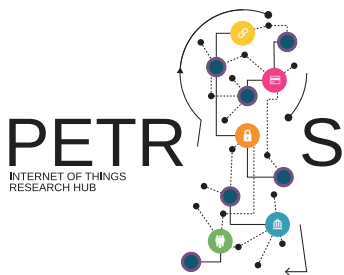


The Little Book of PHILOSOPHY for the Internet of Things

Joseph Lindley, Paul Coulton, Haider Ali Akmal,
Duncan Hay, Max Van Kleek, Sara Cannizzaro
and Reuben Binns



Editor of the PETRAS Little Books series:

Dr Claire Coulton

ImaginationLancaster, Lancaster University

With design by Michael Stead, Haider Ali Akmal, Rachael Hill and Roger Whitham
ImaginationLancaster, Lancaster University



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What this little book tells you

This Little Book is about philosophy. In our research on the PETRAS project, many of the researchers have drawn on different philosophical theories to help them to understand some of the difficult relationships between the digital, physical and connectivity qualities of the Internet of Things (IoT).¹ In our research, we have had to consider these relationships in terms of how they impact privacy, ethics, trust, risk, security, and adoption. So, throughout this book, we present several different philosophical theories or strands of thought that help illuminate our research, these are;

- Thingyness
- Hyperobjects
- Heterotopias
- Respect
- Fairness
- Ownability
- Accelerationism

Because philosophy is so broad and many of its ideas have been around for thousands of years, it can be hard to know how it might apply to something as contemporary and technologically focused as the IoT, or to figure out how to get started with that challenge. With this difficulty in mind, the seven chapters in this book each describe how you can use different aspects of philosophy and theory to think about and understand the IoT. We have written this book in plain English - each of the chapters can be read on their own as a stand-alone, but if you read the whole book, then the links between some of the theories and examples will start to become more clearly visible.

¹ See the first book in this series, *The Little Book of Design Fiction for the Internet of Things*, for our comprehensive definition of the IoT. A copy can be downloaded here: <https://www.petrashub.org/outputs/>

Introduction

Philosophy is a vast area of study addressing fundamental questions of reality, knowledge, and existence. To demonstrate how huge the ideas of philosophy can be, consider these three quotes from some famous thinkers:

- “I think, therefore I am” (René Descartes).
- “One must still have chaos in oneself to be able to give birth to a dancing star” (Friedrich Nietzsche).
- “The unexamined life is not worth living” (Socrates).

Exploring and attempting to answer fundamental questions about the world, philosophy is a key part of all academic research as it provides us with theories to help and guide us in thinking about the world.

The Internet of Things challenges many of our common-sense notions of how the world works, which is why the PETRAS IoT research hub is concerned with cross-cutting themes that include privacy, ethics, and trust, security and adoption. When everyday objects are connected to the Internet or have computing power built into them, our relationships with them can become a lot more complicated. Let’s begin by considering the following examples: smart kettles don’t just boil water to make tea, they can also tell the corporation that built the kettle about your daily routine and how many times you boil the kettle to have a cup of tea – what does this mean for your privacy? Although you have to buy them, many IoT devices only function correctly if they can connect to server-farms located somewhere else in the world – what does this mean for ownership? And, if your home thermostat can make decisions about when your heating comes on without asking you first, why doesn’t it have to worry about paying your energy bill? Using philosophy and theory is one way we can begin to answer these questions.

If you are a philosopher, then this book should provide some interesting



examples of how theory is being used to inform research into the IoT. If you are an IoT researcher or professional technologist, then this book will show you how useful philosophy can be in helping you to understand internet connected devices in a deeper way. If you are simply curious, then we hope that the book will stimulate the curiosity that made you pick it up in the first place!

Thingyness

Described by combining the Greek words for *to exist* (Onto) and *to study* (Logia), *ontology* is the branch of philosophy that tries to understand what the fundamental parts of the world are, how they are related to each other, and how we know what is real. Although we intuitively feel like we know what is real and what is not real, as ontologists have explained, philosophically speaking, things are not as simple as they seem. For example, are conceptual objects like love, hate or war, any more or less real than very physical things like stones, roses and guns? By asking and attempting to answer questions like this, ontologists have developed theories that we use to explain what it means to *be*. Because this book is about the Internet of *Things*, in this section we look at how ontology might be applied to the question of what it is like to be a *thing*?

There are many different perspectives in ontology.² *Materialists* believe that the only real things in the world are *physical*; they say that it is only *matter* (wood, rock, concrete, water, etc) that really exists. In contrast, *idealists* believe that it is *human thought* that is not only real, but more important than matter; only through thought do we construct reality. Realists argue that all human experience of the world is mediated by our physical selves and our mental conceptual framework, both of which are necessary for conscious experience; and, whether or not the ultimate reality is physical or mental, or both, there is a real world that exists independently of human experience. *Correlationism* is the view that our experiences reflect or correlate with the real world; it is the idea that we humans experience the world via a combination of what exists in our minds and what our bodies can experience in the physical world. The *speculative realists* challenge the validity of correlationism; they speculate that instead of our experiences being a correlation between the imagined and the

² See here for more information on Ontology: Hofweber, T. 2018. "Logic and Ontology" Stanford Encyclopaedia of Philosophy. Available at: <https://plato.stanford.edu/entries/logic-ontology/>.



physical, that perhaps every individual thing, idea, or concept, might have its own reality, not necessarily resembling, reflecting, or correlating with our experiences. Speculative realism asks, “why would you – a human being – be able to shed light on the reality of a teapot?” Because it challenges firmly held ideas, speculative realism is quite bold and very weird, but by giving an alternative to these old ideas, it is also quite exciting. One reason for the current developing interest in this perspective is that rapid changes in science, such as quantum physics, and technological revolutions such as the IoT, are shaking the foundations of our knowledge.



Figure 1. The clamshell of speculative realism (Shelfish Philosopher, 2018).

“..speculative realism is an event rather than a philosophical position: it names a moment when the epistemological tide ebbed, revealing the iridescent shells of realism they had so long occluded” (Bogost, 2012)

Building from the speculative realist school of thought, *Object Oriented Ontology (OOO)* is a theory for addressing the question what it is like to

be a *thing*? OOO tries to know the unknowable and to get inside the reality of any given object (although it also acknowledges that this is almost entirely impossible). The strange world of OOO is interesting as a thought experiment, but how do we know we can trust it? Ian Bogost,³ makes the point that “one ought not trust a metaphysician⁴ who had only read and written books about the nature of the universe’. He is arguing that we should only really trust philosophers if we can see they have *real* experience of *doing* the philosophy they talk about in books. To explain this further, Bogost introduces an idea called *carpentry* as a practical way to *do* OOO by writing computer code or building things that help us to better understand the inner world of objects. By using *carpentry*, we can use OOO to understand, critique, and help to design better IoT devices.⁵

The first thing to remember with OOO is that *any thing* is an object. For example, *you* are an object, your eyes, brain, hair, and sense of humour are all objects too. This book is also an object, so are the words on the page, and so is your experience of reading it. The IoT is an object. And the things that are part of the IoT are objects too—from internet-connected toys, to autonomous cars, to the behind-the-scenes data-centres that make a lot of IoT devices work properly. OOO tells us that none of these objects in themselves are more meaningful or significant than any other. Because every object is defined by its own unique, exclusive, and particular reality, we *cannot* say that any particular thing is intrinsically more important than another. So, as opposed to idealism and correlationism (which privileges humans over other types of object) and in contrast to materialism (that promotes the human *interpretation* of other objects), the object-oriented view sees the universe in terms of a non-hierarchical, or *flat*, ontology. The flat ontology is essential because even if two different objects – let’s say a

³ Ian Bogost is an author, game designer, and scholar. His book *Alien Phenomenology, or What it’s Like to be a Thing* (2012) introduces his interpretation of Speculative Realism and Object Oriented Ontology.

⁴ A metaphysician is a philosopher who studies the fundamental nature of reality and existence itself.

⁵ Lindley, J., Coulton, P. and Akmal, H. 2018. “Turning philosophy with a speculative lathe: Object oriented ontology, carpentry and design fiction.” Proceedings of the Design Research Society Conference 2018, Limerick, Ireland, 24th-25th June. Available at: <http://eprints.lancs.ac.uk/124284/>.

television and the stand it sits upon – are physically close to one another, they do not necessarily have much ontologically in common, and just because they don't have much in common, it doesn't mean one is more significant than the other.

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Figure 2. Read out of a message sent by an IoT device used as part of an OOO Carpentry project.

There are many kinds of IoT-things – from toothbrushes to aeroplanes and lampposts to heart implants. They also live double lives; their physical existence is visible, tangible, and every day (a smart fridge is still very much a fridge!), but they also have a digital life that is entirely foreign to us humans. In the blink of a human eye, IoT devices sense our world, convert what they discover into data, and send that data to the other side of the planet where it is stored in a factory-sized data centre. They also serve multiple different purposes at the same time, but for different people. For example, for *householders* who have smart meters installed, smart meters are primarily a convenience as you no longer have to allow meter-readers to enter your house. But for *energy companies*, they could mean cost savings, because they don't have to pay human meter-readers any more. At the same time, for *power stations*, smart meters might allow a better understanding of fluctuations in energy demand. It is because of the diversity of IoT-things, their physical/digital double lives, and their multiple possible meanings, that OOO is so useful for helping to understand the IoT in its entirety. So, through OOO, philosophy provides ways for businesses, researchers, designers and governments to understand *thingyness* so that they can drive forward adoption of the IoT and harness its economic value in socially and technically acceptable ways.⁶

⁶ Lindley, J., Coulton, P., and Cooper, R. (2017). Why the Internet of Things needs Object Oriented Ontology. *The Design Journal*, 20(sup 1), S2846-S2857.

Hyperobjects

Timothy Morton defines a *Hyperobject* as a thing that is, “massively distributed in time and space relative to humans.”⁷ In other words, something so temporally and spatially vast that it defies common-sense understandings of it. Morton’s primary example is climate change. Climate change is a *thing*. It has its own ontological and empirically verifiable existence. This is a little strange, because, unlike other things – pencils, your favourite shoes, or your neighbour’s cat – climate change cannot be apprehended in the same way. You can’t see it or touch it. One can demonstrate, through experimentation, statistics and observation that the Earth’s climate has got warmer (and is getting warmer), and that this is the consequence of human action. You may experience a flood, for example, a storm, or an unseasonably hot day. All of these things are aspects of the hyperobject that we call climate change, but they are not the thing itself, only its symptoms. Climate change, as an object, is too big, its effects too large, its essence too temporally and spatially spread out to be perceived as a *thing* in the traditional sense. In fact, if you start thinking about climate change in these terms, it challenges our conception of what a thing even is.

When you grasp the idea of the hyperobject, you realise that we’re actually surrounded by, within, and are part of many of them. Our use of oil, the creation of nuclear waste, and polystyrene packaging are three examples. Polystyrene is something we usually experience for a few fleeting moments when we open up a new product, but the polystyrene itself may then go on to have another life – in a landfill site, part of the mid-Pacific rubbish island, enter the digestive system of a sea turtle, and be returned to the Earth as part of a new geological stratum in thousands of years’ time. Something as simple as a polystyrene coffee cup, that we might *presume* to be quite simple and easily definable, when seen as a hyperobject, becomes something different; the coffee cup has time travelling superpowers.

⁷ Morton, Timothy. 2013. *Hyperobjects : philosophy and ecology after the end of the world*. Minneapolis, MN: University of Minnesota Press.



Qualities such as being able to exist for thousands of years demonstrate one of the defining qualities of hyperobjects; we don't intuitively have ways to manage our relationships with them. It is *true* that there is a direct connection between your morning coffee and the entry of microplastic into the food chain. Similarly, your decision about whether to go on holiday in Australia or Cornwall, depending on where you live, of course, relates to the increasing incidence of storms in the Caribbean. However, as we discover by considering these hyperobjects, it is very hard to connect your immediate sphere of action, for example, *this* cup of coffee, or *that* flight to Oz, with your interaction with the hyperobject (let alone what that hyperobject may come to represent in the future).

The IoT is a hyperobject. Just as with global warming, it's very difficult for an individual to fully understand their relationship with the IoT. When you use IoT devices like your Amazon Echo or use your smart TV, it may *feel* like you're simply interacting with a *normal* thing, but there's actually a lot more going on. Although the Amazon Echo is a product you buy and own in order to accomplish a specific task: there's a lot more to it than that. When you interact with Alexa, you're actually interacting with a multiplicity of servers, algorithms, software and data economies. These might include the device itself, Amazon's voice recognition technologies, the infrastructure of your smart lighting provider, the telephone cables to your house, and Amazon employees in Alaska. Some parts of these systems are located in your home or near your house, while others are literally on the other side of the world; some you own but some are the property of others; some are software, some hardware, and some human.

In the case of the Echo, Amazon use data collected from your use of their device in order to improve the service they deliver. They also use this data to target products at you. Those products are designed by people, manufactured in factories, and transported in ships, wagons, vans, and planes. The hyperobject that is the IoT spans the globe, it connects countries, and it transcends the digital and the physical. When they are IoT-enabled, turning on the lights is no longer just about turning on the lights. As Cambridge Analytica's involvement in influencing the US Presidential election and the UK's Brexit referendum demonstrated, individuals' use of services, such as Facebook, is something that only those individuals can consent to – and that is their right. However, as societies, perhaps we should consider hy-

perobjects a little more, and use them to think through the implications of apparently simple actions. *Hyperobjects* is a useful concept when thinking about how to work out what it means to live surrounded by the IoT, and can help us to decide how enthusiastic, cautious, or careful we want to be when considering the adoption of the IoT (and in particular how fair or acceptable it seems to us).

Morton ends with a warning and argues that in the face of hyperobjects, humans are entering a time of *'hypocrisy, weakness, and lameness'*. We drink our morning coffee; the cup is the cause of death of a whale 10 years from now. We fill up our car at the petrol station; a coastal village in the Maldives is flooded next summer. The cat gifs we liked on Facebook turn out to contribute to the dissolution of democracy, as we know it. We tell Alexa to turn the lights down; what traces have we left in the hyperobject that is the Internet of Things, and how might they be used in future?

Heterotopias

Have you ever walked into a room and thought, “this is a big space”, or perhaps gestured to your friend in a movie theatre as if to say, “there’s a space over here, come join me”? On a crowded train most of us have thought, “Can I just have some space, please”? Although we use the concept intuitively in our everyday lives, *defining* what space is has caused philosophers to scratch their heads for centuries. There are clear differences between the space that a room occupies, the space a building defines, the personal spaces which we imagine around our bodies, or the unimaginably huge outer space that – despite being full of stars – is mostly empty.

Yi-Fu Tuan, a key figure in the *Human Geography* movement, characterised space as a way of communicating different ideas:⁸

People of different cultures differ in how they divide up their world, assign values to its parts, and measure them [...] Man, out of his intimate experience with his body and with other people, organizes space so that it conforms with and caters to his biological needs and social relations.

Tuan (1979)⁸

So, spaces, like our bodies, the houses, our towns, cities, and the whole universe, are the locations of a huge variety of *intimate* experiences. However, the French philosopher, Michel Foucault, says that, beyond the *familiar* and *intimate* spaces that Tuan talks about, there are other spaces⁹ we interact with all the time but aren’t necessarily aware of, and these have different properties. For example, the space that your image is in when you look into a mirror – what is the nature of *that* space? Or the voice

⁸ Tuan, Y.-F. 1979. “Space and place: humanist perspective.” In *Philosophy in Geography*, edited by S. Gale and G. Olson. Springer Netherlands.

⁹ See his essay on this written in 1967 called “Des espaces autres (Of other spaces: utopias and heterotopias).” *Architecture, Mouvement, Continuité*, 1984, Translated from the French by Jay Miskowic 16 (1):22-27.



at the other end of a phone call – what space does the voice occupy?

To describe and explore these strange spaces Foucault came up with the term *Heterotopia* (which literally means ‘other place’ in Greek); he also developed a series of principles that explained how heterotopias function.

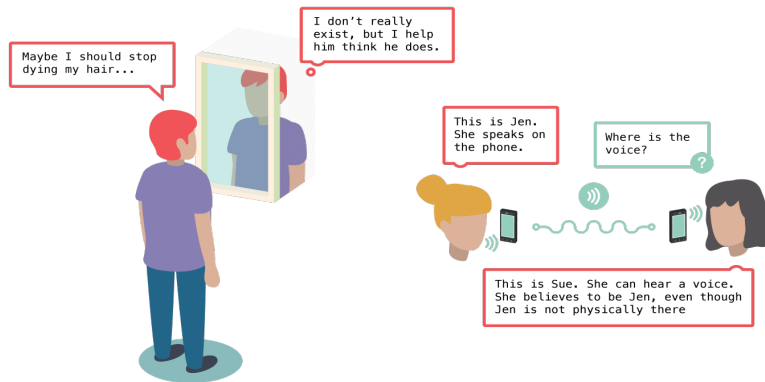


Figure 3. The spaces inside mirrors and phone calls, are a way to imagine Heterotopias or other spaces

Heterotopias are spaces within spaces that relate to each other. The space of the mirror image exists because there is something in the space *in front* of the mirror and the space occupied by the voice-on-the-phone exists because, somewhere, a person speaks into a telephone handset. In both examples, neither space can exist without the other, *but* they don't always play nicely together. These interlinked spaces have their unique sets of rules and properties, and Foucault asked lots of questions to try and understand what these are. For example, what is allowed to be experienced in a space and in what order, what circumstances dictate these experiences, and, most importantly, who gets to decide on all this?

For example, let's imagine a museum. When you step inside there are rules that you must abide by; sometimes no photographs, only quiet talking, no touching of the exhibits, and absolutely no trampolining. The museum allows you access to one sort of space, but the museum heterotopia also *denies* you access to another sort. Museum heterotopias don't just manipulate

space, but, in a sense, they twist *time* too. By providing a physical space for artefacts from the past, they create temporal illusions and transport the artefacts of the past into the audiences of the present. The timeless trinkets we see in museums create heterotopic rules that break up our understandings of space; although museums are *public* places, they allow for very *private* interactions between you, the artefacts, and other visitors in the space.

The IoT has created a whole range of new heterotopias. For example, let's consider the smartphone. The text conversations you have, phone calls you make, and emails you send using a smartphone appear, at first glance, to fit with commonly held conceptions of private spaces. However, if we consider that any message on your phone can be shared with anyone else through a screenshot – the nature of this 'private' space changes. Further, if we consider that your email app vendor knows not only the content of your email, but where you are when you're reading your messages, and where you go *after* reading them – a new, anti-private dimension is revealed. We might also think about the apps and platforms that smartphones provide access to. Although smartphones hold and protect our most private conversations and content, they are also the gateways to sharing it in the most public of ways. They create heterotopias that exhibit very complex relationships with our conceptions of public and private spaces.

Whilst it may be true that you can close doors and windows to make yourself more private at home, similar safeguards are less obvious when objects exist in the digital *and* physical world. The inter-connectivity of the IoT supercharges this effect. Something as apparently simple as a fitness tracking watch can quickly transcend the apparently public number of steps you take on your walk to work and segue into the very private world of your health: although your boots were made for walking, were they made for walking all over the Internet?

These interactions between you, your devices, and the internet are illustrated in this diagram. There are things (both private and public) in the real-spaces we occupy, such as walking to the park, thinking in our head, or writing in a diary. Similarly, there are digital counterparts to all of these things in a digital space. The overlaps are where the heterotopias occur and each one functions in a different way with unique rules. Consider the fitness tracker: it's counting your physical steps, saving them as data locally, sharing that data to different places online, and all the while seeing other devices like

itself around it. That’s a lot of possible interactions! The deeper we go into the diagram the more complex these interactions become. What’s in the middle you ask? By applying Foucault’s thinking we can begin to figure that out.

Looking at smart devices, such as a fitness tracker, in this way, reveals particular forms of heterotopias, which then help us to understand their complexity, and give us a better appreciation of understanding of the fluidity of notions such as *public* and *private* when the physical and virtual combine. Using heterotopias in this way is a useful tool for designers, developers, and users of the Internet of Things to understand what is actually happening.

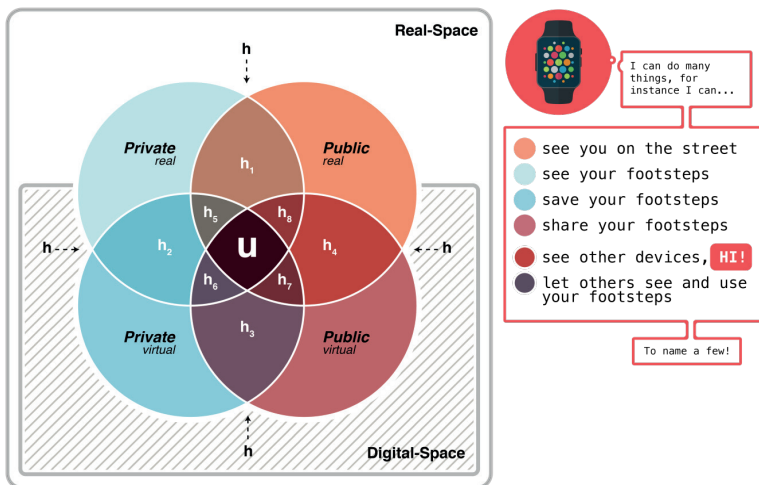


Figure 4. Did you know your fitness tracker was so active?

Respect

The proliferation of “smart” things that make life easier, more comfortable, and more efficient is central to the vision of IoT in the home. What differentiates these IoT devices from the less “smart” things of the past is their level of automation. Through embedded computation, connectivity and data-driven software “smart” devices have more complex behaviours.

As automation increases, and given that IoT devices can carry out actions for themselves or on somebody’s behalf, questions arise relating to how such devices *should* act. For instance, when a smart meter suggests ways to save money, should it include options for switching energy provider? Intuitively the answer seems to be yes; so long as it behaved lawfully, a smart meter acting as a dutiful assistant seems an acceptable proposition. However, if we consider the smart meters that are deployed in the UK they include features such as directly reporting usage for more accurate billing, the ability to remotely control (and shut off) supplies when “necessary”, and the ability to detect and disclose how energy is used throughout the home. Some of this functionality could easily be seen by customers as privacy-invading, in some cases even hostile, and in many cases something that many would prefer to do without.

As things become “smarter”, they necessarily end up taking actions and making choices that reflect the needs of their users. In the case of smart meters, the users are both the individuals whose houses the meters are installed in, *and* the energy companies that design and deploy them. Here we consider how these differing needs may be interpreted in terms of respect.

Borrowing concepts from economic theory and moral philosophy can help us to understand what it means to create *respectful* IoT devices. The smart meter example illustrates a kind of *moral hazard* commonly discussed in political science and economics, known as the *principal-agent problem* or *agency dilemma*. Such an agency dilemma occurs whenever someone, known as the *agent*, is asked or expected to take actions on behalf of someone else, known as the *principal*; in these situations, the agent may be



motivated to act in its own best interests, rather than those of the principal's.

How do we decide if the agent's preferences are more or less important than the principal's? Immanuel Kant, a significant contributor to moral philosophy, argued as part of what he called the *Categorical Imperative*, that an essential aspect of behaving morally is treating others with respect. Being respectful, in Kant's eyes, requires treating principal's as *ends* in themselves, rather than a *means* to further the aims of the agent. This means being genuinely concerned about the needs of others, rather than using them in a selfish manner.¹⁰ Thus, the *moral* choice, for an agent, is to prioritise the principal's needs over its own. Although core to the Kantian notion of morality was having respect for a person as a living conscious being, the concept of respect is really quite versatile and can help us explore IoT devices and automation further.

The following four types of respect we have found particularly useful in understanding and explaining how respectful our relationships with smart devices are. When we say moral decisions require respecting a person's needs, we use the term *direct respect* to mean to observe, consider, and to support their needs. Direct respect describes a device's behaviour as it relates to some preferable law or guideline. For example, we might say that devices must respect users' basic human rights; the rights to life, liberty, and privacy. This would constrain the device from performing actions that might be interpreted as violating these principles, such as committing murder, enslavement, or surveillance. Direct respect characterises a behaviour against rules, while the remaining types of respect describe how the agent, the IoT device, views the principal, the user.

Recognition respect refers to agents that are sensitive to, observe, and recognise aspects of the principal. For example, imagine a smart device being able to automatically recognise a person's mobility impairment and automatically adjust furniture in response.

Obstacle respect relates to the agent seeing the principal and their needs as obstacles to the agent's own motivations. One interpretation of obstacle respect requires being able to make suitable adjustments to resolve these

¹⁰ Kant, I., Hill, T. and Zweig, A. 2002. *Groundwork for the metaphysics of morals*, Oxford philosophical texts. Oxford: Oxford University Press

obstacles, and thus to serve the principal. However, another interpretation suggests the opposite, as it suggests that merely characterising the principal's needs as an obstacle to be overcome means failing to *genuinely* see the principal's needs as the most important thing. A respectful device would avoid framing the needs of end-users as obstacles, and instead would change the device's own priorities.

Finally, *care respect*, as its name suggests, means to capture the kind of respect associated with the agent protecting the principal's well-being, usually in terms of long-term goals. For a smart device, having care respect might involve the agent refusing to order an unhealthy takeaway when the principal is trying to lose weight.

Establishing a rich vocabulary for describing the ways that smart things might behave towards users in their social, human environments can potentially help people form expectations around them. However, respectful human relationships involve complex mixtures of various kinds of respect, therefore, devices will need to mimic this and support not just one but many such kinds of respect simultaneously. This challenge is among the most important ones that need to be faced in order to achieve truly pro-social smart devices in the home.

Fairness

Imagine that the next time you renew your car insurance, you are given the option of putting a little computer in the boot of your car which measures where and how you drive. If the box decides you are a safe driver, your insurance premiums will go down. This is what they call *telematic insurance*. You go for it, and sure enough, after a few months, your monthly premium is reduced by £10. Super!

You recommend telematic insurance to a friend, who agrees to have the same little computer in her car. Sure enough, her monthly premium is reduced too. She waves her paper bill around in joy. But hang on - she saved a whole £25! Insulted and jealous, you wonder: "is she really £15 safer than me?".

You decide to make some enquiries with the insurer. They tell you that their algorithm has analysed the times and places you drive, and determined they are comparatively riskier than those of your friend. Drivers in the neighbourhoods you go to, and the times you go to them, are stopped more often by police, and cars are more often broken into. Astonished, you wonder "Is that fair?" Of course, on the one hand you understand the argument; why, after all, should your friend have to pay as much as you when she avoids the riskier parts of town that you frequent? But on the other hand, a suspicion makes its way: perhaps the data reflect *unjust biases* or social inequality. What if it turns out that the people driving in the neighbourhoods you drive through are more likely to be poor, or members of a marginalised community? What if the police disproportionately pull over drivers at those times in those areas? What of those invisible yet omnipresent social forces that arbitrarily shape the way in which events, people, places, are understood as problematic, or deviant?

When considering whether to use an IoT device, we tend only to consider the effects on ourselves and those directly around us. Will it help me, will it hurt me or my family, will it invade my privacy or support my autonomy? However, because IoT devices have such widespread ramifications affecting many people, perhaps we should adopt a more ethical approach, and ask questions like, whom will it help or hurt, and by how much? Is it arbitrarily



treating some people less favourably? Considering society as a whole, is it likely to cause more harm than good? Moral and political philosophers have thought about these questions for millennia, using various different terms including: *equality*; *non-discrimination*; *distributive justice*; and *fairness*. What they all have in common is that they are all about justly resolving conflicts between people over the good things people enjoy and the harms or burdens they must endure. This could be about everyone getting an equal slice of a cake or ensuring that the justice system is not stacked in favour or against certain groups.

If asked to define *fairness*, we might be tempted to begin with 'everyone gets the same'. But some people might deserve more cake than others because it's their birthday, or another person may get a longer time in prison as their crimes were particularly heinous. Aristotle said that moral equality means things that are alike should be treated alike, while things that are unlike should be treated unlike in their un-likeness'.¹¹

So, *fairness* means that any two people who are alike in certain morally-relevant ways get the same treatment and those who are unlike should be given different treatment according to how different they are. This seems sensible, if not self-evident. However, in order to apply it, one needs to have a measure of likeness, as well as an account of same treatment, neither of which is straightforward.

Political philosophers have offered various accounts of when it is morally acceptable for some people to end up better off than others. Some strict egalitarians (egalitarian refers to a believer in equality) might say that everyone should pay exactly the same (in the car insurance case, this means everyone paying the same premiums regardless of what driving behaviour the little computer detects - what is often called 'solidarity insurance'). In contrast, an extreme libertarian might say that so long as both the customer and the insurer agree to the terms, and neither has been forced by the state into transacting, then any inequalities are tolerable, and indeed fair.¹² Of course, there are many intermediate positions between these two extremes.

¹¹ Aristotle, *Nicomachean Ethics*. As translated in Westen, P. 1982. "The empty idea of equality." *Harvard Law Review*:537-596.

¹² Nozick, Robert. 1975. *Anarchy, state, and Utopia*. Oxford: Blackwell.

Many agree with some version of 'luck egalitarianism'; this holds that people should not suffer as a result of circumstances outside their control (bad luck), but they should bear the cost of foreseeable consequences of freely chosen actions.¹³ For instance, those born with debilitating genetic diseases should have special provisions made available so they can live in parity with more able-bodied people; but those who wilfully gamble and lose their savings to the bookmakers do not deserve compensation. Some critics of luck egalitarianism argue it doesn't go far enough; sometimes, even inequalities arising due to an individual's free choice should be minimised. For instance, feminist political philosophers such as Elizabeth Anderson, have argued that someone who freely chooses to turn down a lucrative career in order to care for a loved one may deserve greater consideration than someone else who turned down a similar career for other, more selfish, reasons.¹⁴

Let's return to our original example of the telematics computer boxes watching you and your friend drive; they have clearly observed some differences between the two of you and charged different premiums accordingly. Your driving habits are similar to those of other drivers who have been stopped by police, and your car is often in high-crime places. But is this 'un-alikeness' a justifiable reason for giving you more expensive insurance? A luck egalitarian might ask whether your higher premiums are the result of free choice or circumstances outside your control. Are you and your friend equally free to choose between driving in low or high-crime areas at low or high-risk times? Or does the data collected by telematics reflect unjust social circumstances?

Ultimately, there are some circumstances when telematics-derived insurance premiums might be unfair. In theory, everyone with a car has the choice of where to drive it, but in practice most people drive at particular times and places, *out of necessity*, between work and home – not entirely the result of free choice. If you were born, raised, and live in a high-crime neighbourhood, telematic insurance premiums are going to be a stronger reflection of unchosen circumstances rather than risks that you have personally

¹³ Arneson, Richard J. 1989. "Equality and equal opportunity for welfare." *Philosophical Studies* 56 (1):77-93.

¹⁴ Anderson, E. S. 1999. "What is the point of equality?" *Ethics* 109 (2):287-337.

chosen to incur. As critics like Anderson have argued, even where your driving data does reflect entirely free choices, you may not deserve higher premiums if those choices serve some laudable social purpose – perhaps, you are driving through those locations at those times in order to distribute aid to homeless people.

These particular cases raise separate questions about who should bear the burden of equalising unfair outcomes. How much should the insurer be required to make their system ‘fair’ when there are likely to be genuine underlying differences in the frequency and number of pay-outs between different driver profiles? Is it the role of the state to provide compensation tax breaks or other benefits to drivers who live or do socially beneficial work in impoverished areas? Whichever way we go about answering these questions, it seems clear that we will be faced with more of them in future. As IoT devices become more widely embedded in all parts of our daily life, the data they generate will enable new kinds of prediction, classification and risk-assessment. These forms of analysis are already being fed into systems whose entire purpose is to detect differences between people and react accordingly. If we want an internet-of-fair-things, we need to adapt our philosophies of fairness in order to determine how differences between people justify differences in treatment.

Ownability and the IoT: Acceptability vs Adoption



The Philosophy of Technology uses philosophical thinking to try to understand the social impact of technology. Originally, the philosophy of technology focused on technology as a single grand concept, but in the late 20th Century with the industrial revolution and the emergence of many different technologies, philosophers realised that *specific* technologies were quite different from each other, and that, maybe, their philosophies should be too. By considering individual technologies, like telephones, cars, planes, and computers, and combining philosophical thinking with the social sciences, the philosophy of technology helps us understand the intricate nature of our relationships with things.¹⁵ Here, we will use theories from the philosophy of technology to ask whether we can *own* the IoT; by asking this question, the battle between notions of *Acceptability* and *Adoption* become evident.

¹⁵ Brey, P. 2010. "Philosophy of technology after the empirical turn." *Techné: Research in philosophy and technology* 14 (1):36-48. <http://doi.org/10.5840/techné20101416>

Ownership is an ancient concept, shared across many languages and cultures. Over the centuries the concept has been used, subtle differences in its meaning have developed, but in the law, the term *ownability* refers to the attribute of things that can be “ownable in law”.¹⁶ For example, things like cars, cats and crumpets can all be owned in law. However, people, the dwarf-planet Pluto and philosophy *cannot* be owned, because they cannot be owned in law (although, until slavery was made illegal, some people *could* be owned in law). From this, we can see that physical *things* like objects, land, and livestock can be owned, while more broadly speaking people and *concepts* cannot be owned.¹⁷ With this in mind, you might have thought that the things that make up the IoT should be ownable. However, theories from the philosophy of technology show us that ownability in the IoT is less straightforward.

One way to get to the heart of what is important about ownership is to ask whom is a technology *for*. If I own an IoT smart speaker device (like an Amazon Echo), is it *for* me (the homeowner), is it *for* houseguests who stay in my home and use it while there, is it *for* the company who manufactured it, or could it be *for* someone else entirely? To explore whom an IoT device might be *for*, we use a notion called the *benefit attribute*. The benefit attribute identifies the person or people whom a piece of technology is *for* with who might benefit from its use. However, even this doesn’t completely explain who a technology is *for*, because people benefit in different ways. Two concepts that help us to understand these differences are *acceptability* and *adoption*.

Accounting for acceptability means trying to establish a kind of moral standard: if something is good and desirable, then it is acceptable.¹⁸ Establishing whether something is *good and desirable* is itself not a simple task with a

¹⁶ Wessels, L. 1908. History of the Roman-Dutch law. Available from <https://archive.org/details/historyromandut00unkngoog> [accessed on 15 June 2018].

¹⁷ Although we say that concepts cannot be owned (in the same way as things), they probably can be owned in some way or other, the distinction between possession and ownership is another long-lived and ongoing philosophical debate (see <https://plato.stanford.edu/entries/property/> for more information). For this chapter the important thing to remember is that *things* can both be possessed and owned.

¹⁸ van de Poel, I. 2016. “A Coherentist View on the Relation Between Social Acceptance and Moral Acceptability of Technology.” In *Philosophy of Technology after the Empirical Turn. Philosophy of Engineering and Technology*, edited by M. Franssen, P. Vermass and A. Meijers. Cham: Springer.

single answer; for example we might say ‘this is a good hammer’ (an *instrumental* judgement), but equally might say ‘this is a good person’ (a *moral* judgement). The same sorts of distinction can apply to the IoT. If we go back to the example of the IoT smart speaker, whether it is a good smart speaker (instrumentally) is different from whether it is good for me, my houseguests, or the company that made it (morally). Although it is important to acknowledge the underlying complexity of the idea of acceptability, usually it is referred to in terms of the ethics that inform the *moral* judgements.

When addressing the *instrumental* goodness of something, the notion of *adoption*¹⁹ becomes a more useful lens to look through. Adoption deals with enumeration, how something is in terms of quantity terms. In contrast, and as we have discussed previously, acceptability deals with ethics and morals, it explores how technology *ought* to be and focusses on its qualities. There are many models and approaches to understanding adoption (Technology Adoption Model, Value-based Adoption Model, Unified Theory of Acceptance and Use of Technology), but in contrast to studies of acceptability, they are all descriptive and do not address questions of *moral* goodness. So, while studying adoption may suggest that a technology is *for* somebody, because it describes that they *do* use it, it doesn’t explain whether their use of it is good for them (or others) or if that use is desirable.

If we go back to the idea of the benefit attribute, then the notions of adoption and acceptability have profoundly different types of benefit attribute attached to them. With the smart speaker example the benefit attribute, when seen through the lens of *adoption*, may relate to how beneficial the widespread adoption of the smart speaker is for its *manufacturer*,²⁰ irrespective of whether it benefits or harms consumers or wider society. In contrast, the benefit attribute for the homeowner and houseguests is better looked at in terms of *acceptability*; does the smart speaker do its job well and might it have any negative effects? Some recent evidence-based investigations into the IoT are biased towards the commercially-driven notion of adoption,

¹⁹ For the purposes of this Little Book we use adoption to be synonymous with acceptance (cf. de Poel 2016: 180).

²⁰ In a real-world example of this it benefits Amazon if more people own Echo devices because then their voice-recognition algorithms work better, which provides a better services, and may in turn help them sell more devices.

discussing the need “to reach commercialisation”,²¹ to exploit “potentially huge market values”²² and for “promoting economic development”²³ and this suggests there is a lack of research into the IoT which is concerned with morally-driven benefit attributes or acceptability.

An acceptability-focused example did, however, appear in an episode of the television series *Detectorists*.²⁴ When buying a new home on a tight budget the characters Andy and Rachael are shown round a rather dingy property. The slimy estate agent explains that the house has a voice recognition system (somewhat similar to Amazon Echo) installed, and proceeds to demonstrate why this is a unique selling point. After three failed attempts to turn on the lights with this system (failed because the system doesn’t work very well) he declares “you can use voice recognition with that, so *only* you can turn the light on”. Perplexed, Rachael asks “why would you do that?”. With ever-decreasing confidence and a self-questioning tone, the agent replies “so that.... burglars... have to..... bring their own torches?” The reality depicted in this scene is one where IoT in the home is difficult to use, and even when it does work is often useless. This lack of utility combined with the IoT device’s association with the estate agent seems to echo and critique the widespread imbalance of benefit attributes toward those that align with *selling more* (adoption) and those that promote a *morally good outcome* (acceptability).

The IoT has inspired a move away from traditional ownership, and toward subscription-supported business models – a necessary move in order to ensure the viability of devices that require significant ongoing technical infrastructure to work (e.g. cloud services). Despite this necessary shift, perhaps the most pertinent question now is not ‘is it possible to own IoT devices’, but ‘who would want to own them’?

²¹ Kim, Y., Park, Y. and Choi, J. 2017. “A study on the adoption of IoT smart home service: using Value-based Adoption Model.” *Total Quality Management & Business Excellence* 28 (9-10):1149-1165.

²² Hsu, C., and Lin, J. C. 2018. “Exploring Factors Affecting the Adoption of Internet of Things Services.” *Journal of Computer Information Systems* 58 (1):49-57.

²³ Hsu, C, and C Yeh. 2017. “Understanding the factors affecting the adoption of the Internet of Things.” *Technology Analysis and Strategic Management* 29 (9):1089-1102.

²⁴ Channel X TV. 2017. *Detectorists*. BBC4. Series 3 (Ep. 3).

Accelerationism

The world has been getting faster for a long time. Tracing our recent history back to the roots of the industrial revolution, there are countless examples of how technological development has been continually, and with ever-increasing rapidity, changing the way we live in and act upon the world. The disorientating effects of this constant change have provoked many social and political responses, but if we were to categorise them, we might separate them into those which seek to slow its pace and those which embrace the opportunities that technology offers. In the 19th century the Luddites destroyed steam-powered factory machinery, because, as they saw it, the machines were destroying people's jobs. However, by the 20th century the former British Prime Minister, Harold Wilson, argued that to be successful Britain must embrace the "White Heat" of technology.²⁵

The problem is that both responses have merit. Technological change often means that people's lives are disrupted. Technology is frequently used to realise financial efficiencies and given that in many situations the most significant financial expense is *human resources*, technology often disrupts jobs, work, and earnings, by de-skilling craftsmen, and making workers redundant. At the same time, the impact of technology has been enormously positive. Healthcare, communication technologies, transportation technology, and manufacturing techniques have drastically increased life expectancy and quality of life across vast swathes of the planet. Accelerationism is the view that holding back technologically-powered change is neither possible nor desirable (the Luddites failed to stop the spread of automated factories after all, and a good thing too!). If this is true, then the best way forward is to grasp the productive power of technology and to make sure it is used to make people's lives *better* and to *not* do harm to others.

²⁵ See the following webpage for further details: <https://www.theguardian.com/science/political-science/2013/sep/19/harold-wilson-white-heat-technology-speech>



The founding text of accelerationist thought is arguably *The Communist Manifesto*. In one of its most famous passages, Karl Marx and Friedrich Engels describe capitalism as follows:

Constant revolutionising of production, uninterrupted disturbance of all social conditions, everlasting uncertainty and agitation distinguish the bourgeois epoch from all earlier ones. All fixed, fast-frozen relations, with their train of ancient and venerable prejudices and opinions, are swept away, all new-formed ones become antiquated before they can ossify. All that is solid melts into air, all that is holy is profaned, and man is at last compelled to face with sober senses his real conditions of life, and his relations with his kind.

Marx and Engels (1848)²⁶

Marx and Engels were writing at the height of the Industrial Revolution. The productive capabilities unlocked by automation were drawing more and more people away from the countryside and into factories. In the process, the old structures of life, work and family that structured the then primarily agricultural economy were being replaced by new ones of workers and employers living in the rapidly-growing cities. This wave of disorienting change generated much wealth, but it also created widespread misery and suffering among the poor. This prompted Marx and Engels to imagine their communist alternative around this simple question: could we have the wealth without the misery?

We don't have to be communists to accept that this description captures something of what it feels like to live in a society which is being rapidly changed by technology. As societies, we're still coming to terms with the impact that the Internet is having on every aspect of our lives. The vocabulary of the early Internet – *home pages, email addresses, hyperlinks, forums* – reflects the fact that it was designed as a commons; an open place, for the people. However, the Internet has restructured our lives in very *uncommon* ways. These were hard to anticipate in

²⁶ Marx, K. and Engels, F. 1848. "The Communist Manifesto." In *The two narratives of political economy*, edited by Nicholas Capaldi and Gordon Lloyd, 2010, 389-408. Beverly, MA: Scrivener Publishing.

the 1990s, and have taken a form which is unsettling and disruptive in just the ways that Marx and Engels realised the Industrial Revolution was unsettling and disruptive, as represented in the quote above.

The disruptions we are living through have an impact on many aspects of our lives. Many people now work within new economies which use platforms like Uber or Deliveroo; although these companies and their technology-enabled business models offer unique propositions to customers, the more we use them the more they restructure and sometimes destroy others. The apparently innocent act of sharing our lives with friends via social platforms often invades our privacy in ways we don't understand, and in making us 'the product' drives multi-billion-dollar advertising businesses.

Before the internet, notions of privacy, work and home, even inside and outside, were straightforward. If I was inside my house, I was not at work. If I was reading a book in my home, I would have a reasonable expectation that no-one else would know what that book was, when I was reading it, or what other books I might own. Today, if I can work just as effectively in the office or on the train, or at home, then where does work end and home begin? If my internet service provider can know what websites I've been visiting, Spotify know what music I've been listening to, or Netflix know what my favourite shows are, in what sense are my entertainment choices private? And how might these companies use this information in ways which I might not expect? What say might I have in this now, and what effect might my decisions have in the future?

The fact is, we are at the thin end of the IoT wedge. Although the IoT is here, it is going to be far more pervasive in the future. The changes brought about by the IoT will continue to accelerate.

Automation, artificial intelligence, and networked infrastructures offer huge opportunities for increasing efficiencies across many industries, and for making our cities and homes safer, more ecologically sound, and more pleasurable to live in. Self-driving cars are but one way that vast amounts of 'boring and demeaning' work can be 'permanently eliminated'.²⁷

²⁷ Srnicek, N. and Williams, A. 2016. *Inventing the future: postcapitalism and a world without work*. London: Verso.

However, the acceleration is so powerful that we seem to be in danger of falling over a precipice of the future. Beyond the edge, there will either be *Star Trek* or *The Matrix*²⁸: either we will live in a world in which automation has freed up people and resources so that everyone enjoys its benefits, or one in which the majority live increasingly miserable lives as automation removes their means of making money and having a meaningful vocation.

In the face of this, it can be tempting to want to slam on the brakes: to slow the pace of technological change so that we can catch up with ourselves, but as the Luddites learned, this is nigh-on impossible. The challenge of accelerationist thinking, then, is to *ride the tiger*. We must look at the technological changes that can at times seem about to overwhelm us, and rather than despairing, we must embrace the great potential benefits they offer while remaining vigilant in guarding against their potential harm. Because these benefits and harms are often subtle and unexpected, we must embrace new ways of evaluating and regulating new technologies, particularly those that make up the IoT.

²⁸ This comparison is borrowed from the former Greek Minister of Finance and economist Yanis Varoufakis. See, for example, <https://www.theguardian.com/lifeandstyle/2015/nov/28/conversation-brian-eno-yanis-varoufakis-interview>.

Summary

The discussions in this book are not intended as overarching philosophies for the IoT, nor do they suggest that they are the 'best' ways of developing understandings of the IoT (for, as Socrates said 'The only true wisdom is in knowing you know nothing'). What we are offering in the book is our own ideas about how philosophy *might* help us answer the questions the IoT poses us (because, as Aristotle argued 'It is the mark of an educated mind to be able to entertain a thought without accepting it'). For interested readers, the footnotes throughout the book provide links to a wide range of resources, including several PETRAS research papers that build upon these ideas. Keeping in mind that Plato's teaching, 'A good decision is based on knowledge and not numbers', probably applies to the IoT as much as it does anything else, we hope that these chapters have helped you to 'know' more about both the IoT and philosophy.



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