5 Airport code/spaces

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Introduction

> In our need to move, we submit to a series of invasive procedures and security checks that are becoming pervasive and yet are still rationalised through a discourse of exception – 'Only at the airport'.
>
> (Fuller and Harley 2004: 44)

Nearly all aspects of passenger air travel, from booking a ticket to checking in, passing through security screening, buying goods in duty free, baggage-handling, flying, air traffic control, customs and immigration checks, are now mediated by software and multiple information systems. Airports, as we have previously argued (Dodge and Kitchin 2004), at present consist of complex, overlapping assemblages to varying degrees dependent to function on a myriad of software systems, designed to smooth and increase passenger flows through various 'contact' points in the airport (as illustrated in Figure 5.1) and to enable pervasive surveillance to monitor potential security threats. Airport spaces – the check-in areas, security check-points, shopping areas, departure lounges, baggage reclaim, the immigration hall, air traffic control room, even the plane itself – constitute coded space or code/space. Coded space is a space that uses software in its production, but where code is not essential to its production (code simply makes the production more efficient or productive). Code/space, in contrast, is a space *dependent* on software for its production – without code that space will not function as intended, with processes failing as there are no manual alternatives (or the legacy 'fall-back' procedures are unable to handle material flows, which means the process then fails owing to congestion).

Air travel increasingly consists of transit through code/spaces, wherein if the code 'fails' passage is halted. For example, if the check-in computers crash there is no other way of checking passengers in; manual check-in has been discontinued, in part owing to new security procedures. Check-in areas then are dependent on code to operate and without it they are simply waiting-rooms with no hope of onward passage until the problem is resolved. In these cases, a dyadic relationship exists between software and space (hence the slash conjoining code/space), so that spatiality is the product of code, and code exists in order to produce spatiality.

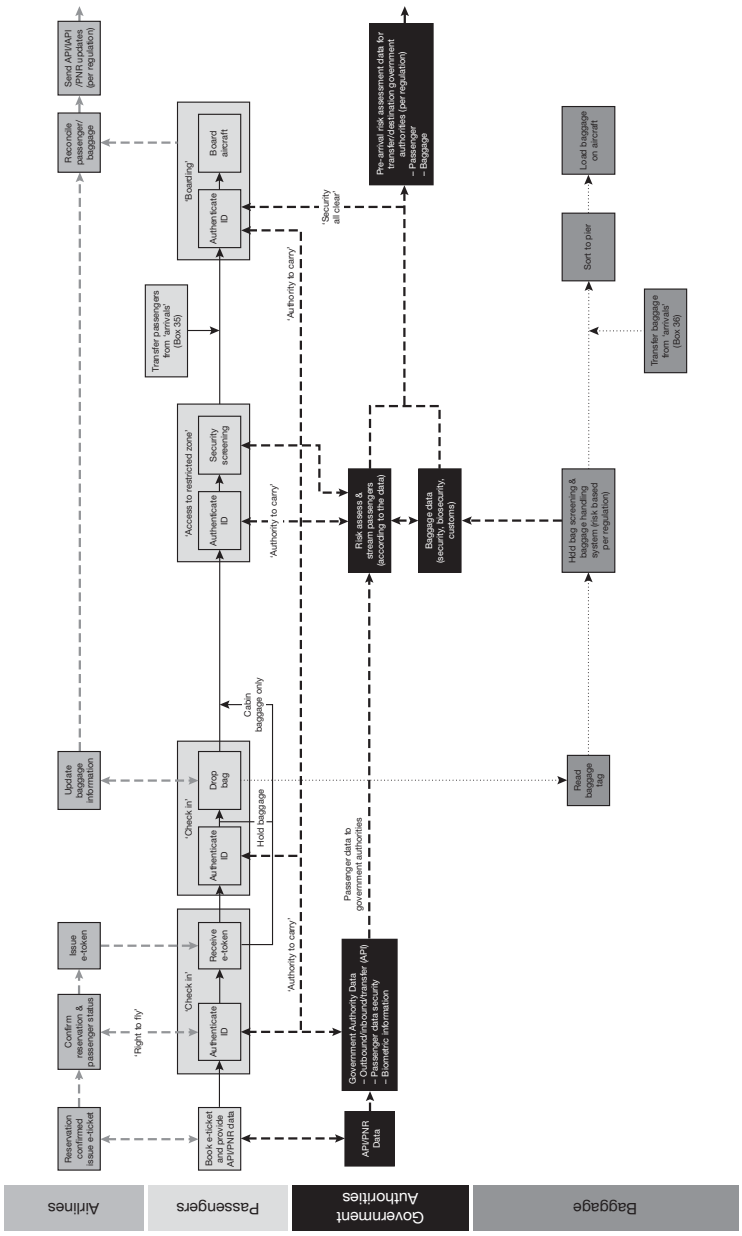


Figure 5.1 An inscription of orderly air travel created by an air travel industry expert group called 'simplifying passenger travel' to show the idealized flow of a typical departure process. The physical movement of passengers and baggage is represented by the solid lines. Many elements in the process are reliant on software and the correct exchange of digital information (represented by dashed lines in the diagram).

Source: Modified from SPT 2006: 5.

In earlier work we demonstrated how code/spaces are produced and how their operation is always contingent, relational and embodied, enacted through a process of transduction (Dodge and Kitchin 2004; 2005). Transduction is a process by which a domain shifts from one state to another, in this case from a non-coded space to a code/space. Software, we argued, alternatively modulates the production of space by altering the means by which spatialities are brought into being. It enables new, or automates old, socio-spatial processes wherein the code is essential for their deployment (see Dodge and Kitchin (2005) for a fuller explanation). Such a description might give the impression that software establishes the spatiality of much of the airport in a deterministic way (i.e. code determines in absolute, non-negotiable means everyday practices), with universal outcomes (i.e. such determinations occur in all places and at all times, in a simple cause-and-effect manner). In contrast, we would argue that the work that software does in the world is always embodied, the product of people and code. Code/space is never consistently created and experienced the same, but rather it is always produced; always in a state of becoming, emerging through individual performances and social interactions that are mediated, consciously or unconsciously, in relation to the mutual constitution of code/space (see Dodge and Kitchin 2004; 2005).

Further, we argued that code/space was most often the product of a 'collective manufacture' (Crang 1994) – of many people and systems recursively interacting with each other in multifarious ways. Indeed, airports function through multiple, interacting sets of complex socio-technological relations (see also Fuller and Harley 2004; Knox *et al.* 2005).

Code/space also varies for another reason. As we noted in Dodge and Kitchin (2004), code/spaces have accreted over time to no set master plan, with technological advances and political and economic decisions, to create interlocking assemblages. The components of these assemblages have a diverse range of owners, maintainers and licensing, accompanied by a labyrinth of contracts, leasing and service-level agreements. Further, a raft of national and international bodies and industry organizations are responsible for the setting and vetting of standards for systems where software is vital (such as aircraft navigation and air traffic control systems). As a result, the code/spaces of each airport vary in their production, the sedimentary outcome of different layers of deployments, systems, procedures and regulation laid down over years of operation. Further, code/spaces are relational, not discretely referenced to individual passengers and airports but, rather, stretched out across the whole architecture of networked infrastructure of air travel, from the locations from where tickets are initially reserved to final destination (see, for example, Bennett's (2004) detailed empirical attempt to trace some of the locations through which his personal data flowed when booking plane tickets). Code/spaces are often simultaneously local and global, grounded through the passage of people and goods, but accessible from anywhere across the network; and linked together into chains that stretch across space and time to connect start and end nodes into complex webs of interactions and transactions

(e.g. ticketing and passenger name records (PNRs) held on the main global distribution systems (GDSs) (Sabre, Amadeus, Worldspan and Galileo) can be accessed from many thousands of terminals across the world). These assemblages, then, have no central control and a complexity much greater than the sum of the parts. In this sense, as we argued in Dodge and Kitchin (2004), they are an assemblage that needs to be analyzed, in Deleuze and Guatarri's (1987) terms, as striated – that is, complex, gridded, hierarchical, rule-intensive, related; and as complex systems with emergent properties (see Holland 1998; Waldrop 1994).

In this chapter we want to expand our argument that the code/spaces of air travel are emergent, relational, contingent and embodied in nature (rather than deterministic, fixed, universal and mechanistic) by demonstrating how they are brought into being through the interplay of people and code. Code, we want to demonstrate is not law by itself (see Lessig 2000). Software's ability to do work in the world is *always* mediated by people – either through a direct interface between passenger or worker, or through gatekeepers who take the outputs of a program, interpret the results, and negotiate with a passenger(s) or fellow worker(s). What this means is that how travelers engage with software and its gatekeepers (the travel agent, check-in, security, immigration staff, and so on) and react through embodied practice varies between people and is contingent on their abilities, experiences, knowledges, and the context in which interactions occur. It is a social and cultural event, not a simple, deterministic exchange or an act of naked governmentality, and it unfolds in multifarious, ever-changing ways.

In this sense, the code/spaces of air travel are of-the-moment and performative. The airport is never repeated exactly twice and never fully predictable or ordered (though that is what systems of management and regulation aspire to). If there is a seemingly orderly pattern at a broad level it is because the various parts of the airport assemblage are citationally performed and people and systems are employed to make air travel work in particular ways. Ordering flows takes continual tuning, and as Knox *et al.* (2005: 11) note from their study of a British airport, 'the organization of "flow" is always in danger of "overflow", of disintegration into confusion and flux, where people and objects become unstuck from the smooth operation of representations and get lost in the intransigent opacity of the "mass".' Negating the occurrence of 'overflows' means the airport is remade as the airport continuously – cleaners clean; security guards patrol; food is prepared, served, cleaned away; planes land, taxi, disgorge passengers and luggage, are cleaned, refuelled, serviced, reboarded and leave; passengers and luggage flow through the various circuits and are helped on their way in various ways (by signs and flight information display screens, by printed boarding cards, by audible announcements, by customer service agents). If one spends time in the airport observing what is happening, its diverse realities become all too clear (on the sociology of airports see, for example, Gottdeiner (2001) and Pascoe (2001)). And much of this work in citationally reproduced through people and code doing work together. This

becomes very apparent if a software system fails and the space fails to be produced as intended (e.g., the check-in area becomes a waiting-room), and passenger flows rupture into flux.

Airports require continuous routine maintenance, ad hoc repairs and planned renewal that are easily overlooked by passengers unless they are directly impacted (see Graham and Thrift (2007)). They exhibit 'metastability' at different scales – i.e. 'they are stable (only) in their constant instability' (Fuller and Harley 2004: 153). Given this 'collective' and 'unfinished' nature, there is always scope for 'workarounds' as airport staff in different roles adapt their interactions with software systems to cope with the pressures of on-the-ground situations, often these are 'unauthorized' actions but done with the tacit understanding of managers as necessary to circumvent systems to get the job done (e.g. sharing access accounts). There is also the ever-present potential for errors, particularly in data entry and translation within and between these software systems (see the numerous real-world stories reported on the RISKS List, catless.ncl.ac.uk/risks), while the output of software can easily be wrongly interpreted by workers and passengers (so-called 'human error'). There are also opportunities for malicious damage to vital software systems of air travel from insiders and also external attacks (e.g. computer virus damage to the US-VISIT system operated by US Customs and Border Protection agency in August 2006 caused considerable disruption; Poulsen (2006)).

In order to illustrate our arguments we draw on observant participant research as passengers.[1] This consisted of purchasing flights and traveling through a number of airports[2] between January and April 2007 and undertaking sustained observation of our own and other peoples' engagement with the software systems that are used to augment air travel. This consisted in spending time at airports in order to experience and observe the purchasing of tickets, the checking-in process, passing through security, 'hanging around' departure lounges, going to gates, boarding planes, flying, collecting baggage, passing through customs and immigration, and exiting the airport. Our observations are by no means exhaustive, but they are sufficient to add empirical weight to our argument that code/spaces unfold in diverse, negotiated and embodied ways despite the use of software designed to enforce systems of automated management (modes of governance that are automated, automatic and autonomous in nature through their use of software processing – see Dodge and Kitchin (2007)). Rather than detail examples from the full assemblage of air travel, we focus on three key sites and practices – checking in, security screening and immigration – to illustrate our argument.

Checking in

Checking in to a flight is a process that is now only achievable through software, with manual check-in discontinued for security reasons and from business logic of maintaining flow. As the Simplifying Passenger Travel group (SPT 2004: 1) states, '[t]he objective of the program is to streamline

repetitive checks of passengers and their documents by collecting the information once and then sharing it electronically with all the subsequent service providers.' Increasingly the move to e-tickets also means check-in agents require 'live' data connections. While the usual procedure of queuing up to a staffed check-in desk is still commonplace, in order to save staffing costs and to increase efficiencies, airlines have been moving to self-service check-in, either at home prior to travel or through the use of self-service kiosks at airports. In all of these cases, passengers are subject to intensive, invasive surveillance and software sorting (Graham 2005) aimed at confirming identity and algorithmically assessing potential security risks, but they are also embodied, negotiated spaces and practices (see also Adey (2004); Curry (2004); Morgan and Pritchard (2005)).

Here, 'code is law' (à la Lessig) in the sense that, if the ticket or passenger is not recognizable through identification codes and personal descriptors (full name, date of birth, etc.) within the prescreening system, the passenger will initially be denied the 'right to fly', and the system might assign a passenger for extra security checks and baggage inspection while traveling. However, there is an interaction between the person(s) and code, and some problems of identity and 'trustworthiness' are negotiated through redress with agents (albeit usually with them tapping at a keyboard to correct or update systems), although the degree of negotiation is typically occluded in official evaluations of procedure and the proper working of the software system. Many of the neat boxes of idealized flow shown in Figure 5.1 are social as well as software-produced. As a result, while the experience of check-in can often be quite similar across passengers, it varies in multifarious ways as different moments of code/space are enacted through the embodied interactions of people and code.

Check-in areas traditionally consist of a row of check-in desks behind which agents sit and in front of which passengers queue. When an agent arrives at a desk to start checking in a flight, he or she first logs on to the system, accesses the flight details and sets the television monitor above the desk to reveal the destination and flight number that will be processed at that desk. As passengers reach the front of the queue, they pass over their tickets and passports/ID cards. The agent checks the ticket code against the system to confirm reservation and update the PNR, then verifies the passenger details by comparing the photo in the passport with the passenger, or alternatively, for international flights to certain destinations such as the US, scans the machine-readable part of the passport (see Figure 5.1). In US airports the ticket code and scanning will be interpreted with passenger prescreening profiling systems that will alert the check-in agent as to whether the passenger needs additional security checks further on in their passage through the airport, with this information being printed on the boarding card[3] (see GAO 2007). If the plane does not have open seating, the check-in agent will then ask about seat preference and assign seats and ask a set of predefined security questions about carry-on baggage. They then weigh (with the weight digitally displayed to the passenger) and tag the

bags to go in the hold. A large label identifying the destination airport, and airports en route, along with barcodes that also identify the destination (making the bag machine-readable for systems that automatically sort and distribute bags) and owner of the bag is printed off and attached to luggage. A baggage receipt is stuck to the boarding card, and these are returned to the passenger along with the ticket, and the luggage trundles off along the conveyor belt on its own coded and tracked journey.[4]

These practices are not simply rote but are part of a social exchange between the passenger, check-in agent and information systems. Passengers ask additional questions about their travel, for example checking in to additional legs, or confirming the routing of baggage to the final destination. Check-in agents ask for additional information. And there can be frank exchanges between them when, for example, the system does not recognize the ticket or passenger, or has seemingly lost details of pre-ordered seats, or the desk is closing as a late traveler arrives, or the luggage is too heavy and the airline wants additional payment to carry it, or the flight is overbooked and the airline is seeking to hold over or re-route passengers, or the check-in agent will not check the passenger all the way through to their final destination, claiming a 'system glitch' (while the person at the next desk is having this done). We have witnessed or experienced all of these situations and others. For example, as the records from Rob's notebook document:

> The check-in agent at desk 55 types furiously on the keys and roles his eyes at the couple at the front of the queue. He batters away for another couple of minutes while the couple turn round and shrug their shoulders communicating to the rest of the queue that they are not the problem. The check-in agent, seemingly admitting defeat, picks up a phone and has a short conversation. He drops the receiver and informs the whole queue in a loud voice that they'll have to move through a parallel queue at check-in desk 54 to re-form in front of desk 53. A couple of chaotic seconds later, as people dance around each other and baggage, the queue is re-set. The agent transfers all his paperwork, tickets, baggage tape and so on, turns on the computer and taps away at the keyboard for a couple of minutes logging himself back on and accessing the right flight details. He then proceeds to book the remainder of the queue.

In this and the other examples, the situations were all solved by a combination of dialogue between people and accessing, updating and modifying information systems.

This traditional system is being supplemented with, or increasingly substituted by, self-service check-in kiosks. These consist of a touch-screen interface designed to allow the passenger to interface directly with the check-in information system, with the promise of greater efficiency for airlines and for passengers. Scott O'Leary, of Continental Airlines, claimed such kiosks meant: '[w]e are essentially queueless . . . the mean check-in time is 66

seconds. For customers with no bags, it's 30 seconds' (quoted in Fishman 2004: 91). It can be argued that such kiosks, and crucially the software systems behind them, herald the next level of automated consumer service provision. The logic here, as Carr (1997; quoted in Wood 2003: 338) argues, is to produce an environment 'where security will be the only necessary human contact a passenger need make en route to the gate, freeing aeroplane employees for other activities airside.'

When approaching the kiosk, initially the passenger is asked for a booking reference code (or another form of unique identification number) and then proceeds through a set of information screens concerning security, seat selection and whether there are bags to check in. If flying to the US, the passenger is prompted to enter the machine-readable portion of their passport into a special slot and then to enter Advanced Passenger Information System (APIS; see below) details, including the address of where they will be staying. Self checking-in can be quite a prescriptive exercise in that certain fields have to be entered, but there can be options to express a degree of choice, for example with regards to seating and baggage. And just as with traditional checking-in there is the opportunity to lie, or at least be selective with the truth with regards personal information (such as answers to: Did you pack this bag yourself? Has it been left unattended? Or in the case of APIS information, do you have a criminal record? etc.). It does not always go smoothly, and the kiosk software can crash or the network connection can freeze. It can also be quite a social experience if more than one person is checking-in at the time, or if help is needed, or if there is pressure from others to hurry up, and so on.

For example, a businessman in his forties reaches an Aer Lingus kiosk just ahead of Rob. They swap a few words of apology for nearly colliding, and Rob walks round to the next machine, which has just been vacated. He then types in his booking reference number and starts to follow the instructions. The businessman is joined by a woman and they confer about seating as he taps at the screen. After a few seconds the software on Rob's kiosk seems to have crashed. He taps at the screen, but nothing happens. He looks around for help, but all of the staff are busy helping people at other kiosks, so he heads to a free machine and starts the process again, hoping that it will work given he was already halfway through the process on a previous machine. The man and the woman are now discussing whether they are going to check one of their bags in, or whether they might get away with taking it on as carry-on luggage despite it being too large. They decide to risk it. Rob manages to complete the check-in process, changing his seat from a window at the back of the plane to an aisle near to the front. The man, woman and code were interacting with each other through a contingent, context-driven exchange.

Martin queues up to use a suite of forty self-check-in kiosks at the United Airlines terminal at Los Angeles International Airport. There is much confusion because the old way of checking in has essentially been discontinued[5] relatively recently, and many people are clearly trying to workout United Airline's 'EasyCheckin' system for the first time, including Martin.

A Mexican woman occupies the next terminal to him. She tries to use the machine but looks bewildered. She seeks to attract the attention of someone from the airline to help her, but there are only a couple of agents on the customer side of the desks for the forty machines. Afraid to try and work her way through the system in case she makes a mistake she resigns herself to a lengthy wait as she tries to get help. Like many software systems, the interface is unfamiliar to her and it takes time to adapt to, particularly in the way to respond to data entry requests and to determine how to navigate through the process. Again, this is a social, contingent, relational engagement with software.

Through security

> Effective immediately by order of the Transportation Security Administration: If you plan to travel with liquids, gels or aerosols in your carry-on bag remember 3–1–1. All liquids, gels and aerosols must be in 3 ounce or less sized containers. Containers must be placed in a 1 quart-size, clear, plastic, zip-top bag. Only one bag is permitted per traveler. It must be removed from your carry-on and placed in the security bin for X-ray screening. Remember 3–1–1 to speed your screening process.
>
> (Background PA announcement heard at US airport security check points in spring 2007, designed to order passenger behavior to smooth flow through changed screening procedures)

Like the check-in area, security checkpoints are places of queuing, boredom, chatting, fidgeting, preparation for screening, and of intense surveillance. The outward aim is ensure that no prescribed items pass through to airside and to identify and isolate passengers who might pose a security risk. It demarcates the beginnings of a sterile zone that should be devoid of proscribed people and objects. As such one might interpret the security checkpoint as a more general act of governmentality that seeks always to maintain orderly mobility. Producing this ordered, sterile space is achieved through a combination of manual observation and practices (such as uniformed staff asking questions and frisking) and automated surveillance using sensors to collect data and software to process and analyze them. The results from the sensor evaluation are interpreted and followed up by manual intervention such as bag searches. As Rob's notes illustrate:

> The bag belonging to the passenger behind is moved into operator's frame. The operator performs a set of scans. He zooms in on one section, then zooms back out again and performs the same scan routine. He then zooms back in once more and calls a colleague over. Pointing at the screen he indicaters the suspected problem and they confer. The colleague then gestures to the bag's owner, a smartly dressed man in his fifties and they

> head off to one side. The bag is placed on a counter and the passenger is asked some security questions and for permission to search the bag. The man concurs and all the bag's items are emptied onto a counter. The offending item is a meter long steel security cable. There is a brief negotiation, where the security official clearly sees the cable as a potential weapon and the passenger argues that it is simply for securing the laptop to a workstation. The official concedes that the man can keep the cable this time but suggests that it not be carried in carry-on luggage in future. One is very much left with the impression that not every passenger would have been allowed to keep the cable (and there is a large perspex box nearby full of confiscated items including cutlery, pen-knives, nail files, a metal ruler, a hammer, and other assorted, mostly metal, objects).

Another journey and the check-in agent is having difficulty scanning Rob's machine-readable passport. She keeps swiping it through a slot at the top of her keyboard and when it fails she checks it visually, polishes the surface clean before trying again. Eventually it seems to work, and the boarding pass is printed out. It has four Ss printed on it standing for 'Secondary Security Screening Selectee', an unassuming visible manifestation of the intensive software sorting that Rob's digital persona has been subjected to. When Rob gets to the security zone leading through to the sterilized departure area he is directed off to one side. He waits there for five minutes while periodically someone working at one of the machines calls out 'special security check'. Eventually, someone arrives, and he's moved to a new line where he is asked to remove all the usual security items. These are taken to a machine to be scanned. He is asked to stand in a GE EntryScan machine and to follow the instructions. The machine blasts air onto his clothes and hair, capturing the resultant air streams and analyzing them for explosives and narcotics using an ion trap mobility spectrometer.[6] Once the test is complete, the doors of the machine open automatically and he is then asked to sit down and wait as his bag is emptied and all of the items within are swabbed and tested for explosives. Eventually he is allowed to proceed through to the gate. As with check-in, all of these examples reveal complex social interactions between passengers, airport workers and software.

While the processes and practices are broadly similar for all passengers, they emerge in contingent and relational ways to produce divergent realities, and by no means is the code simply law. As a result, as Wood (2003: 337) notes, the security area becomes a form of theatre creating the 'Spectacle of the Frisk', a performance that 'defines contemporary air travel'. Elaborating further, Wood states:

> In a public site, we grow accustomed to viewing individuals pulled from queues, their possessions opened and studied, their bodies turned into maps of hidden threats. The gloved hands of the inspector traverse the shoulder blades, down an invisible axis toward the hips, then toward the feet. Often

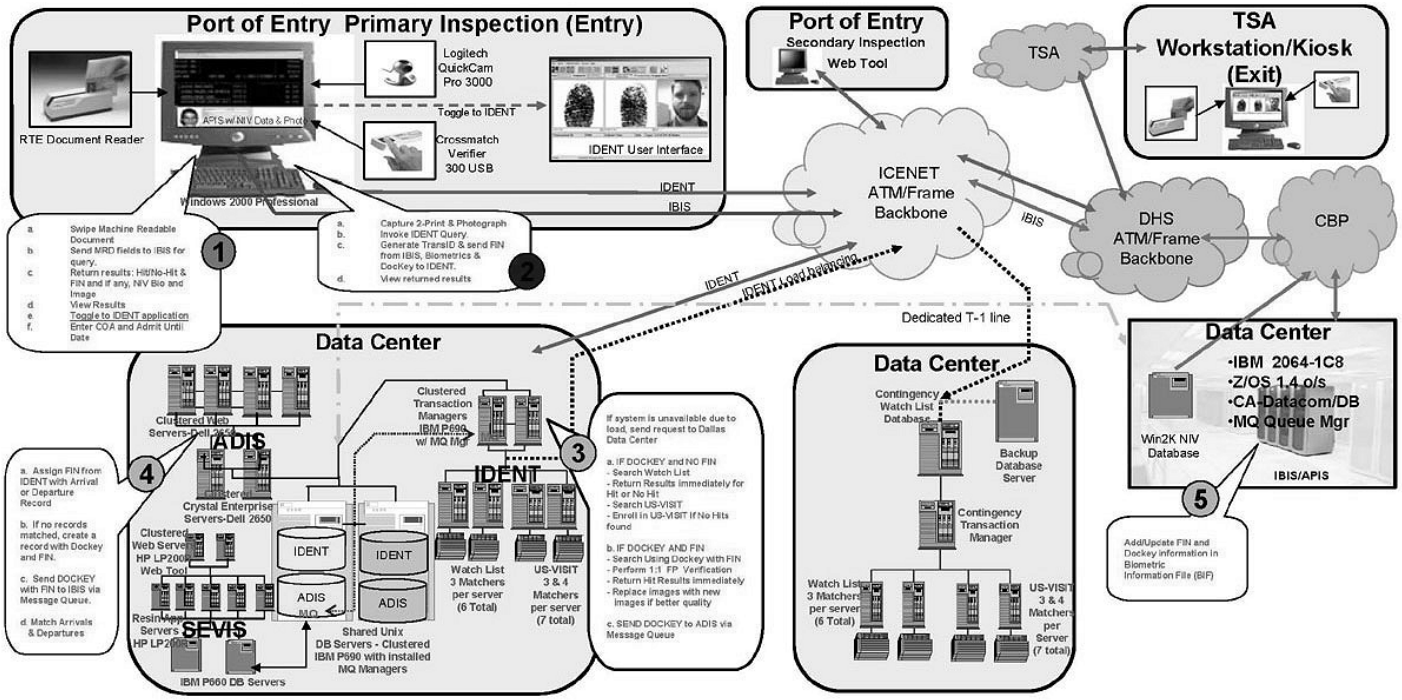
> accompanied by a metal detecting wand, the ordeal is mediated by questions and unspoken rules of decorum: 'Will you unbuckle your belt? May I open this bag?' Invisible lines of demarcation separate the inspected passenger from others who wait nearby. Yet all may observe the spectacle. Does he fold his underwear? What's in that zipped bag? Why did she pack so many sweaters? At once in terminal space, this interpersonal dance of touch and display reveals a network of surveillance practices that remains otherwise unnoted in public life. Beyond the local spectacle, though, we find ourselves tied within a web of individuation and deindividuation marked by perpetual surveillance.

Immigration

> The gates and barriers that contain, channel, and sort populations and persons have become virtual.
>
> (Lyon 2003: 13)

In Kitchin and Dodge (2006) we explored the use of software in regulatory and security systems designed to discipline and re-shape passenger behavior. In particular, we examined data capture and information processing systems designed not only to monitor passengers, but to build profiles to actively try and predict people who posed potential security risks. There is a shift to automatic calculation of categorical risk based on the digital body rather than individual suspicions based on the subjective assessment of the real body. To achieve this, enormous efforts and sums of money are currently being invested by governments in database systems (Figure 5.2) and new biometric identification technologies (see Amoore 2006). For example, in the US these include the US Visitor and Immigrant Status Indicator Technology (US-VISIT), APIS and Secure Flight passenger prescreening programs.

To take one of these systems: US-VISIT, which monitors all international travel in and out of the USA for the Department of Homeland Security (DHS), is being developed and operated by the Accenture-led Smart Border Alliance through a contract worth up to $10 billion (Leyden 2004). At its core, the system will consist of the integration of three existing DHS systems: the Arrival and Departure Information System (ADIS), the passenger-processing component of the Treasury Enforcement Communications System (TECS), and the Automated Biometric Identification System (IDENT) (DHS 2004). In addition to US-VISIT, passengers on international flights will continue to be prescreened by US Customs and Border Protection using APIS. APIS uses information from the machine-readable part of a passport along with PNRs supplied by air carriers (typically containing thirty-four fields of personal information) to try and identify suspect or high-risk passengers by checking for matches against a multi-agency database, the Interagency Border Inspection System (IBIS), and the FBI's National Crime Information Center wanted persons files. IBIS includes the combined databases of US Customs, US



Source: US-VISIT procurement notice, DHS

Figure 5.2 Illustrative representation of the complexity of networked information systems underlying immigration profiling by US Transportation Security Agency. This diagram is now out of date.

Source: Poulsen 2006

Figure 5.3 A widely displayed poster ostensibly to inform passengers of procedures to help maintain smooth flow through immigration control of international passengers arriving in the US. But it can also read as a disciplinary representation of the biometric performance necessary to translate humans into code.

Immigration and Naturalization Service (INS), the State Department, and twenty-one other federal agencies (US Customs 2001). The data are also processed using specially designed and secret algorithms to try and predict possible high-risk passengers who do not yet appear in these databases, based on activity patterns that are deemed to diverge from normal or are out of place. In other words, a lot of data work is performed on international passengers before they have arrived in the US and as they enter the country.

It is when one passes through immigration halls that one most directly interfaces with such systems, including visual and tactile connections to code (see Figure 5.3). Here, machine-readable passports and, depending on location, biometric information are scanned, processed and interpreted, with the results outputted to gatekeepers (immigration officials). It is the gatekeeper who decides whether one gains entry to the country. Code is critical to the process, and is not easily overridden, but the decision is one made by a person interfacing with a computer and often in negotiation with the passenger, as the examples below illustrate.[7]

The man at the front of the queue has been there for a while. He is white and in his mid-forties. The immigration official keeps looking at the passport, to his computer screen, and across to the passenger. The passenger is unable to see what the official sees on his screen (a classic asymmetric power relationship of the observer and the observed, which is facilitated by the spatial configuration of the inspection booths). Talking to him afterwards, it transpires that he has recently traveled through Pakistan and then on to northern India. He has also been to Indonesia in the past twelve months and flown through Dubai. All are 'terrorist hotspots,' and he has been flagged up as a *potential* security risk. It is up to the immigration official to determine whether this potentiality might translate into a real risk while the traveler is in the US. The passenger explains that he is a professor, married to a Pakistani woman, and that he conducts research in Indonesia. The immigration official looks sceptical, and the passenger is told he will need to answer some more security questions. A few seconds later another immigration official arrives, and the passenger is escorted to an office at one side. The professor has been software-sorted (see Graham 2005) for additional attention, but the code is not simply law, as he will now have the opportunity to negotiate with the border control system. This might involve additional searches through various national and international databases or might simply consist of a conversation between official and passenger. How it proceeds will partly depend on issues such as class, nationality, profession, and so on. It is unlikely that a white, mid-forties professor with no criminal history will be classed as a security threat and he will probably be allowed into the country after a short while. A young male, non-white Muslim, however, might be a different proposition, the so-called 'flying while Arab' issue (see Fiala 2003).

The rest of the queue moves quite quickly. Then one of us is called up to the booth. The passport is swiped, fingerprints are scanned, and we are asked the reason for the visit. We state that we're attending a conference, and we

have an exchange about employment and research. The official asks to see some other form of ID such as a staff card. The best that can be offered is a library and business card, which does not seem to satisfy him. Further questions follow concerning the need to attend this particular conference, how long one would be staying, where one is staying, and so on. All the time, the officer's fingers are tapping on a keyboard, and he stares at a screen, occasionally looking up. The conversation lasts a couple of minutes, and after a while it becomes apparent what is happening – the official is looking up the conference on the Internet. We volunteer the web address, and a few seconds later he seems apparently satisfied and we're allowed through. One is left wondering what would have happened if he had not found the website? Would we have followed the other professor to be asked additional questions? Would we have been allowed through? Would the questions even have arisen if we'd simply stated we were there for a holiday? Either way, software mediated the exchange in two ways – first through facilitating the search of immigration and criminal databases and second by enabling a search of the Internet.

At a different airport, a Chinese man is being berated by the immigration official. The man looks confused and scared. He holds out his passport, visa and travel documents. The immigration official pushes them away. Despite the fact that it is clear the man does not speak English he states loudly, 'I need to know where you are staying and working. I need some more documentation.' They've reached an impasse. The passenger's documents have enabled him to be software-sorted to a certain stage, but he is seemingly missing information that will complete the process. The immigration officer points to one side. 'You'll have to wait. Over there.' The Chinese man looks at the official, over at a row of seats, and back at the official. He pushes forward his documents again. 'Over there.' The official points, rolling his eyes. 'No-one speak Chinese!' he bellows patronizingly, as if this will make it easier to understand. Reluctantly the man starts to shuffle to where he is pointed, when a Chinese woman in the queue steps forward and offers to act as a translator. The official asks to see her documentation and then hesitantly agrees. Three or four minutes later the Chinese man is allowed to pass through, all smiles and bows. If the Chinese woman had not volunteered to help it is not clear how long he would have been waiting or whether he would have made it through immigration at all. Without the translator to provide the last inputs to the system, the software could not finish processing his permission to enter the country.

Another airport and we stream through immigration holding our passports open at the photo page. The official barely looks at them – he is only interested in non-EU passports – it is purely a cursory visual check. Clearly, if you are flying between EU countries then you must be a legitimate passenger – the hard work was to get into the EU in the first place. Only five people on the whole flight spend more than two seconds at the booth – three Americans and two Japanese businessmen. None of them is delayed significantly either, all clearly deemed low-risk passengers. With the exception of the five non-

EU travelers, none of the other passengers have been subject to software processing at immigration. The same happens a few weeks later at the same airport, only this time the official spends slightly longer looking at the passports of a black man and woman, and three middle-eastern-looking men. All of them have British passports, and none of them is scanned to check them in the information system. In these cases, rather than there being a negotiation between official, passenger and software, the officials have decided only to use the software to aid decision-making in a limited fashion. Usually one of the most coded of processes becomes almost entirely uncoded by manual override to one of visual inspection – an inspection that is clearly embodied and discursive, shaped by issues such as race, class and gender (as with the other examples above).

Conclusion

As these examples illustrate, airports consist of code/spaces – software purposefully mediates many of the processes and actions of air travel. However, code is not simply law – deterministic, fixed and universal. Rather, air travel emerges through the interplay between people and software in diverse, complex, relational, embodied and context-specific ways. It is an event that unfolds in multifarious, ever-changing ways. And this is not simply the case for the three parts of the assemblage we have discussed, but is also true of purchasing tickets, updating bookings, moving through and buying things in the departure lounges and gate areas, boarding the plane, the flight itself, baggage reclaim, and backgrounded systems such as building management systems, plane systems and air traffic control.

Because airports are diversely (re)produced, through the collaborative manufacture of people and code, they are certainly not the non-places as described by Augé (1995). While airports share similar architecture and processes, they are places in the same sense that small towns are, albeit with a larger throughput of people. They have diverse social relations and formations, engender meaning and attachment, represent different values and images of the locale and nation, and so on (Crang 2002). This is especially the case for the hundreds or thousands of workers and for travelers who live locally and pass through the airport regularly. And Grenoble airport with its small number of flights per day is very different to Chicago O'Hare with its thousands.

As we discuss in more detail in Dodge and Kitchin (2004), the ever greater use of software to organize, manage and produce air travel is set to grow, supported by a persuasive set of discourses that work to create a power discursive regime. These discourses include security, safety, economic rationality and increased productivity, and convenience and flexibility. Software enables securer and safer air travel by widening, deepening and automating the extent to which passengers, workers, equipment, planes and spaces are monitored and regulated through 'infallible' systems of detection and response; software enables the streamlining and automation of tasks, speeding up processes,

increasing throughput, increasing efficiencies and enabling staff and product savings that can be passed on to the traveler; and software provides passengers with greater convenience and flexibility in terms of booking, itineraries of travel, passage through the airport, tracking passenger status and rewards and so on. Collectively, these discourses work to justify further investment, to make code/spaces appear as commonsense responses to particular issues, and convince travelers (and workers) of the logic of their deployment. In other words, they work to ensure that air travel will continue to consist of densely interconnected code/spaces.

Despite these efforts to further introduce ever-more deterministic forms of automated management, the code/spaces of air travel will continue to be contingent and relational in nature, the products of complex and diverse interactions between people and code. As such, we believe these interactions warrant further attention and study, requiring detailed ethnographies of aero-mobilities across peoples (passengers by class, race, gender, etc. and different kinds of worker), airports (local, national and international hubs) and countries (with differing policy, legislation and practice).

Notes

1 We acknowledge the contingent nature of our experiences and that they are only partially generalizable. While not 'elite travelers' in the conventional sense – we fly economy class – both authors undoubtedly enjoy privileged mobility as relatively affluent academics with established credit histories and being able-bodied, white males, native English-speaking and holders of EU passports. People with other identities and cultural characteristics may well have different experiences, particularly at security screening and immigration.

2 Manchester International Airport (MAN); Liverpool John Lennon Airport (LPL); Glasgow International Airport (GLA); Dublin Airport (DUB); Berlin Tegel (TXL); Grenoble Airport (GNB); Munich Airport (MUC); Chicago-O'Hare International Airport (ORD); San Francisco International Airport (SFO); Los Angeles International Airport (LAX).

3 According to some sources, there are a number of factors that will always lead to a passenger being assigned extra security checks, such as such as a one-way reservation, made within twenty-four hours. Other criteria that might lead to extra checks are: passengers traveling alone; passengers who change their flight at the last minute; passengers who pay cash for their tickets; passengers who carry no luggage; random selection. See en.wikipedia.org/wiki/Secondary_Security_Screening_Selection (accessed 25 October 2007).

4 While much of this journey is through code/space, completely dependent on software for routing, there is still scope for errors – attested to by the common passenger experience of waiting frustrated at the carousel for bags that fail to appear. For example, the UK consumer advocacy group the Air Transport Users Council statistics show that 5.6 million bags were 'mishandled' in 2006 by European-based airlines (AUC 2007). The fact that bags continue to 'lose' their human owners with such frequency shows how automation is still imperfect. Furthermore, despite intensive surveillance, employee theft from checked luggage is all too common (Heathrow airport, for example, has such a reputation for this that it has been dubbed 'Thiefrow').

5 A few conventional check-in desks exist for passengers with special needs, but the spatial organization of the terminal space and the urging of the customer service staff all 'encourage' use of the self-service kiosks. It is clear many experienced passengers find the kiosks easy to use and more efficient.
6 See GE Infrastructure Security, Entry3, www.geindustrial.com/ge-interlogix/iontrack/prod_entryscan.html (accessed 25 October 2007).
7 Unless an entirely automated, fast-track process is used (as now operated in some airports where iris scans and biometric passports are used to verify passenger status). Even then, if there is a problem a gatekeeper will step in.

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