, along with repression and agency, surveillance and security, efficiency and invasiveness, are neither positions nor ideas that remain stable or distinct in either Songdo or Rio. They orbit around each other, leaving a comet trail of smart city concepts and clichés of interaction, responsiveness, and the social benefits of urban data. *Control Syntax Rio* and *Control Syntax Songdo* – two recent projects – portray and assess the structure of these positions as well as the rhetoric and logic of urban monitoring and control technologies.[4]

Farzin Lotfi-Jam and Mark Wasiuta, *Control Syntax Rio*, Het Nieuwe Instituut, June 2016. Photo: Pim Top.

Control Syntax Rio

Built in 2010 in reaction to a calamitous landslide, COR was planned to anticipate and respond to future disasters and infrastructure failures. Equally important, it was intended to demonstrate Rio's commitment to improved urban administration and traffic management. To the International Olympic Committee and Rio's citizens both, COR was heralded as an urban feedback system and control center that would combine disaster response, urban sensor monitoring, and a form of intelligent traffic administration that would speed circulation during the crush of the 2016 Summer Olympics and after.

The technical and conceptual armature for COR originated in IBM's "Smarter Cities" initiative. A second, separate command and control center supports police and defense operations by conducting urban surveillance, face recognition sweeps, and crowd pattern evaluation. Segregating overt security and tracking tasks from COR's operations left IBM and COR with a relatively narrow mandate. COR amasses data on traffic flows, urban health, and weather patterns and responds to interruptions by changing traffic routes and by directing emergency teams to sites of interruption. In short, COR's primary tasks are to monitor, assess, and represent the metabolism of the city and to respond to actual or potential disruptions that drain, slow, or block it.

COR determines if Rio's metabolism is normal or abnormal. Through the logic of the IBM code around which it is built, COR measures abnormality according to four escalating scales of intensity: incident, event, emergency, crisis. How this scale is registered and represented, and how it determines response, form the foundation of Rio's computational urbanism.

At first glance, COR's control syntax appears banal and managerial. Yet it is also charged with potential crisis. For example, if protest erupts, then traffic will have to be redirected to avoid paralysis. If buildings explode, routes will need to be cleared to usher response teams. Explosions, fires, protests, landslides, rallies, and sudden tropical storms combine with faulty traffic lights, accidents, spilled trucks, burning buses, and quotidian congestion as elements of the COR syntax.

Farzin Lotfi-Jam and Mark Wasiuta, *Control Syntax Rio*, Het Nieuwe Instituut, June 2016. Photo: Pim Top.

Control Syntax Rio models a traffic route through Rio de Janeiro from Copacabana Beach to Maracana Stadium – beach volleyball and soccer competition sites for the 2016 summer Olympic games. It also traces a path through COR's decision matrix. The model aligns the material traffic infrastructure of the city with the immaterial syntax of COR's urban management code, allowing us to see the physical city – its traffic apparatus of streets, lights, and sensors – organized through Rio's control algorithms.

Farzin Lotfi-Jam and Mark Wasiuta, *Control Syntax Songdo*, Seoul Biennale of Architecture and Urbanism, September 2017. Photo: Sangtae Kim.

Control Syntax Songdo

The sensors that saturate Songdo are both technical and expressive. In their technical mode, they monitor environmental conditions and traffic patterns, track vehicles, and record street and building vibrations to signal disruptions, anomalous events, and potential dangers. As expressive objects, the sensors signal to Songdo's residents that the city is ecologically optimized as well as safe, controlled, and vigilant. The streetscape of sensors, the elision of traffic control and citizen identity, and the compaction of environmental, social, and urban threat are the informational and spatial matrix of Songdo's Control Syntax.

These threats and the fears they raise are not merely the product of solicitous municipal authorities; they are the constitutive feature of Songdo's smart urbanism. For the Songdo model to be sold as a successful urban product, it must first be recognizable as a city. Songdo's master plan – which places towers adjacent to its "central park," allocates space to global universities and charter schools, and inserts museums and cultural centers into the city grid – is designed to attract residents by generating a convincing image of city life. This is a spreadsheet urbanism, for which elements, buildings, programs, and amenities are determined by a serial logic of differentiation and are calculated to deliver an impression of programmatic and morphological diversity. Yet the fully regulated city is also intrinsically fearful of the diversity, disorder, and social tensions that are among the most visible signs of urbanity.

Songdo sensor and communications post, June 2017.

The paradox of urban fear exaggerated and then dramatically controlled is as familiar to contemporary global rhetoric of national security as it is to Songdo's smart city syntax. In this sense, Songdo is a byproduct of disinvestment in conventional public welfare programs and the inverse investment in border security, immigration, and other global population circulation controls and restrictions. Marketed as a "global city," Songdo's primary global claim is its attenuation of an international logic of internalization and exclusion.

The global also appears in Songdo through implicit association with global climate change. The virtues of environmental climate monitoring – of which the urban network of air monitors are pervasive reminders – help normalize and idealize a fully monitored city. Inside, automated waste extraction reinforces the link between environmental protection and domestic monitoring. Connecting apartment buildings to collection plants, a network of pneumatic tubes suck apartment waste beneath the streets to processing. Garbage is collected, compacted, and exported from the city in hyper-compressed containers. Residents are provided coded waste bags, deposited through the "smart" garbage portal on each floor of each building. Monitoring the disposal of domestic waste correlates to monitoring domestic energy consumption, and to the perpetual monitoring of particulates and contaminants in city air. The constant threat of climate catastrophe hovers over Songdo's monitoring regimes, lending them a sense of urgent necessity.

If environmental monitoring and domestic monitoring merge through waste disposal, Songdo's streets are the site of the most complete condensation. The habituation to monitoring on the inside extends notions of domestic security out onto the streets. In Songdo's control room – and in its imagination – the street persists as the image of both threat and control, the image of smart city efficiency and optimization, as well as the image of social fears and transgressions. In Songdo, there is a plan to geotag children to better monitor their movement and for fear they will be hit by traffic. Incoming cars are monitored to track drivers, check records, and to alert the city of possible criminal intrusion. Within a narrative of smart city civic life gone awry, each accident is the consequence of a particular system failure. As in Rio de Janeiro, traffic engineering in Songdo is politics. Here, it is also biopolitics: a metonomy of sensing operations connect city, street, camera, license plate, and particulate sensor to environmental threat and to new forms of monitored life.

Farzin Lotfi-Jam and Mark Wasiuta, *Control Syntax Songdo*, Seoul Biennale of Architecture and Urbanism, September 2017. Photo: Sangtae Kim.

Control Syntax Songdo comprises a physical model and a sequence of 360° videos marking key sensor locations to illustrate the attentive, nervous ubiquity of Songdo's vision technologies. The model compresses Songdo into a single intersection, congested with compound traffic accidents. It catalogues this sequence of accidents alongside the anxieties that lurk within the imaginary of smart city algorithmic control and regulation. The model is less a scene of spectacular catastrophe than an image of the predictive logic that forms the rationality of the smart city, and of the real and fabricated fears percolating through Songdo and similar smart city installations.

Control Rooms

For both Rio and Songdo the control room is the active demonstration of urban sensing, information extraction, feedback, and management. Titanic walls of data screens and camera feeds form a sublime image of urban omniscience, a proscenium of management in which the subdued theatricality of quotidian routine is as much a rhetorical effect as it is the product of real operational drama. The theatricality relies on the tracking, staging, presentation, and visualization of an event that can interrupt the banal data tableau of daily urban life. At COR, maps of the city are activated by the sudden appearance of street lines colored green, red, or yellow. Each color indicates a degree of traffic interruption and the level of algorithmically determined response. The strobing of these colored vectors is the visual corollary to a script of urban drama registered through traffic congestion and coordination.

In Songdo, the drama is more anticipatory. A network of cameras, vigilantly focused on apartment and office towers to catch the first sign of building fire, recompose the city into a grid of video feeds. Fixated on Songdo's architecture, the monitors seem to stretch the eight-hour duration of Warhol's *Empire* to infinity. The Songdo serial aesthetic is relentless. Other cameras catch and record the license plate of each car entering the city and track its movement through streets, intersections, and ubiquitous underground car parks. Sensors embedded in streets, fences, and building facades record patterns of movement and stasis, predict use cycles, and warn of transgression and invasion.

Smart city control rooms exhibit and conflate at least two primary characteristics. The first is the rational administration of the city. Faced with intensifying density, complexity, and the striation of populations through wealth disparities and access to services, the control room promises a corrective process of municipal management. The second is through their association with urban emergency response centers, from which smart cities cathect an urban imaginary of failures, crises, and vulnerabilities. A sense of threat attaches itself to the smart city at its origins. Looming political instability, environmental catastrophe, financial precarity, infrastructural entropy, and other signs of urban apocalypse fuel the desire for smart city experimentation.

Smart cities draw their population into the logic of urban command and control. In Rio, the control room doubles as a public relations space in which the city can show evidence of managerial competence. From an open balcony, COR's control room can be observed by Rio's citizens or any visitor and can be viewed online through a camera serving as a permanent witness to COR's data collection and presentation. The implication is that COR's control mechanisms are components of the democratic city and, like the data, graphs, and charts they generate, belong to the citizens of Rio.

Center of Operations Rio, January 2016.

In Songdo, smart city interpolation begins at home, where domestic sensors, automated waste retrieval, and interactive television education merge with the traffic cameras and vibration sensors on the streets of the city. Songdo's smart citizen identity is one in which a sense of domestic security permeates the city and ubiquitous street monitoring is as familiar as an apartment smoke detector. On the 3rd floor of Songdo's G Tower, visitors are led to a viewing room to watch a film that narrates the story of Songdo's sensor infrastructure and the city's "Smart Environment," "Smart Home," "Smart Building," "Smart Health," and "Smart Learning" accomplishments. As the film reaches its climax, the "switchable smart glass projection screen" fades from hazy to transparent, revealing – like an apparition coming into view – the smart city operations center below. In keeping with the persistent secrecy of the Songdo operation, photography is prohibited and the length of observation is tightly curtailed. We glimpse the control room in a flash, as a profane illumination of computational rationality.

As they translate sensing operations and information extraction into a scene of representation and consumption, the control rooms demonstrate a new mode of urban vision while they alter the image of the city. The conventions of urban formal organization – with their hierarchies of visual, spatial, perceptual, symbolic order – shift toward a new urban vocabulary comprising motion sensors, traffic cameras, and operational data maps. Written into smart city control algorithms, these newly significant urban elements produce an undifferentiated, non-hierarchical array of urban objects and actors.

The reformation of urban vision, the decision trees and algorithms that coordinate smart city operations, and the distribution, location, and saturation of the city with sensors and cameras together provide the physical, spatial, informational, and political armature of what we call the smart city's "control syntax." The habituation to this syntax, the collating of city populations into the scenes and technologies of control, and the merging of citizen identity with smart city ideals of efficiency and security are the basis for an ever more pervasive, twenty-first-century version of a condition we name "computational governmentality."

Such computational governmentality – with origins in post-war command and control networks – involves citizens as sensors and treats them as informational units. Through expanding computational governmentality, the rationality of smart enhancement and fantasies of the frictionless management of the city encounters its more complexly coded political, social, and topographic facts. It is an informational feedback system of governance that interpolates viewers into its spectacular, optical logic, its techniques of urban regulation, and its scripted data scenography. The city as data-driven political configuration – cities, streets, sensors, and data – is also the city as a theater of control, a theater narrated and dramatized by control syntax.

The drama performed in, and by, smart city control rooms is gripping, in part, because of its familiarity. The image of massive control screens and banks of glowing monitors has become a standard trope of cinema and an emblem of cold war computational technocracy. From NASA Apollo mission command centers to the war room in Stanley Kubrik's *Dr. Strangelove*, the control room has erupted as a dream image of twentieth century rationality. The smart city control room is the product of the world seen through space programs, defense systems, and the image of mega-death calculation meeting the everyday life of the city.

Tokyo Motor Show, 1971.

Traffic Controls

The control room is also the product of the historical integration of computation with the city and its rapid acceleration during the 1960s and 1970s. We sweep into this history early experimentation with traffic-sensing technologies – the assessment of traffic as a sign of looming environmental crisis, the renewed insistence on the street as artery for the management of population distribution, and urban congestion as synecdoche for global population instability. In this conception of urban traffic as a principle structural agent of the postwar city, its manipulation and resolution became an urgent problem that attracted different strategies and approaches to computational urbanism.

Research projects ranged from computer surveillance to monitor traffic flow to designs for automated guideways and computer driven vehicles. For example, the 1971 Tokyo Motor Show restaged the *Traffic Game*, a demonstration of a working "computer-controlled mini-car system" that was first played at the Automobile Industries Pavilion at Expo '70 in Osaka. The game's literature explained that "the passengers could experience an urban traffic system in which there were neither traffic delays nor accidents."[5] While a computer managed and drove the cars through a twenty-five-meter grid of multiple intersections, passengers could signal the direction they wished to travel by manipulating a physical lever. Arrows on the display panel indicated possible directions based on the vectors of other players' cars. Players that reached their destination in time were awarded commemorative medals.

The *Traffic Game* was the first deployment of automated urban car technology. It was soon tested at the larger scale of the Higashimurayama Project test track. Here, users inserted a credit card to rent a car and indicated their destination by entering its code number on a keyboard. The project introduced lane changes, different vehicle speeds, and multiple loading stations. As the physical scale and degree of computational complexity ramped up from a game to the testing track, so did claims for the social and psychological benefits of cybernetic travel. At Expo ‘70 and the Tokyo Motor Show, passengers were asked to “learn about future traffic while having fun.” Yet the authors of these projects claimed the game and the Higashimurayama test track would also evaluate the effects of “relieving the driver of nerve straining driving judgement.”[6]

The psychological dimensions of the Higashimurayama Project were not at all foreign to other test sites, and to the rhetoric of traffic and computational urbanism more generally. One advantage of the computerized roadway often invoked in the US was that it would provide a new informational infrastructure for data conduits, cable television, and electrical cables: it would be both a street and an informational utility corridor. It would unite traffic control, urban administration, and the behavior of the city’s occupants. The street would not only be a space of volatility and instability, but also a switch or a circuit that could be modulated and controlled. Computationally directed travel would act as a mediator between urban subjects and their desires. It would retain the car as an icon of freedom and mobility while alleviating and resolving traffic jams, accidents, air pollution, and all the calamities, conflicts, and catastrophes that urban desires engender.

The primary emblem of computationally directed travel – the electronic systems map of smooth or “anomalous” traffic flow – anticipated the IBM decision algorithm and the smart city focus on normal and abnormal traffic metabolism. This was also the site for emergence of a new image of the city in which the conditions of control, optimization, and algorithmic decision paths become its logic and rationality.

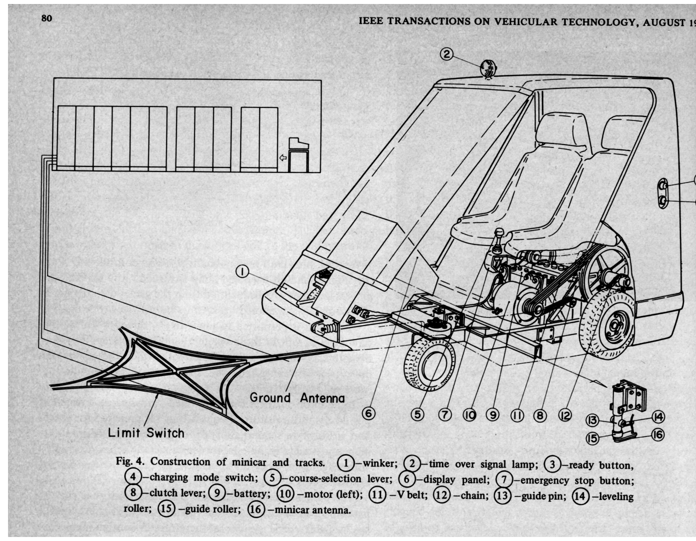

Diagram of the Mini-Car used in *Traffic Game* at Expo ’70 Osaka. Source: Takemochi Ishii et al., “Computer-Controlled Minicar System in Expo '70,” 1972.

We see suggested in these early iterations – and fully formed in Rio and Songdo – the image of the city filtered through computational urbanism. It is blithely directed toward engineered efficiency, but also flooded by narratives of possible threat, risks, and disruption. In all of these sites, models, and algorithms, disparate modes of action or interruption are flattened and made equivalent. In Rio, protests and traffic jams occupy the same plane of meaning, illustrating a simultaneous banalization of politics as traffic engineering and elevation of traffic control to the charged potency of urban politics. This effect is not limited to Rio. In Songdo, domestic security and the social order of the city are made coextensive. In the Tokyo test and concurrent American versions, automated traffic registers as an agent and metaphor for urban control. In the recent military appropriation of smart city technologies, the street is read as a vector of threat. Across this history, but most emphatically in recent smart city operations, traffic engineering appears as urban politics haunted by potential catastrophe.

The conjoined flattening and elevating of events, urban politics, and traffic, is the myth of the smart city and its antecedents – its unresolved and unresolvable contradiction. The myth is the rational management of the city in the face of what can’t be managed: sources of conflict, urban inequities, and the division of cities into zones of affluence and impoverishment. It transposes structural, social instability and economical precarity onto the surface of geological, climatological, and technological fact.

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2
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4
Control Syntax Rio was commissioned by Guus Beumer and Marina Otero at Het Nieuwe Instituut in Rotterdam. It was exhibited at Het Nieuwe Instituut in 2016 and Storefront for Art and Architecture in New York City in 2017. *Control Syntax Songdo* is a collaboration with Jean Im. It was exhibited at the Seoul Biennale of Architecture and Urbanism in 2017 and will be exhibited at MAXXI, the National Museum of 21st Century Arts, in Rome in Fall 2018.

5
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6
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