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When things become other things

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A brief genealogy …

- Geographies of the Internet; how the internet creates new geographies
- Embedding of software into everyday life and how it produces new spatialities and spatial formations
- More lately, interested in the 'world coming into existence' through pervasive computing
- Thinking about 'everyware' – how things and spaces become routinely linked into distributed networks

- This paper is about the latter

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Things do things

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Introduction

- Things (objects and tools) are changing in nature
- They are being imbued with capacities that allows them to do additional work in the world
- These capacities are the result of their embedding into circuits of software
- Explore here:
  - the new nature of things
  - their social and spatial implications
- Start of this process
- Follow Thrift's (2004, 583) lead in trying "to capture the outlines of a world just coming into existence, one which is based on continuous calculation at each and every point along each and every line of movement."

Remaking things

- Software **re-makes** objects and tools - allows them to become differently - in three ways
  - giving them machine-readable unique identifiers
  - making them trackable and traceable in time and space
  - enabling them to communicate across networks

- In combination these capacities transform their **technicity** – their ability to do work in the world; and the ability for other aspects of the world to do work on them
- How objects become knowable is altered – gain new ontological status (as uniquely definable, measureable things); this ontological status is re-programmable (mutable)
- Status in relational actor-networks is changed as gains additional agency

Remaking things

Credit card

- Is a material token of a database (makes data portable)
- Has a machine-readable unique identifier
- The use of the card must be traced and tracked over time and space (provides a geo-history of consumption)
- The card can communicate with the shop and bank's databases through an intranet
- Other objects and infrastructure has been built around it (ATMs, card readers, wallets …)

- CC does work in the world - the card enables the purchasing of goods; affects other things
- CC is worked upon - the information concerning purchases is used to monitor and regulate the amount of credit that can be spent; feed into marketing and geodemographics models …

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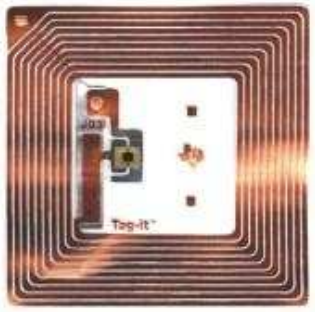
Remaking things

- Also include EZPass cards, machine-readable passports
- Similarly, an RFID labelled bottle of water can be queried as to its contents and can point its user to other information and things; and can traced through a logistics network



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What enables this to happen?

- Technological advances, capital, labour, practices, protocols, standards, conventions
- Wide-spread, wide-scale distributed network infrastructural
  - new unique addressing schemes and tagging
  - new sensing/scanning techniques
  - pervasive network access
  - ‘infinite’ memory
- ‘Internet of things’
  - the seamless lookup of any object, anywhere, by anybody or anything – things are uniquely indexical
- Leading to three levels of communication

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Machine to Machine Communication

FIGURE 4. **EXAMPLES OF MACHINE TO MACHINE COMMUNICATIONS**

Cargo Monitoring	A high-value cargo vehicle communicating its location at regular intervals to a monitoring station. No human intervention is required unless an exception occurs, such as the vehicle deviating from the agreed route.
Vending Machines	A vending machine communicating its stock levels to a central computer at the end of the day.
Healthcare	Healthcare monitoring equipment, such as a cardiac monitor or dialysis machine, communicating a patient's status to a medical database at the end of a day.
Remote Access	Overnight, automated downloading of files (e.g. e-mail) to a laptop computer or PDA.
Vehicle Services	Automated updating of a vehicle's navigational system to incorporate up-to-date information, such as road construction and weather forecasts.

SOURCE: DELOITTE RESEARCH

Machine to Person Communication

FIGURE 2. **EXAMPLES OF MACHINE-TO-PERSON COMMUNICATIONS**

Remote Patient Monitoring	A cardiac monitor alerting a physician if the patient's condition suddenly deteriorated, enabling an emergency response.
Vending Machines	A mobile-enabled vending machine requesting attention from a technician in the case of a technical fault, reducing down time.
Driver Services	A traffic information system alerting a driver in the event of an accident on his known route, allowing an alternate course to be taken.
Car Rental	A mobile-enabled rental car alerting the rental company if it was driven outside of its permitted boundary, allowing the staff to take immediate corrective action.

SOURCE: DELOITTE RESEARCH

Person to Machine Communication

FIGURE 3. **EXAMPLES OF PERSON-TO-MACHINE COMMUNICATIONS**

Traffic Management	Remotely reconfiguring the timing for a traffic signal, allowing traffic patterns to be quickly altered (perhaps in response to a traffic accident).
Vending Machines	Changing prices on a vending machine without requiring a site visit.
Vehicle Services	Remotely unlocking a car door; or turning on the air conditioning or heating in a car a few minutes prior to the owner arriving.
Maintenance	Conducting remote diagnostics and maintenance on a machine, saving the technician a visit to the site.

SOURCE: DELOITTE RESEARCH

Blogs

- A blog is more than a personal webpage
- It is a site of *exchange* where the host posts ideas, thoughts, opinions, information, questions, etc., and other people can comment
- In the Internet of Things – objects can be traced and tracked, recorded, communicated with but at a distance
- The object itself does not blog, it provides information for an external blog – an information system that exchanges information with multiple objects and can process, analyse and can meaningfully act upon that data
- Internet of Things are subject to surveillance and control whereas a blog also involves sousveillance and negotiation

‘Blogjects’

- A blogject as formulated by Bleecker (2006:6) is a particular class of ‘Internet of things’ that
  - can ‘track and trace where they are and where they’ve been’
  - ‘have self-contained (embedded) histories of their encounters and experiences’ (rather than indexical histories)
  - ‘have some form of agency – they can foment action and participate; they have an assertive voice within *the social web*’

- For Bleecker blogjects are things that can ‘do’ meaningful social acts where their actions shape how people think about the world
- So, for Bleecker, a car that creates a blog but does not actively communicate with other blogs to engender a *wider* ‘collective intelligence’ (e.g., to provide a *macro-scale* picture of elements of traffic on a road network – pollutants, fuel consumed) is not a blogject
- The collective intelligence of a car fails to be a blogject because it does not converse consciously with the driver and change his/her view of the world.

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Refining 'blogjects'

- We think that Bleecker's notion of blogjects needs to be more fully thought through given its limited, binary nature (that blogs are only blogs if they perform consciously meaningful acts for people)
- Rather than come up with a new neologism we want to refine his concept
- For us, a blogject is something that:
  - Has a unique identifier
  - Has awareness of its environment and is able to respond to changes in that environment
  - Traces and tracks usage in time and space
  - Records that geohistory
  - Can communicate that geohistory across a network
  - Can use the data it produces to undertake automated management – automated, automatic and autonomous (AAA) actions in the world
- But they are not defined by the quality or nature of communication and exchange
- Instead we need to recognise that there are different kinds of blogject

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Blogjects mk I

- Handheld GPS receiver/ MP3 player
- They trace and track usage
- Record usage as embedded history
- They do things AAA
- They engender meaningful acts
- All essential capacities are held locally
- Primary functionality does not require network connection
- But can connect to wider network - information can be uploaded and updates in firmware downloaded
- Uploaded information can be processed and analysed in relation to other usage
- Has the potential to translate to Mk III blogject

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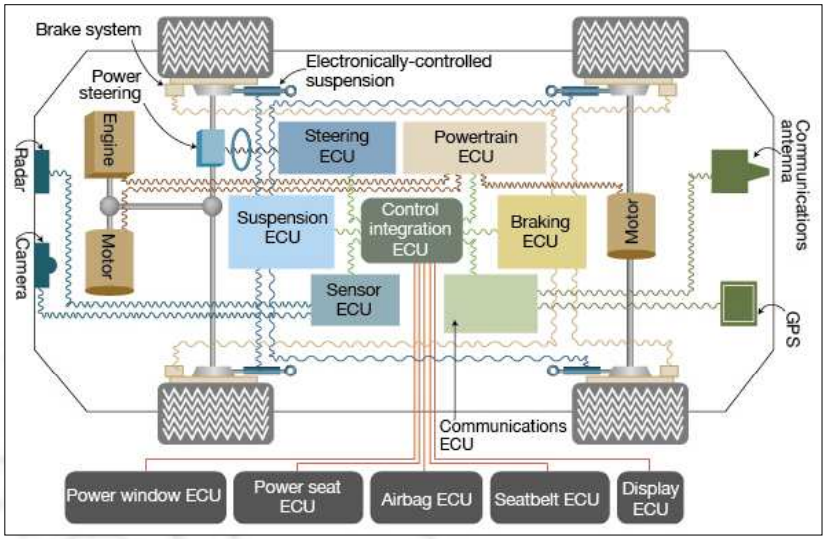
Blogjects mk II



- ECUs in a car
- They trace and track usage
- Record usage of car
- They do things AAA
- They engender meaningful acts (such as making the car work and preventing accidents) but not necessarily in a conscious way to the driver
- There is communication between blogjects (between ECUs) *but* communication is limited to network in the car unless directly connected to wider network
- When connected to wider network information can be uploaded and updates in firmware downloaded
- Uploaded information can be processed and analysed in relation to other cars, road networks, etc.

Blogjects mk III

- Rhizomatic blogjects
- Doesn't function without its relations – needs the wider network to function; needs up-and-downstreaming
- They trace and track usage but not necessarily locally
- Record usage but histories are not necessarily held locally
- They do things AAA

- ATMs, Sky digiboxes, planes, mobile phones

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Smart Vending – Overview

Smart Vending Machines

- Local storage and processing power
- Remote maintenance interface
- Connection to backend system

⇨ (Near) real time information

Main Application Areas

- (Near) real-time and predicted inventory
- Advanced Data Analysis
- Remote Management
- Cash Accounting

Photo: Harting

Smart Vending – Applications (1)

Fulfillment Optimization

- Delivery route planning based on accurate data
- Integration of service stops with delivery route
- Single machine fill lists without on-site inspection
- Reduced on-truck inventory
- Out-of-stock alerts

Remote Maintenance

- Price change management
- Software upgrades
- On-machine advertising content updates
- Coupon updates
- Recipe mix proportions
- Failure alerts

Spimes (Sterling 2005)

- Entire life history of things from manufacture/growing to disposal; includes:
  - history of everything used to make, process, distribute that thing, plus protocols for disposal
  - history of everyone/everything that has come into contact with the object
  - history of the context of making and use – labour relations, cost and profit margin, carbon tax, patents …
- Object with a full genealogy – full actor-network of object is knowable and indexical
- Proto-spimes – spime-like capacity
  - movies – imdb.com
  - Part in place for agriculture – farm-to-fork traceability
  - Part in place for food - AURA

What does all this mean for space?

1. How space becomes
2. Spatial organisation
3. Spatial behaviour
4. Spatial governance
5. Spatial analysis and thinking

1. How space becomes

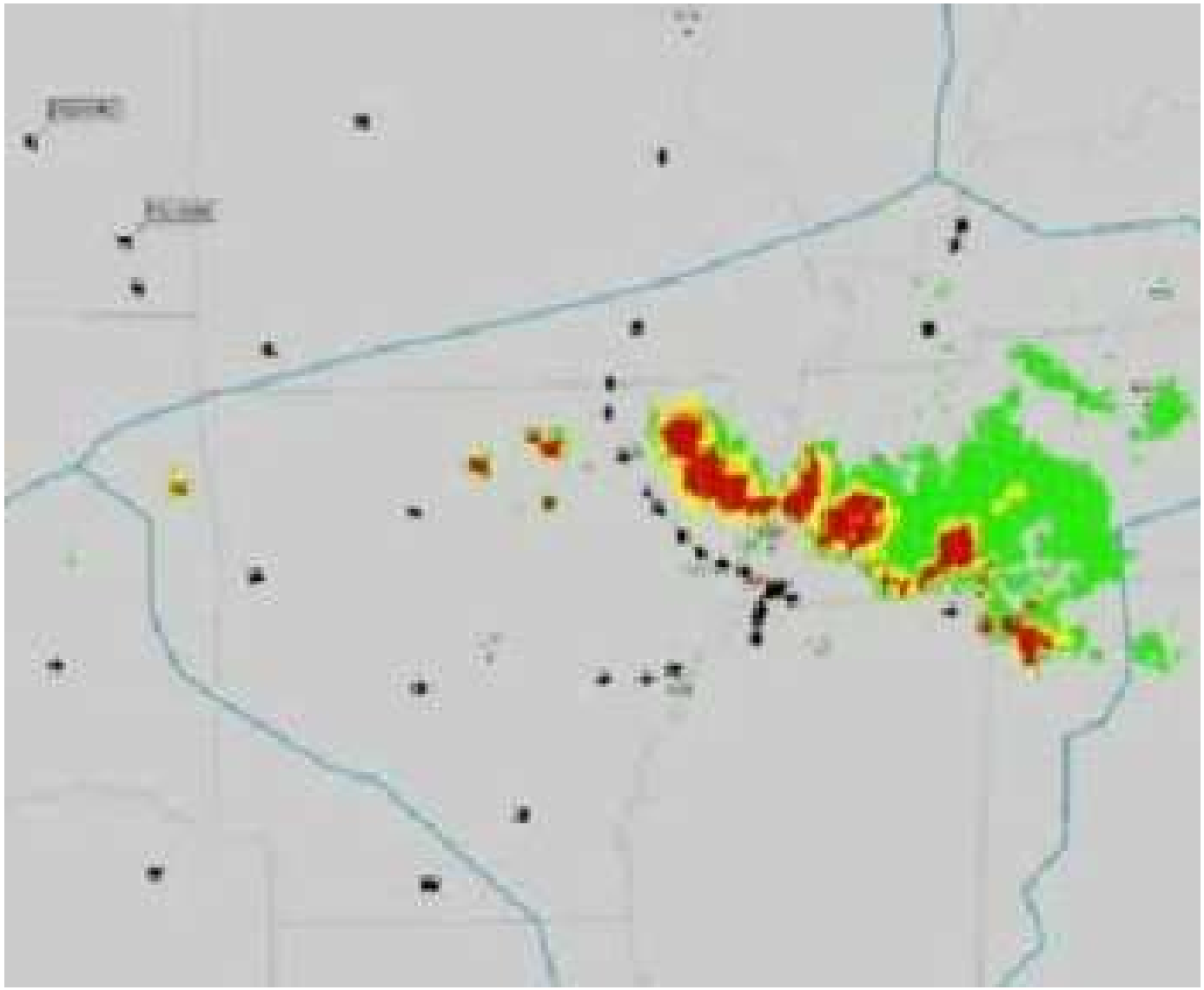
- Objects gain additional capacities as actants – as things able to beckon space into being through their work
- Blojgects make a difference to how spaces operate and to spatiality (most often in collaboration with people)
- They beckon into being code/space and coded space
- Code/spaces are spaces dependent on code to function
- Coded space is space mediated by code, but whose relationship is not dyadic

2. Spatial organisation

- Where things are physically located is continuously tracked
- Form better understanding where they need to go
- New formations of spatial orderings and flows of material goods that reconfigures fundamentally how a institution functions
- Chains of supply and production
- Where marketing is targeted

- Value garnered from track and trace (geo-history)
- Increased efficiencies, productivity, coordination, security …

FedEx vs thunderstorm



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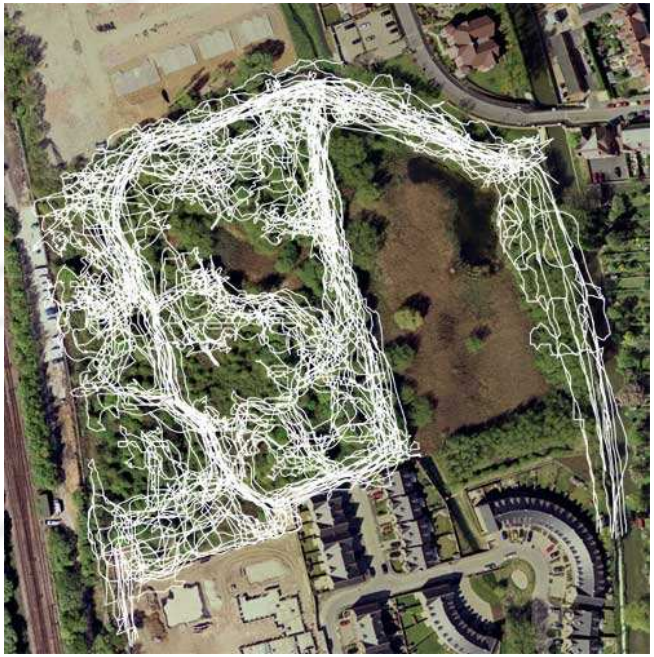
3. Spatial behaviour

- Blogjects increasingly likely to affect access, movement and flow through networks
- The blogging of location data facilitates new decisions that can be made without pre-planning
- Track-n-trace enables (complex) patterns of movement to be plotted and re-traced with precision
- The internal histories enable profiles and patterns of spatial behaviour overtime to be built up
- The communications aspects opens up scope for ad-hoc, collaborative exchanges that would not be possible without the blogject



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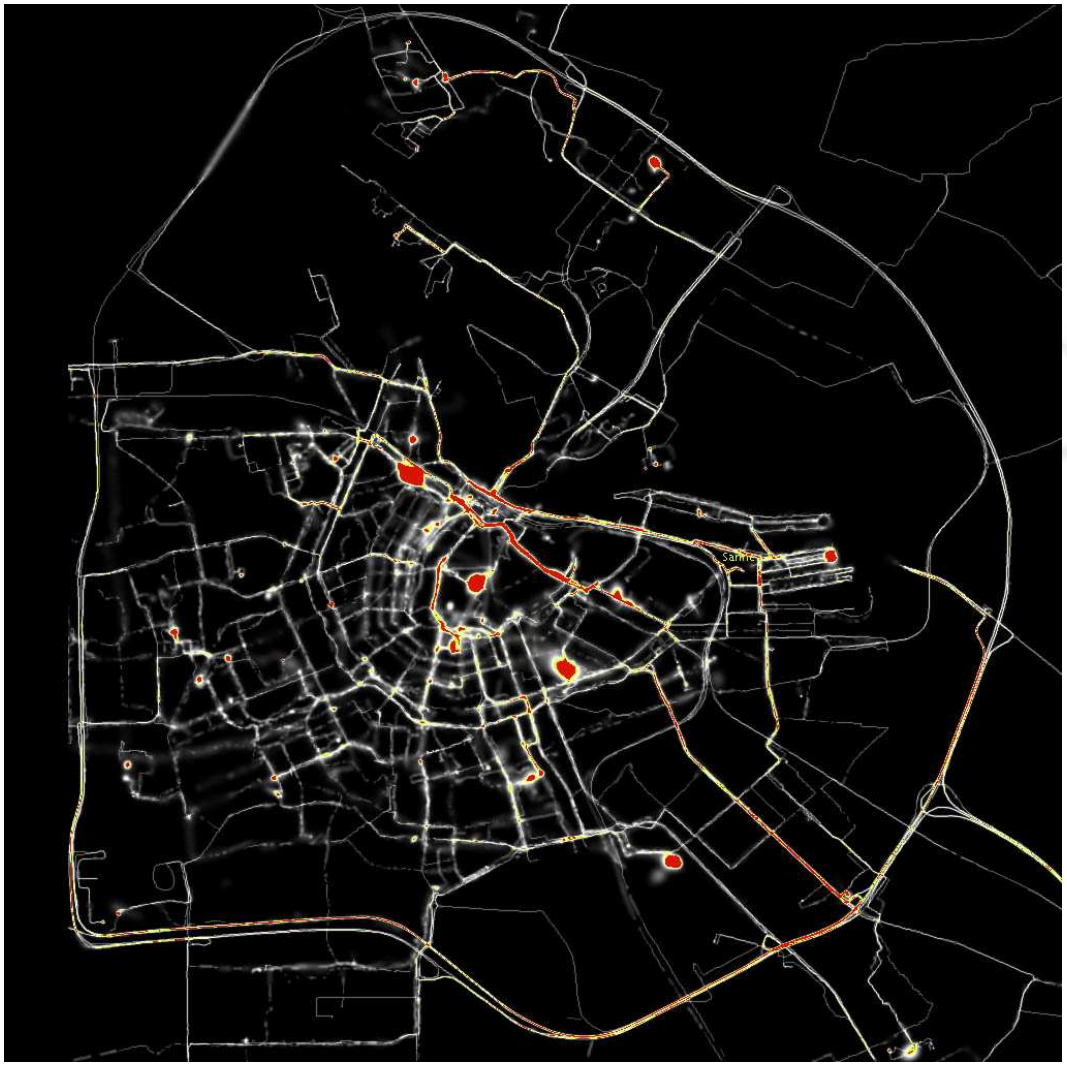
Esther Polak and Waag Society Amsterdam real-time

http://realtime.waag.org/



4. Spatial governance

- Blogjects are powerful actants in a new modes of governance
- Increases granularity
- Dynamic
- Enables automated management
  - AAA surveillance/sousveillance
  - Reshaping behaviour
- Leads to software sorting
- Regulation of access, movement, flow
- (though there is scope for hacking the blogjects)

5. Spatial analysis and thinking

- New ways of measuring and knowing the world
- Provides:
  - New ways of generating and connecting data
  - New means of modelling, predicting, simulating spatial relations
  - New modes of geo-visualisation, and imaging and perceiving space
  - New cognitive maps of the world

Conclusion

- Everyday objects are increasingly being folded into the ‘Internet of Things’
- Many types of object are being remade to blog – things that know their histories and can communicate with other objects
- There are a number of different kinds of blogjects coming into being and doing work in the world
- This work is often AAA enabling high technicity
- These blogjects have a number of spatial effects that need to be mapped out

The End

- **Contact**
  - Rob.Kitchin (at) nuim.ie
  - M.Dodge (at) manchester.ac.uk

- **Also see:**
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