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Delaying Obsolescence

Introduction

This paper starts by responding to Patrick Boot, Alastair Hare and Ruby Ho's "Up-front thinking for the optimization of product life" (Boot et al., 2008) and Brian Burns's "Re-evaluating Obsolescence and Planning for it" (Burns, 2008). They argue that the most important response to concerns about obsolescence is to *plan* for obsolescence. I argue that, although their suggestions are sensible in themselves, they are far too conservative if designers and engineers *limit* themselves to planning for obsolescence in this way.

In contrast, I argue that, in *addition* to planning for obsolescence, designers and engineers should be aiming to *delay* obsolescence.

In the second half of the paper, I respond to likely objections, primarily focused around the idea that my suggestions are unrealistically idealistic, failing to recognise the economic realities. I respond to these objections appealing to research in advertising, psychology, cognitive linguistics, philosophy, history, and economics, as well as drawing on the *Statement of Ethical Principles* developed by the Engineering Council and the Royal Academy of Engineering. (Engineering Council and Royal Academy of Engineering, n.d.)

Definitions and Clarifications

To say that something is obsolete is to say that it is no longer in general use, or has been discarded.[i] It is important, however, to make a distinction between different types of obsolescence.

In philosophy, it is common to make a type/token distinction (Blackburn, 2008, p.371). For example, imagine that I ask, "How many letters are there in the word 'Mississippi'?" Some might answer "11", while others might answer, "4 – m, i, s and p." If you answer 11, you are counting tokens, and if you answer 4, you are counting types.

In this paper, however, I would like to introduce a new terminology, for a number of reasons. First, because the type/token distinction may not be the most natural distinction for non-philosophers. Second, there is a further

ambiguity in how we understand "type". Finally, and linked to the second reason, because I would like to make a three-way distinction.

So, for example, imagine a car park with 12 cars and 6 motorbikes. If asked how many vehicles there are in the car park, most people would answer "18", assuming the question to be concerned with tokens, rather than types. If someone asked how many *types* of vehicle there were, some might answer "2 – cars and motorbikes", but others might make the division based on make or model.

Therefore, I will make a distinction between item obsolescence, product obsolescence, and technology obsolescence.

By "item", I am referring to one individual item (like tokens above). So, for example, I am referring to *my* particular Pentax ME Super, which is obsolete because it no longer works.

By "product", I am referring to a particular product, but not to a particular item. So, for example, I am referring to the Pentax ME Super, in general, not just my individual copy. The ME Super is essentially obsolete because there are many more advanced cameras that have been produced since the ME Super was discontinued, and very few people still use the ME Super (though there is a niche market for enthusiasts).

By referring to "technology obsolescence" I intend to go beyond any particular model, to say – for example – that film cameras in general are (more or less) obsolete, having been replaced for the majority of people by digital cameras.

In summary, we have:

1. Item obsolescence
2. Product obsolescence
3. Technology obsolescence

Planned Obsolescence

Oxford Dictionaries define planned obsolescence as "a policy of producing consumer goods that rapidly become obsolete and so require replacing, achieved by frequent changes in design, termination of the supply of spare parts, and the use of non-durable materials" (Oxford Dictionaries, n.d.), and Boot, Hare and Ho quote Brooks Stevens as stating that planned obsolescence is "instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary." (Boot et al., 2008)

In *Made to Break: Technology and Obsolescence in America*, Giles Slade credits the term "planned obsolescence" to a twenty-page pamphlet called *Ending the Depression through Planned Obsolescence*, written by Bernard

London in 1932. (Slade rejects Brooks Stevens's claim to have invented planned obsolescence, writing that "Stevens's claim does not stand up to scrutiny.") (Slade, 2006, p.73)

As London imagined it, planned obsolescence would be enforced with regulation, essentially putting an expiry date on products, such as shoes, homes and machines. Slade quotes London as stating that, once the product had reached its expiry date,

> these things would be legally "dead" and would be controlled by the duly appointed governmental agency and destroyed if there is widespread unemployment. New products would constantly be pouring fourth from the factories and marketplaces, to take the place of the obsolete, and the wheels of industry would be kept going... (Slade, 2006, pp.74-5)

Slade also comments that Aldous Huxley's *Brave New World*, also written in 1932, contains similar ideas:

> For example, Huxley wrote of the year 600 AF (after Ford, about 2463 AD), "Every man, woman and child [is] compelled to consume so much a year in the interests of industry" and then to discard it so that new goods can be manufactured and consumed. Hypnopaedia or sleep teaching indoctrinates the young utopians in the values of a society based on obsolescence by repeating over and over "Ending is better than mending... old clothes are beastly. We always throw away old clothes. Ending is better than mending, ending is better... Ending is better than mending. The more stitches, the less riches; the more stitches..." (Slade, 2006, p.76)

Slade writes that, in contrast to London's approach, "Planned obsolescence, for Stevens, was simply psychological obsolescence, not product death-dating." (Slade, 2006, p.153) Slade continues:

> And what exactly was the corporate position on planned obsolescence? In a 1958 interview with Karl Prentiss in *True Magazine*, at a time when America's wastefulness had blossomed into a national controversy, this was Stevens's answer: "Our whole economy is based on planned obsolescence and everybody who can read without moving his lips should know it by now. We make good products, we induce people to buy them, and then next year we deliberately introduce something that will make those products old fashioned, out of date, obsolete. We do that for the soundest reason: to make money." (Slade, 2006, p.153)

Discussing the more recent history, Slade writes:

> ...in 2004 about 315 million working PCs were retired in North America. Of these, as many as 10 percent would be refurbished and reused, but most would go straight to the trash heap. These still functioning but obsolete computers represented an enormous increase over the 63 million working PCs dumped into American

> landfills in 2003. By 2003 informed consumers expected only two years of use from the new systems they were purchasing, and today [2006] the life expectancy of most PCs is even less.
>
> In 2005 more than 100 millions cell phones were discarded in the United States. (Slade, 2006, p.1)

To consider the impact of this in terms of CO_2e emissions,[ii] here are Mike Berners-Lee's estimates for the emissions from manufacturing a computer:

> 200 kg CO_2e a simple low-cost laptop
>
> 720 kg CO_2e a 2010 21.5-inch iMac
>
> 800 kg CO_2e an all-the-frills desktop (Berners-Lee, 2010, p.124)

To put this into context, he writes, "Even before you turn it on, a new iMac has the same footprint as flying from Glasgow to Madrid and back." (Berners-Lee, 2010, p.125)

Planning for Obsolescence

In "Up-front thinking for the optimization of product life", Patrick Boot, Alastair Hare and Ruby Ho acknowledge that an obvious answer to the problem of planned obsolescence would be to return to traditional values, aiming to build things to last, like we used to. They argue, however, that this approach would be misguided and counterproductive. They write:

> There are many consumers today who are affronted by poor design and manufacture that seems to lead to premature and unsatisfactorily short product life... However, it is of no use to assume that such products are simply planned as a response to some inappropriate marketing trend as a continuation of the work of Brooks Stevens, and that all industry is engaged in a conspiracy of false obsolescence...
>
> The simple response to the dilemma of products which seem to fail prematurely is to demand that all products last longer, perhaps forever. (Boot et al., 2008, p.251)

Their main point is that this response would be counterproductive. They write, "To begin to plan for the inevitability of obsolescence we must first realise exactly that – the inevitability of obsolescence." (Boot et al., 2008, p.251)

If obsolescence is inevitable, then we would just be adding to the problem if we built things to last. If we know that a product is only going to be used for

a year, there is no benefit – and in most cases there will be a cost – in designing it in such a way that it will last for 10 or 20 years.

This can be appreciated more readily if we think about *why* products become obsolete.

If we think about item obsolescence, then breakage will often be the reason for obsolescence. My phone breaks, so I need to get another (whether I get the same model again, or a different one). But even with item obsolescence, breakage will only be one of the causes of obsolescence, and not necessarily the most significant. If we consider product or technology obsolescence, breakage becomes even less significant. There are other reasons why a particular product, or a particular technology, becomes obsolete.

Boot, Hare and Ho write that:

> Technological changes, economic forces, fashion trends, issues of repair, maintenance and durability, and customer expectations must all be acknowledged as contributing to the many ways in which a product becomes obsolete. (Boot et al., 2008, p.249)

If a product can become obsolete because of a technological change, a fashion trend or customer expectations, manufacturing it to last forever is not going to help.

Boot, Hare and Ho argue that we need to *plan* for obsolescence, in order to design the product in such a way that we minimize the impact on the environment, by thinking carefully about how a product will be used and how long a product will be needed for, and to think about disposal as well.

Referencing Brian Burns's "Re-evaluating Obsolescence and Planning for it" (Burns, 2008), they identify four modes of obsolescence:

1) Aesthetic Obsolescence, which they then divide into:
   a) Wear and tear
   b) Fashion
2) Social obsolescence, which they also divide into two:
   a) Society stops doing something (such as using hula hoops)
   b) Something is made obsolete by *law*. (E.g. CFCs)
3) Technological obsolescence – "when a functioning product is made obsolete by a newer model"
4) Economic obsolescence – "when repair or maintenance is too costly to be justified." (Boot et al., 2008, pp.253-4)

Reflecting on these causes of obsolescence, Boot, Hare and Ho urge designers to think carefully about how a product will be used, and to think about how long it is likely to be used for, and then design the product with this in mind, thinking about which materials to use (not using materials that are unnecessarily durable), and to also think about how the products will be disposed of when they are no longer used.

> It is suggested that every product should be evaluated, particularly in the design stages, against each mode of obsolescence to determine which will likely be its weakest link... (Boot et al., 2008, p.255)

They ask:

> How reliable must it be and what are the consequences of failure? How much will technology change? How mature is the product and its market? Will laws and standards change? Are there fashion cycles to consider? What will it look like in a year? How well will it wear? (Boot et al., 2008, p.255)

In summary, they end their short paper writing:

> If only one thing is taken from this section let it be that obsolescence is a natural inevitability for all products. The more deliberate we are about both recognizing this fact and applying that recognition to appropriate planning for obsolescence, the better *prepared* our products will be *at the time of their predictable demise*.[iii] (Boot et al., 2008, p.256)

Delaying Obsolescence

In the previous section, I focused on the move from planned obsolescence to *planning for* obsolescence. Everything that Boot, Hare and Ho say seems sensible and important. However, if we emphasise the fact that obsolescence is inevitable, as they do, this emphasizes what all products have in common – the fact that they will inevitably become obsolete – and draws attention *away* from the ways in which products can differ – the *length of time* that a product remains useful before it becomes obsolete and is replaced by a newer model.

In this section, I will argue that Boot, Hare and Ho do not go far enough. They are far too conservative. They rely too much on an acceptance of the status quo, particularly in relation to consumer habits, consumer attitudes and the social context.

Their paper is titled "Up-front thinking for the optimization of product life". But in what sense does their approach optimize product life? This is not a rhetorical question. I do not mean to imply that their approach does not optimize product life. On reflection, however, it should be clear that their approach would only optimize product life on the assumption that consumer habits stay as they are.

Consider the questions that they suggest that designers ask – as I quoted above. They suggested that designers ask whether standards will change, but not whether standards *ought* to change, or whether designers themselves (or those marketing their products) could be instrumental in changing those standards. They suggested that designers ask whether

fashion cycles would change, but they did not reflect on the extent to which designers themselves influence fashions or trends, and did not suggest that designers ask if they could influence consumers to make different choices.

Similarly, when they suggested that designers ask how well a product will wear, it is unclear whether they thought that designers should consider how it will look in a year in order to consider how long people are likely to keep the product, before discarding it, such that we can plan for its "predictable demise" *at that point*, or whether we should consider how it will look in order to *change the design* – to use different materials, for example, so that it looks better as it ages.

Regardless of what Boot, Hare and Ho had in mind in relation to the particular example of wear and tear, the focus of the paper is made absolutely clear in the final line of the paper (already quoted above). The focus is on "appropriate planning for obsolescence", such that our products will be "better prepared" at the "time of their predictable demise." (Boot et al., 2008, p.256)

As such, the focus is clearly on *planning for* obsolescence and not on aiming to *delay* obsolescence. Furthermore, as suggested above, the emphasis is on *predicting* how consumers will behave, rather than on aiming to *influence* consumer choices.

However, why should designers and companies be so conservative? Why should designers merely *predict* how consumers will use a product or technology, rather than aiming to *change* or *revolutionize* the way that consumers use a particular technology?

This conservative approach of merely *predicting* what consumers will want clearly *contrasts* with the approach that was taken with planned obsolescence, by the likes of Brooks Stevens.

Remember, Stevens talked about planned obsolescence in terms of "*instilling*... the desire to own something a little newer, a little better, a little sooner than is necessary" (Boot et al., 2008, p.250) and *inducing* people to buy products.

As stated above, Giles Slade quotes Aldous Huxley's *Brave New World*, presenting it as a representation of planned obsolescence taken to extremes. In addition to the section I quoted earlier in the paper, Slade also quotes the following passage.

> Why is it prohibited? asked the Savage...
>
> The controller shrugged his shoulders. "Because it's old; that's the chief reason. We haven't any use for old things here."
>
> "Even when they are beautiful?"

> "Particularly when they're beautiful. Beauty's attractive, and we don't want people to be attracted by old things. We want them to like new ones." (Boot et al., 2008, p.76) (Slade, 2006, p.76)

Of course, *Brave New World* is fiction, and the world depicted in the novel is extreme, and we have not used hypnopaedia or sleep teaching to indoctrinate people. On the other hand, to dismiss *Brave New World* as fiction and therefore irrelevant would be to miss the point. The novel is a satire. John Naughton, for example, comments that Huxley's novel was inspired by two things. First, "Huxley's imaginative extrapolation of scientific and social trends" and, second, "his first visit to the US, in which he was struck by how a population could apparently be rendered docile by advertising and retail therapy." (Naughton, 2013)

Clearly, it isn't merely the technology itself that is making old technology obsolete – it is also how products are *marketed*. Considering mobile phones, for example, the lifespan of a phone is clearly influenced by the fact that many of us don't pay for the phone itself, but get it as part of a contract. As a result, if a customer's contract is over and they are able to get a new phone when they sign up for a new contract, most people will do so – even if they are perfectly happy with their current phone.

Indeed, mobile phone providers compete with each other in terms of how frequently the customer will be able to upgrade their phone.[iv]

In addition, it is not only incentives and payment plans that influence how long consumers will keep a product and when they will choose to replace it. Designers and advertisers have frequently aimed to change consumers' attitudes and buying habits in order to maximize profits – giving consumers things they didn't realize they wanted, creating the demand as well as creating the product, or indeed creating a new demand for an existing product.

Ben Goldacre writes, "as George Orwell first noted, the true genius in advertising is to sell you the solution *and* the problem", and gives the example of pharmaceutical companies aiming to create new markets for existing products, resulting in what some call "disease-mongering". He writes:

> Recent favourites include Social Anxiety Disorder (a new use for SSRI[v] drugs), Female Sexual Dysfunction (a new use for Viagra in women), night eating syndrome (SSRI again) and so on: problems in a real sense, but perhaps not necessarily the stuff of pills, and perhaps not best conceived in reductionist biomedical terms. (Goldacre, 2009, pp.152-3)

Herbert W. Simons et al. address similar examples, but focuses more on the accumulative effect, rather than attempts to sell an individual product.

> Consider television ads for medicinals such as pain relievers and nutritional supplements. An underlying and oft-repeated premise of these advertisements is this: Got a problem? Take a pill! No advertiser deliberately strives to turn America into a nation of pill-poppers, and no single advertisement has that effect. Still, the combined effect of these multiple messages is pronounced. (Simons et al., 2001, p.62)

In terms of creating a new market for an existing product, Simons also gives the example of Miller Lite beer, which he presents as a case study of advertising. Simons et al. state that, before the Miller Lite advertising campaign,

> reduced-calorie beer was marketed primarily to diet-conscious consumers (read women). According to Bob Lenz... who originated Miller Lite's "Tastes Great/Less Filling" campaign, "Low cal was considered a sissy product, and it turned off the heavy beer drinker..."
>
> So Lenz got the idea to market the beer to heavy beer consumers through the vehicle of professional sports. They pitched Miller Lite as a macho product that enabled men to drink more because it was less filling. (Simons et al., 2001, p.282)

These examples don't focus on obsolescence, but they do highlight the extent to which people have used marketing strategies to influence consumer behaviour, and if this is what is done to persuade people in other cases, why are Boot, Hare and Ho so conservative in relation to the possibility of persuading people to buy longer lasting products, or to fix products rather than throwing them away.

Therefore, if designers are serious about minimizing the environmental impact of their designs, they should not merely *plan* for obsolescence in the way that Boot, Hare and Ho suggest. They need to be aiming to extend the longevity of their products if and when possible, in order to delay obsolescence, and to minimize the impact on the environment.

How can designers delay obsolescence? Given the creative nature of design, I am sure that designers will have many more ways of delaying design than one philosopher can be expected to provide in an academic paper on the ethics of obsolescence. My aim, therefore, is not to provide design solutions. My aim, rather, is to emphasise what designers need to be aiming for, which is to delay obsolescence, not merely to plan for it.

Nevertheless, it will be useful to consider a few indicative examples here, considering ways in which obsolescence can be delayed.

Clearly, as Boot, Hare and Ho acknowledge, where breakage is the problem, one of the most significant issues is the fact that it is often cheaper to replace an item than to fix it. One way of making obsolescence less likely would be to make technologies easier to fix, and/or to design them in such a

way that it is easier to simply replace individual parts, rather than having to replace the complete item.

For example, Dave Hakkens has designed a phone to solve the problem that, when a phone breaks or become obsolete, it is "often just one part that killed it" but yet "we throw everything away because it's almost impossible to repair or upgrade." Hakkens' phone is "made of detachable bloks. The bloks are connected to the base which locks everything together into a solid phone. If a blok breaks you can easily replace it; if it's getting old just upgrade." (PhoneBloks, 2013) Presumably other products, such as personal computers, could be designed using the same principles.

Alternatively, rather than designing products that consumers can fix themselves, companies could move away from consumerism based on consuming new products, and move towards a service based industry, *servicing* products to make them last.

For example, *The Economist* states that Rolls-Royce has been "gradually changing the way it does business. Profits used to come from selling engines and replacement parts. Now they come from providing long-term repair and maintenance—or 'power by the hour'. Rolls is steadily signing up all its customers to this sort of service. Margins are typically higher than on hardware. Customers do not mind because they are buying peace of mind—it is Rolls's job to make sure the engine keeps running." (The Economist, 2011)

However, as suggested above, breakage probably isn't the most significant cause of obsolescence. For example, even if products don't break, or if they can be fixed at a reasonable price, products are likely to become obsolete as a result of new technology.

This is especially significant in relation to electronic goods. Writing about modern communications and computer technology Diane Coyle writes:

> "There is no previous example of a new technology whose price has fallen so rapidly, or which has diffused through the economy as quickly, as innovations such as computers and mobile phones." (Coyle, 2011)

Arguably though, it is even more significant in relation to products that have electronic components, but also non-electronic components. This is important because there is such a discrepancy in the longevity of different *parts* of the product.

Consider, for example, cameras. SLR[vi] cameras, and other interchangeable lens cameras, are already modular to the extent that the lenses are bought separately from the camera body, and the camera bodies do, typically, become obsolete more quickly than the lenses, with new cameras being introduced (and old models being discontinued) much more regularly than lenses.

Prior to the advent of digital cameras, photographers were likely to keep the same camera for many years. The Pentax K1000, for example, was manufactured for 20 years, from the 1970s through to the 1990s. Digital cameras, however, are likely to be discontinued and replaced after only 2 or 3 years. Furthermore, not all components of the camera become obsolete at the same rate, and when a new camera is brought out to replace an older model the difference is often minimal, with a new sensor usually being the most significant improvement. From a photographer's perspective, this can result in a significant improvement in the quality of the camera, and therefore may be considered worth the money. From an obsolescence perspective though, the sensor is only a small part of the product, so if someone buys a new camera specifically for the new sensor that is hugely wasteful, with the rest of the camera discarded, and replaced with a new one which – apart from the sensor – may be almost identical. (Pentax Forums, 2010)

Again, therefore, if the aim is to reduce waste and to maximize the life of each product, it would make sense to design cameras that can be upgraded, with an approach like the Phonebloks, rather than replaced. Or if this is not feasible with cameras, perhaps camera manufacturers could invite customers to return their cameras to be dismantled by a professional, and have a new sensor fitted to the old camera, rather than just bringing out more and more new cameras. Clearly, this approach would mirror the Rolls-Royce approach considered above.

Another example that might fit this general approach is Renault's electric car, the Twizy. When you buy a Renault Twizy you do not buy the battery. You buy the car, minus the battery, and then hire a battery. (Renault, 2014) This is interesting, because the car is likely to outlive the battery, and would also be a significant part of the cost of the car. Therefore, if you bought the battery along with the car, it would be tempting to simply purchase a new car when the battery failed. If the battery is merely hired, however, you would just ask for a new battery, and carry on hiring.

As Boot, Hare and Ho highlight, however, breakage and new technologies are not the only causes of obsolescence. In relation to aesthetics, designers can clearly make better or worse choices about which materials to use. Some materials age better than others. Some materials only look good when in pristine condition, while other materials develop character as they age. For example, Pentax's MX-1 camera has "brass top and bottom panels that develop a distinctive appearance after years of use". (Ricoh, 2013) This means that the MX-1's "classic looks should become even more pronounced as it ages." (Digital Photography Review, 2013) In this case, however, some may argue that this is an example of poor planning, because, after years of use, the camera is likely to be obsolete.

Also, linked with the aesthetics of different materials, there are also social attitudes. Consider, again, the indoctrination in *Brave New World*,

considered above. Do people value things that are brand new, and look brand new, or do people value things that are older, and have character, displaying signs of their history in their appearance?

Again, we don't have to be conservative here, accepting whatever happens to be the status quo, limiting ourselves to *predicting* that a product will have a short life span, because people dislike things that look old, and therefore designing it with that limited lifespan in mind. As well as using materials that age well, gaining character, we can also aim to change people's attitudes, to persuade them to see the value in older products.

Objections

Clearly, my arguments above are likely to evoke a number of objections, particularly that my suggestions are unrealistic – that we cannot change people's attitudes to that extent, and that ideas for modular products, such as the Phonebloks, will not be economically viable, and will not be able to compete with other, more disposable, products.[vii]

One of the things that Boot, Hare and Ho urged designers to think about was social obsolescence. (Boot et al., 2008, p.253) "Will laws and standards change?" (Boot et al., 2008, p.255) From their point of view, designers need to be *planning* for obsolescence. The world is changing, regulation is being introduced, and attitudes are changing. You don't want to be designing and producing inefficient cars when legislation is introduced that makes these vehicles obsolete. Again, my claim is that this is too conservative. If they believe it is necessary to *predict* social change, it follows that they believe social change is possible. But, if that is the case, why restrict ourselves to *predicting and responding to* social changes?

"But we live in a capitalist society with a free market…"

In *The Ancestor's Tale*, Richard Dawkins talks of the "vanity of the present" and "the conceit of hindsight, the idea that the past works to deliver our particular present". Dawkins writes:

> The late Stephen Jay Gould rightly pointed out that a dominant icon of evolution in popular mythology… is a shambling life of simian ancestors, rising progressively in the wake of the erect, striding, majestic figure of *Homo sapiens sapiens*: man as evolution's last word… (Dawkins, 2005, pp.1-2)

But we are *not* the last word of evolution, as Dawkins emphasises:

> Biological evolution has no privileged line of descent and no designated end. Evolution has reached many millions of interim ends (the number of surviving species at the time of observation), and there is no reason other than vanity – human vanity as it happens, since we are doing the talking – to designate any one as more privileged or climactic than any other. (Dawkins, 2005, p.4)

Also note that he refers to interim ends, and not definite ends. Even if we *do* privilege the line of descent that leads to us, humans, there is no reason to suppose that evolution *ends* with us. The forces of evolution do not simply cease.

When I teach engineering students, I frequently recognise this vanity of the present or the conceit of hindsight when a discussion of ethics leads us to consider issues relating to economics. It seems that, to many, it is very tempting to assume that our current form of capitalism is the end point that our history has brought us to, and that – now – there is nothing that can be done to change it. Frequently, students will object, "But we live in a free market economy", as if that refutes any suggestion that we should be seeking social change.

The "we live in a free market" objection is flawed for two reasons. First, because, actually, we don't. We have a *relatively* free market, but this includes numerous regulations that limit the free market. Writing about market economies after 1945, Pomfret writes:

> Governments recognised that they should not only support freedom to pursue wealth and happiness, but also freedom from poverty, ill health, and ignorance. In this respect the twentieth century was the Age of Equality, even though much inequality remained at the end of the century. (Pomfret, 2011, p.203)

Here, highlighting the significant (and growing) inequality between the richest and the poorest, some may challenge the label, "the Age of Equality." Pomfret acknowledges that "in some of the richest countries incomes were becoming more unequal" (Pomfret, 2011, p.viii) and that there are now "fears that the new rich are skewing future equality of opportunity" (Pomfret, 2011, p.ix) but he explains that "Characterizing the twentieth century as the Age of Equality is intended to capture the main driving force behind long-term economic evolution in the 1900s." (Pomfret, 2011, p.ix) He stresses that "The nineteenth century was a period of rapid economic growth characterized by relatively open markets and more personal liberty, but it also brought great inequality within and between nations", (Harvard University Press, 2011) and it is *in contrast to this* that Pomfret calls the twentieth century the Age of Equality. "The nineteenth century opened with just one economic power, the United Kingdom... Despite two world wars and other traumatic upheavals, the twentieth century ultimately saw the economic benefits spread more widely within the rich countries and across the globe." (Pomfret, 2011, p.2) He also emphasises that the success of market-based economies, in contrast

to fascism and communism, "was achieved not through unbridled capitalism but by *combining* the efficiency and growth potential of markets with government *policies to promote greater equality of opportunity and outcome*." (Harvard University Press, 2011) Pomfret comments that "the extent of the safety net for those at the other end of the wealth distribution in high-income countries" is "in striking contrast to a century earlier" (Pomfret, 2011, p.ix)[viii] and that in post 1945 Europe "the mixed economy and the welfare state became the norm." (Pomfret, 2011, p.99)

Second, whether we live in a free market or not, and whether we have regulations or not, there is no reason to believe this can't change. It is easy to assume that the world has always been like this, and that there is no hope of changing it (especially for those who have neither studied history nor lived through a period of dramatic social and economic change). Pomfret, however, emphasises that the modern capitalist economics that we take for granted are relatively new, and still in the process of being refined.

Just as Dawkins points out that we have not reached the final end of evolution, Pomfret emphasises that our economic systems are still evolving. He writes:

> The need to incorporate public policies to promote equality was universally accepted by governments of the leading market economies after 1945 and was a prerequisite to victory over communism. That victory is not, however, the end of history. Debates about the balance between allocative efficiency and distributional equality remain and evolve…
>
> In the twenty-first century new challenges such as global warming, the threat of piracy, and the right to protection all demand global solutions. War is an increasingly unacceptable method of conflict resolution, especially between major powers. The century must become the Age of Fraternity… and history moves on. (Pomfret, 2011, p.203)

Returning to obsolescence, we should remember that people did not always have the attitudes that modern consumers have now. We had to move towards these values and this consumerism. After all, Brooks Stevens talked about *instilling* the desire to buy something new.

Slade presents an extreme view in the opening line of his *Made to Break*:

> *For no better reason than that a century of advertising has conditioned us* to want more, better, and faster from any consumer good we produce, in 2004 about 315 million working PCs were retired in North America. (Slade, 2006, p.1. My italics)

It would seem that Slade must have chosen to open the book with this line for rhetorical effect, rather than focusing on what could be defended as literally true, because this statement is not only obviously false, but also inconsistent with much of what Slade says elsewhere in his book. Clearly,

there were other factors, such as greater economic wealth, and technological developments. Slade himself comments that "it was the electric starter in automobiles, introduced in 1913, that raised obsolescence to national prominence by rendering all previous cars obsolete." (Slade, 2006, p.4) Clearly, this wasn't an example of advertisers selling a product that people didn't really need or want until advertisers persuaded them they needed it. Rather, people "hated hand-cranking their cars and were greatly relieved when they could simply push a button on a newer model." (Slade, 2006, p.4)

Nevertheless, to go to the other extreme, to suggest that advertisements had nothing to do with this change of attitude, looks equally implausible.

"We can't persuade people to change their minds…"

Some might be sceptical of the ability of advertisers to affect our ideologies, but it is not clear that this scepticism can be defended.

Simons et al. write:

> Advertisements have become so integral to the fabric of our lives that we may believe that we hardly notice them, and therefore, we downplay their ability to influence us. "I never pay attention to ads," is a common claim. But it is difficult, if not impossible, to escape ads, and the billions of dollars spent by advertisers each year suggest that advertisements are doing *something*. Most important, as chapter 3 argued, advertising shapes and reinforces ideologies. Michael Schudson… called advertising's dominant ideology *capitalist realism*. Says Jonathan Dee… capitalist realism's central value is the "fetishism of commodities… [It] amounts to an insistent portrait of the world as a garden of consumption in which any need… can be satisfied by buying the right things"… Even the most "informative" of advertisement reinforces the central ideological conviction that we are what we own. (Simons et al., 2001, p.276)

At this point, cynics might claim that we can shape people's attitudes when this is in relation to encouraging people to buy more consumables, but that changing people's attitudes when this relates to moral attitudes and moral behaviour is quite different. It is not clear, however, that we should take it for granted that encouraging people to consume *more* should be easier than persuading people to buy *less*, or to make ethical choices.

First, buying things costs money, and if Brooks Stevens' plan was to encourage people to buy things they didn't really need, it is not clear that we should take it for granted that we will not be able to *remind* people that they don't need to buy the newest model every year, but can make their products last that bit longer. Saving money is not, in itself, unattractive.

Also, it is not clear that the claim that we won't be able to change people's buying habits by appealing to *ethics* is supported by evidence. Relatively recent history has seen radical changes in relation to moral attitudes, in relation to sexism, homophobia and racism (including the abolition of slavery). Those who point to racial tensions to suggest that little has really changed need to be reminded that it wasn't that long ago that signs stating "no blacks, no dogs, no Irish" were common in London, (BBC news, 2007) or that an MP for a major political party in the UK campaigned with the slogan: "If you want a nigger for a neighbour, vote Labour." (BBC News, 1999)

In *The Political Mind*, George Lakoff considers the battle in America between conservatives and progressives, and argues that one of the reasons that conservatives gain an advantage over progressives is in the way that conservatives, explicitly and forcefully, appeal to their moral values. Progressives, on the other hand, are more likely to shy away from stating their values explicitly. For example, Lakoff writes:

> Neoliberals' focus on Old Enlightnement reason leads them away from stating overtly the moral basis of their proposals, which flow from empathy and responsibility. Instead, they argue from interests – material interests of members of demographic groups... The argument is: It is in our political interest to help others achieve their material interests. If we do that, they'll vote for us…
>
> Their intuitive impetus is the morality of empathy. But the basis of the argument is group interest, not empathy. Why does this matter? Because political thought begins with moral premises, since all political positions are supposed to be correct. To get the public to adopt progressive moral positions you have to activate progressive moral thought in them by openly – and constantly – stressing morality, not just the interests of demographic groups. (Lakoff, 2008, p.53)

The subtitle of Lakoff's book is *Why You Can't Understand 21st Century American Politics with an 18th Century Brain*. This is significant, because this subtitle hints at the reason why he thinks that progressives need to appeal to moral values openly and constantly.

Lakoff claims that progressives are typically committed to an 18th Century Enlightenment view of how the brain works – "namely, that reason is conscious, literal, logical, universal, unemotional, disembodied, and serves self-interest." (Lakoff, 2008, p.2) Lakoff continues "As the cognitive and brain sciences have been showing, this is a false view of reason." (Lakoff, 2008, p.2) He writes:

> We will need to embrace a deep rationality that can take account of, and advantage of, a mind that is largely unconscious, embodied, emotional, empathetic, metaphorical, and only partly universal. A New Enlightenment would not abandon reason, but rather understand that we are using real reason – embodied reason, reason

> shaped by our bodies and brains and interactions with the real world, incorporating emotion, structured by frames and metaphors and images and symbols, with conscious thought shaped by the vast and invisible realm of neural circuitry not accessible to consciousness. And as a guide to our own minds… we will need some help from the cognitive sciences – from neuroscience, neural computation, cognitive linguistics, cognitive and developmental psychology, and so on. (Lakoff, 2008, pp.13-4)

To give a concrete example of an advertising campaign that has had a significant impact on people's attitudes and behaviour, consider PETA's "I'd rather go naked than wear fur" campaign.

PETA claim that "fur industry directories reveal that in 1972 there were 779 established fur garment makers in the United States. 20 years later, in 1992, that number had dwindled to only 211." (PETA, 2008)[ix]

In keeping with Lakoff's claims, the campaign involved an explicitly moral message, stated explicitly and repeated frequently, and it made an impact.

Some might question the extent to which this decline was caused by the PETA campaign. Lindsay Barnett, for example, highlights "A shift to low-cost fashion" and "Technological advancements that have made it possible to create more authentic-looking faux fur" (Barnett, 2010) However, Barnett nevertheless concedes that PETA "has doubtless been instrumental in spreading the word about the downside of fur", and the fact that PETA's campaign didn't cause the decline single handed needn't undermine the relevance here. In designing and marketing products that aim to delay obsolescence and therefore to reduce carbon emissions and waste, economics and the appeal of the products will clearly be relevant factors, but the moral values appealed to in promoting longer lasting products can also play an important role. It doesn't have to be one or the other: better products (to compete with existing products) *or* effective marketing (with a moral message). An effective approach is likely to require both.

For those still skeptical of the power of advertising, consider the evidence from the empirical study of psychology. John T. Cacioppo, Richard E. Petty and Stephen L. Crites, Jr. state that:

> …one of the more surprising findings in the area of attitude change is that repeated, unreinforced exposures to a novel or unfamiliar stimulus result in a positive attitude toward the stimulus. That is, repeated exposure to a novel stimulus that results in neither reward nor punishment breeds preference for this stimulus over a similar stimulus to which an individual has not been exposed. This *mere exposure* effect has been demonstrated using stimuli as diverse as nonsense words, ideographs, polygons, and faces… (Cacioppo et al., 1994, p.262)

We can recognize the significance of this when we consider that:

> Advertising is one of the most prevalent forms of persuasion in contemporary American society, and, indeed, around the world… Most Americans are exposed to 3,000 commercial messages a day, and American children and teenagers sit through about 3 hours of television commercials a week…
>
> Advertisements even pervade media perceived to be commercial-free. Companies pay filmmakers exorbitant fees to have characters use their products… Companies sponsor concerts in exchange for the prominent display of product logos… Even the clothes we wear sport labels that advertise for designers or manufacturers such as Nike or Reebok. (Simons et al., 2001, pp.275-6)

The ideas considered above, from Lakoff, Simons and Cacioppo, Petty and Crites, Jr., and the example of PETA, suggest that we need to make products available that are designed to be used longer, or to be upgraded rather than disposed of, and that we need to advertise them, while also highlighting the moral imperative that motivated the design of these products in the first place.

Cacioppo, Petty and Crites, Jr. also refer to research demonstrating how a range of variables can "alter attitude ratings even though the underlying attitude may be unaffected." (Cacioppo et al., 1994, p.263) They write:

> In an illustrative study, college students read a case about a Mr. R. K. who had been found guilty of threatening to bomb a hospital. Students were then asked to rate themselves in terms of their sentencing disposition on a stern-leniency scale, and they wrote a paragraph justifying this rating. The stern-leniency rating was taken as an indicant of the students' attitude rating, and the justifying paragraph was used to commit the student to this rating. Next, students received the perspective manipulation. Half of them learned that the maximally lenient punishment allowable for this crime was 1 year and the maximally stern punishment was 5 years (narrow perspective); the other half of the subjects were told that the maximally lenient punishment was 1 year but that the maximally stern punishment was 30 years (wide perspective). Afterward, the students were asked how many years they felt Mr. R. K. should be imprisoned for his crime. As expected, the students exposed to the narrow perspective advocated fewer years of imprisonment than subjects exposed to the wide perspective, even though both groups would still describe their attitude positions the same. (Cacioppo et al., 1994, p.263)

If this can be generalised, this too could be significant in relation to product design and the environment. For example, if I consider myself to be someone who cares about the environment, and I have a choice of cars that do between 25mpg[x] and 65mpg I may make a different choice than if my choice is between cars ranging from 25mpg and 100mpg.[xi] Or, to consider the point in relation to obsolescence, environmentally conscious people may keep their phones longer if, rather than having the option framed in terms of whether

they keep a phone for 6 months or for 2 years, the option is framed in terms of a range of choices between keeping the phone for 6 months or for 5 years or more.

Finally, Cacioppo, Petty and Crites, Jr. also highlight another way in which attitudes can be changed, which is so obvious we might think that we don't need empirical research to prove it. They write:

> In Bill McGuire's probabilogical model of attitude change, for instance, attitude-relevant beliefs are represented in terms of syllogisms, and attitude change is predicted to occur as a mathematical function of changes in these beliefs. Consider the following attitude syllogism:
>
> First premise: Reading *Time* magazine keeps one informed.
>
> Second premise: A magazine that keeps one informed is valuable.
>
> Conclusion: *Time* magazine is valuable.
>
> Research on this model indicates that attitude change varies as a function of both logical consistency and hedonic consistency (wishful thinking). Logical consistency is demonstrated, for instance, as when the conclusion is more likely to be accepted the more likely is the first or second premise to be true. Hedonic consistency, on the other hand, refers to the tendency for individuals to see things as consistent with their personal desires or wished. They might therefore tend to see conclusions and premises as more likely the more desirable they are, even if this goes against pure logic. Thus, changes in the probability that an underlying belief is true also produce changes in a person's attitude, but these changes are biased by wishful thinking… (Cacioppo et al., 1994, pp.264-5)

Clearly, the wishful thinking is a challenge here, in that people hope that they can buy whatever they want, and that this won't have any bad consequences for the environment. On the other hand, this research does support what many of us would hope was a given – that people do want to be logically consistent. Therefore, if people believe that making choices that are good for the environment is valuable, and if they recognize that, for example, buying a Phonebloks phone, and keeping it for 5 years, is an example of a choice that is good for the environment, this is likely to lead to the conclusion that, buying a Phonebloks phone, and keeping it for 5 years, is valuable. Of course, this fact alone may not be sufficient to motivate people to *buy* the phone. While they see the value in that choice, it may still be the case that, from a personal point of view, they might value the latest iPhone more. Nevertheless, this evidence, along with Lakoff and PETA, provide some reason to hope that an appeal to moral values can have some impact.

Finally, consider another example of people being morally motivated, which has particular relevance to obsolescence, waste and climate change: rationing in World War 2. Mark Roodhouse writes:

> Reflecting upon three years as Minister of Food, Lord Woolton believed that 'the success of any rationing scheme depends, in the long run, on two things; the first is its justice and impartiality, and secondly - and perhaps the more important factor - on the general public acceptance of the correctness of its purpose and the fairness of its administration'. (Roodhouse, 2007)

Of course, this example could be seen as a negative as well as a positive: while rationing was successful and accepted by the public, people did not simply reduce their consumption, voluntarily. Regulations had to be introduced and those who evaded them were punished. Nevertheless, the point is that, where the purpose was understood and the regulation was considered fair, the public were willing to accept the regulations. This point also brings me to the final section of this paper.

Leadership, Beyond Listening and Informing

In this section, I address two significant challenges, both of which require (I will argue) a similar strategy in response.

First, some of the examples discussed above, demonstrating the ability to persuade people to change their behaviour by appealing to ethics, required the help of regulations. This is most obviously the case with the example of rationing, but is also true of the change of attitudes relating to sexism, racism and homophobia.

Second, I have acknowledged that I do not know whether ideas such as Phonebloks, or other modular products, or products that follow Rolls-Royce's example of focusing on the service provided, will be economically viable and able to compete with existing products. Presumably, this would have to be considered on a case by case basis, and some will be and some won't be. I will assume, however, that at least many otherwise good ideas and designs will not be economically viable – or, at least, will not be economically viable in the current market, as things are.

Both of these points bring me to the issue of this section – designers' and engineers' involvement in politics and public engagement.

Regarding the issue of whether a particular product is economically viable, some of these ideas may need the support of legislation or political change (such as a change in costs, shifting costs from labour to resources, for example) before the new ideas are able to compete with existing products.

My claim, which I will defend in this section, is that designers and engineers, and the engineering profession, should not shy away from getting actively

involved in these issues, and not merely as advisors, but more actively, *requesting* or campaigning for changes.

For example, engineers should not shy away from emphasising that they have developed a technology that could significantly increase efficiency or reduce waste, but explain that, as things stand, this technology can't compete with existing technologies. Rather, engineers should emphasise that there needs to be a change to the playing field if the new technologies are going to be able to compete.

In the UK, the Royal Academy of Engineering and the Engineering Council published a *Statement of Ethical Principles* which they believe "all professional engineers and related bodies should subscribe." (Engineering Council and Royal Academy of Engineering, n.d.) These principles are categorised into "four fundamental principles that should guide an engineer in achieving the high ideals of professional life." (Engineering Council and Royal Academy of Engineering, n.d.) The third of these is "Respect for Life, Law and the Public Good" and includes the imperative to "minimise and justify any adverse effect on society or on the natural environment for their own and succeeding generations", and "take due account of the limited availability of natural and human resources." (Engineering Council and Royal Academy of Engineering, n.d.) In addition, the fourth of these principles is, "Responsible leadership: Listening and Informing". This states that:

> Professional Engineers should aspire to high standards of leadership in the exploitation and management of technology. They hold a privileged and trusted position in society, and are expected to demonstrate that they are seeking to serve wider society and to be sensitive to public concerns. They should:
>
> - be aware of issues that engineering and technology raise for society, and listen to the aspirations and concerns of others.
> - actively promote public awareness and understanding of the impact of benefits of engineering achievements.
> - be objective and truthful in any statement made in their professional capacity. (Engineering Council and Royal Academy of Engineering, n.d.)

My argument is that, given the (supposed) fact that many of the technological solutions that could help us to reduce waste and to increase efficiency require government support, in the form of new regulation or different incentives, the third and fourth of these ethical principles need to be taken together. Without the fourth principle, engineers are likely – often – to feel powerless in relation to the third principle, which includes environmental concerns: "I designed an electric car that increased efficiency significantly, but no one bought it."

In addition, I would urge the engineering profession to be more proactive, and not limit themselves to listening and informing. This may have more to do with connotation than a significant disagreement, but "listening and informing" can sound a little passive, suggesting that engineers should give people information when asked. I am happier with "actively promote public awareness", but I think even this doesn't put emphasis on what may be needed, which is for engineers to stir things up, to emphasise that – even if engineers do come up with technological innovations that help to reduce waste and increase efficiency – we will probably also need social and legal changes to make these innovations effective.

One of the most well known definitions of sustainable development, from the UN, states that:

> sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (United Nations, 1987)

Even if we accept this definition of sustainable development, however, there is significant scope for varying interpretations, depending on how we interpret the "needs of the present" and the needs of future generations.

Defining a need, and distinguishing needs from mere desires, is notoriously difficult. For example, while responding to David Barybrooke's *Meeting Needs*, Gillian Brock comments that some may worry that "it is impossible to distinguish adequately between real needs and mere pretenders." (Brock, 1994, p.811)

I will not address these philosophical difficulties in detail here. For my purposes, much broader strokes will suffice, and I will focus on two extremes, which I will refer to as a conservative interpretation and a radical interpretation.

Soran Reader and Gillian Brock make a distinction between contingent needs and non-contingent needs. They state that,

> It is part of the grammar of the word, that it makes sense to ask, 'what for?' about any need. The answer gives the end for which the need is a necessary condition. For example: 'I need 20p' 'What for?' 'I can't make a phone call without it.' 'I need water.' 'What for?' 'I can't live without it.' (Reader & Brock, 2004, p.252)

Essentially, for Reader and Brock, "Contingent needs are requirements for contingent ends", while, non-contingent needs "are necessary conditions for non-contingent aims" such as staying alive. (Reader & Brock, 2004, p.252)

Even then though, there is some debate about what counts as a non-contingent need. They write: "Needs-theorists offer various concepts as candidate non-contingent ends, for example agency, life, flourishing or avoidance of harm." (Reader & Brock, 2004, p.252)

According to what I call the conservative interpretation of the UN's account of sustainable development, needs are interpreted as contingent needs, based on our current lifestyles. I need a car to get to work, because I live 20 miles from my office, or I need a car to get to my jiu jitsu club. I need a new computer, because my old one is too old to play the latest computer games. I need a new phone because I can't read ebooks on my current phone.

For many, this is the natural interpretation. It is also an approach that is naturally associated with a technological solution to the problem of climate change, rather than a social solution. That is, on this approach, it is natural to think of the problem of climate change in terms of engineers finding innovative solutions that allow us to maintain our current lifestyles, while still being able reduce CO_2e emissions.[xii] On the face of it (though I will challenge this below), this interpretation is implied in the title of two influential books addressing efficiency and limited resources: *Factor Four: Doubling Wealth, Halving Resource Use* (Weizsäcker et al., 1998) and *Factor Five: Transforming the Global Economy through 80% Improvements in Resource Productivity*. (Weizsäcker et al., 2009) I don't say this to criticise these books. Clearly, if this approach could allow us to maintain something very similar to our current quality of life, with little or no sacrifice, while still reducing CO_2e emissions sufficiently, this would clearly be desirable.

In contrast though, the radical interpretation focuses on what we *really* need, interpreting this in terms of non-contingent needs, making a distinction between subsistence and luxury. On this interpretation, it is hard to resist the conclusion that a person doesn't *need* to live in a big house in the country, 20 miles away from the office, and they don't *need* a car or a new phone.

Incidentally, the UN report seems to have something closer to the radical interpretation in mind, emphasising "the essential needs of the world's poor" such as "food, clothing, shelter, jobs". Also, acknowledging the need for social solutions, it states that "*Perceived* needs are socially and culturally determined, and sustainable development requires the *promotion of values* that encourage consumption standards that are within the bounds of the ecologically possible and to which all can reasonably aspire" (United Nations, 1987).[xiii]

On the radical interpretation, sustainable development is less likely to be focused on finding ways in which we could sustain our current way of life. Rather, on this view, the aim would be to aim for a *new* way of life and a new society, which was sustainable in the sense of meeting the (non-contingent) needs of the present[xiv] and of future generations.

In contrast to the conservative interpretation, the radical interpretation is more likely to suggest social solutions rather than technological solutions. Rather than wondering how much more efficient we can make privately owned cars, we are more likely to ask whether we can justify the

environmental cost of having a transport system based largely around the use of cars, as opposed to building a transport system around forms of public transport. We are more likely to ask whether we *need* to fly to Australia for a holiday. And, on the radical interpretation, the answer will often be, no.

It is natural to see ethical issues relating to waste, obsolescence and climate change in terms of a choice between technological solutions and social solutions. To a large extent, this is an empirical question about what level of change is required, and how much of that change can be achieved through technological developments.

To a large extent, however, in this section I will ignore this debate and focus instead on emphasising the ways in which the two interlink and support each other. Above, I gave *Factor Four* and *Factor Five* as examples that – on the face of it – seem to suggest a focus primarily on technological solutions, finding more efficient technologies to allow us to maintain our way of life.

On closer, inspection, however, these books consider social and legal considerations alongside the engineering innovations. For example, they include chapters on regulation, incentives and tax reforms, and *Factor Five* emphasises that "we want to present practical pictures of whole systems of technologies, infrastructures, *legal rules*, education and *cultural habits* interacting to produce economic progress while conserving a healthy environment." (Weizsäcker et al., 2009, p.3. My italics.)

They continue:

> Relating to capitalism and regulation, we repeat and support my understanding from some 20 years ago that 'communism collapsed because it was not allowing prices to tell the economic truth, and that capitalism may collapse if it does not allow prices to tell the ecological truth'. Markets are superb at steering an efficient allocation of resources and stimulating innovation, but they don't provide public order and law, moral standards, basic education and infrastructures, and markets are miserably inefficient, often even counterproductive, when it comes to protecting the commons and steering innovation in a long-term sustainable direction. (Weizsäcker et al., 2009, p.3)

This is all presented most simply – and most bluntly – when Ernst von Weizsacker writes: "Many of the suggestions in this book are not politically feasible in a market that leaves almost no role for the state." (Weizsäcker et al., 2009, p.3)

Ultimately, even if we opt for technological solutions, finding more efficient technologies allowing us to maintain our lifestyles (broadly) while still reducing waste and CO_2e emissions, it is still very likely that people will not give up the old, trusted technologies in favour of the more sustainable technologies, unless there is a significant change in people's motivations

(such that they are willing to change their habits and/or pay more in order to buy something that is less wasteful and more efficient) or there are additional incentives or disincentives, or – more radically – choices are restricted by regulations.

Ultimately, we will often need legislation. We will need different incentives, or a change in costs. For example, some argue that we need to change costs, making labour cheaper, and making the use of resources more expensive – which would help to encourage a move towards more labour-intensive/service-based approaches, similar to Rolls-Royce's "power by the hour". For example, in *Factor Five: Transforming the Global Economy through 80% Improvements in Resource Productivity*, von Weizsäcker, Hargroves, Smith, Desha, and Stasinopoulos write:

> Overall, *labour productivity* has increased twentyfold over those last 200 years...
>
> Today, labour is not in short supply. Otherwise the International Labour Organisation (ILO) would not speak of a shortfall of 800 million jobs to create a situation of near full employment. On the other hand, as we have indicated before, energy and other natural resources are in short supply, and the scarcity is getting worse every decade... *Resource productivity* should become the main feature of technological progress in our days. Countries making the scarce production factors more productive should enjoy major economic advantages over those ignoring these new scarcities. (Weizsäcker et al., 2009, pp.15-6. My italics.)

Similarly, Tim Jackson writes:

> New taxes on resource use or carbon would be offset through reductions in taxes on labour. This argument has been elaborated over at least a decade and has been implemented in varying degrees across Europe. But progress towards a meaningful ecological tax reform remains painfully slow. (Jackson, 2011, p.174)

In this sense, it is not a case of technological solutions versus social solutions. Rather, it is better represented as:

Technological + social = solution

In contrast to this, if we concentrate on technology and engineering, neglecting the social and the legal, we may end up with the most frustrating of possible outcomes, where engineers and designers develop the innovative technologies that could allow us to cut our CO_2e emissions significantly, but they remain unused. In short:

Technological solution alone = unused technology

This is why the fourth principle in the *Statement of Ethical Principles* is so important, and why the heading of "Listening and Informing" shouldn't be

understood in passive terms of informing when asked, but needs to be interpreted much more as a call to arms (metaphorically, of course) – to promote technologies, to campaign for the legislation necessary 1) to support the technologies that we have and 2) to incentivise the innovation necessary to develop new technologies.

Writing in the Royal Academy of Engineering's *Engineering Ethics in Practice: a guide for engineers*, I emphasised the fact that the medical profession has "been involved in debates about the ethics of abortion, or of stem cell research" and stressed that "This has typically gone beyond just giving medical advice, and has included ethical analysis, arguing for or against particular views." (Royal Academy of Engineering, 2011, p.27) I also emphasised that "something would be lost if the medical profession... was not involved in public debate and had no part to play in forming public policy. Indeed it may be thought that the medical profession fails if it does not engage in this way." (Royal Academy of Engineering, 2011, p.24)

Similarly, it is important that the engineering profession does not perceive its leadership role as being one that is focused merely on informing the public and politicians about the technical details. Rather, I suggest that the profession ought to recognise that engineers have a perspective that goes beyond their technical understanding. Medics, for example, don't only have knowledge of medical treatments and procedures. They also have experience of seeing the impacts on their patients, not only of treatments, but also of public policy, such as cuts in funding. Likewise, engineers have professional experience that goes beyond the technical details and an understanding of different materials or processes, but also includes insight into the social impact of different designs. Engineers also have experience of the frustrations involved when a valuable project fails to get support because it is not seen to be economically viable, or because it goes against what consumers expect from a particular product.

Of course, realistically, these considerations are likely to be addressed more effectively at the level of the professions (or of large corporations) rather than at the level of individuals. Having said that, professions are made up of individuals. Therefore, as individuals, some of us (at least) need to engage with these issues, and to encourage the professional bodies etc. to engage with these issues.

Back to Obsolescence

Consider the Phonebloks phone, or a personal computer designed using the same principles. Or imagine a camera that is well constructed, using materials that will age well, and designed in such a way that the sensor can

be removed and replaced as easily as the memory card so that photographers can upgrade sensors without replacing the entire camera. Plausibly, designs like this could have a significant impact on delaying obsolescence. However, I have conceded that I do not know whether these ideas would be economically viable. If they wouldn't be, as things are at the moment, then we would need to see some sort of change. We would need consumers who are willing to pay a bit more for something that is better for the environment (reducing waste and CO_2e emissions), and/or we need changes in legislation that change the playing field, by changing the costs involved in using more resources, such that new, environmentally friendly designs, like these, become economically viable.

As I have argued, innovating in design and engineering, and creating new technologies, may all be wasted if social change is also required, but isn't forthcoming. Therefore, I have argued that the moral imperative to consider impacts on the environment may have little impact unless it is reinforced by a commitment to leadership, considering how the technologies will be used (or not) in society, and how they can be promoted, either directly, by thinking more about the possible marketing of the products, or indirectly, by being actively involved in public debate, campaigning for social and legal change (and not being afraid to think in terms of *campaigning* rather than merely *informing*).

For this reason, the education of our future engineers needs to focus on more than just the technical aspects of engineering. I am not suggesting that they need to have a thorough understanding of history, but they should have enough of a historical perspective to recognise that the legal and economic world has not always been as it is. They need to appreciate that there is no reason to assume that economics cannot continue to evolve in order to meet new challenges. Similarly, a student's education should inform them of the role that professional institutions play in public engagement and policy, helping them to recognise the potential for the profession to develop this work in the future.

Conclusion

This paper started by responding to arguments suggesting that the most important response to concerns about obsolescence was one that focused on *planning* for obsolescence, which was characterised as being inevitable. In response, I argued that focusing on the fact that obsolescence is inevitable distracts from the fact that changing *when* something becomes obsolete can have a significant impact in terms of reducing waste. Therefore, I criticised the conservatism of these views, suggesting that we shouldn't merely be *planning* for obsolescence. We should also be working to *delay* obsolescence.

In response to objections that I anticipate, suggesting that my views are unrealistic, overly optimistic or not economically viable, I appealed to evidence from a range of disciplines, including psychology, cognitive linguistics, marketing and economic history in order to provide evidence that change is possible. However, I did concede that this change may not come easily, and I also conceded that, in many cases, solutions may not be available at the individual level. An individual's innovation in design may fail to have a social impact if it is not economically viable, or if its implementation would require social change. In these cases, I argued that there needs to be social (and possibly legal) change as well as technological innovation, and I argued that engineers and designers should not consider these social and legal issues to be considerations for others, rather than for them. Realistically, however, these considerations should be considered, primarily, at the level of the professions (or large corporations) rather than at the level of individuals.

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Bibliography

Barnett, L., 2010. *Los Angeles Times: Just How Responsible is PETA for a Decline in Fur Sales*. [Online] Available at: http://latimesblogs.latimes.com/unleashed/2010/03/just-how-responsible-is-peta-for-a-decline-in-fur-sales.html [Accessed 25 November 2013].

BBC News, 1999. *Looking Back at Race Relations*. [Online] Available at: http://news.bbc.co.uk/1/hi/482565.stm [Accessed 25 November 2013].

BBC news, 2007. *Was Britain Better in the 50s*. [Online] Available at: http://news.bbc.co.uk/1/hi/magazine/6681337.stm [Accessed 3 March 2014].

Berners-Lee, M., 2010. *How Bad are Bananas? The Carbon Footprint of Everything*. London: Profile Books.

Blackburn, S., 2008. *Oxford Dictionary of Philosophy*. Oxford University Press.

Boot, P., Hare, A. & Ho, R., 2008. Up-front thinking for the optimization of product life. In Burns, B. *EcoSuss*. Carleton University Press.

Brock, G., 1994. Braybocke on Needs. *Ethics*, 104(4).

Burns, B., 2008. Re-evaluating Obsolescence and Planning for it. In T. Cooper, ed. *Longer Lasting Solutions*. Aldershot, UK, Gower.

Cacioppo, J.T., Petty, R.E. & Crites, S.L., 1994. Attitude Change. In V.S. Ramachandran, ed. *Encyclopedia of Human Behavior*. San Diego: Academic Press.

Coyle, D., 2011. *The Economics of Enough: How to Run the Economy as if the Future Matters*. Princeton: Princeton University Press.

Dawkins, R., 2005. *The Ancestor's Tale: A Pilgrimage to the Dawn of Life*. London: Phoenix.

Dictionary.com, n.d. *Obsolete*. [Online] Available at: http://dictionary.reference.com/browse/obsolete [Accessed 28 February 2014].

Digital Photography Review, 2013. *Just Posted: Pentax MX-1 hands-on preview*. [Online] Available at: http://www.dpreview.com/news/2013/01/07/Pentax-Mx-1-hands-0n-preview-just-published [Accessed 23 November 2013].

Engineering Council and Royal Academy of Engineering, n.d. *Statement of Ethical Principles*. [Online] Available at: http://www.engc.org.uk/ecukdocuments/internet/document%20library/Statement%20of%20Ethical%20Principles.pdf [Accessed 26 November 2013].

Fuel-economy.co.uk, 2013. *What is my car's MPG*. [Online] Available at: http://www.fuel-economy.co.uk/mpg.php [Accessed 25 November 2103].

Goldacre, B., 2009. *Bad Science*. London: Harper Perennial.

Harvard University Press, 2011. *The Age of Equality: About This Book*. [Online] Available at: http://www.hup.harvard.edu/catalog.php?isbn=9780674062177 [Accessed 26 November 2013].

Heinberg, R., 2011. *The End of Growth: Adapting to Our New Economic Reality*. Clairview Books.

Jackson, T., 2011. *Prosperity without Growth: Economics for a Finite Planet*. Routledge.

Kameka, A., 2013. *Sprint One Up plan now official - upgrade every year and get a discount in the process*. [Online] Available at: http://www.mobileburn.com/22035/news/sprint-one-up-plan-now-official--upgrade-every-year-and-get-a-discount-in-the-process [Accessed 23 November 2013].

Lakoff, G., 2008. *The Political Mind: Why You Can't Understand 21st Century Politics with an 18th Century Brain*. New York: Viking Books.

Naughton, J., 2013. *Aldous Huxley: the prophet of our brave new digital dystopia*. [Online] Available at: http://www.theguardian.com/commentisfree/2013/nov/22/aldous-huxley-prophet-dystopia-cs-lewis [Accessed 22 November 2013].

Oxford Dictionaries, n.d. *Planned obsolescence*. [Online] Available at: http://www.oxforddictionaries.com/definition/english/planned-obsolescence [Accessed 22 November 2013].

Pentax Forums, 2010. *Pentax K-5 Camera Review: Pentax K-7 vs K-5*. [Online] Available at: http://www.pentaxforums.com/reviews/pentax-k5/pentax-k-7-vs-k-5.html [Accessed 28th November 2013].

PETA, 2008. *YouTube: I'd Rather Go Naked Than Wear Fur*. [Online] Available at: https://www.youtube.com/watch?v=xD6P3lSJXjk [Accessed 2 April 2014].

PhoneBloks, 2013. *Our Goals*. [Online] Available at: https://phonebloks.com/en/goals [Accessed 23rd November 2013].

Pomfret, R., 2011. *The Age of Equality: The Twentieth Century in Economic Perspective*. Harvard University Press.

Reader, S. & Brock, G., 2004. Needs, Moral Demands and Moral Theory. *Utilitas*, 16(3), p.252.

Renault, 2014. *Renault Twizy: Z.E. battery*. [Online] Available at: http://www.renault.co.uk/cars/electric-vehicles/twizy/twizy/zebattery/ [Accessed 2 April 2014].

Ricoh, 2013. *Pentax MX-1 - description*. [Online] Available at: http://www.ricoh-imaging.co.uk/en/digital-compact/mx1.html [Accessed 29 November 2013].

Roodhouse, M., 2007. *Rationing Returns: a Solution to Global Warming?* [Online] Available at: http://www.historyandpolicy.org/papers/policy-paper-54.html#winning [Accessed 25 November 2014].

Royal Academy of Engineering, 2011. *Engineering Ethics in Practice: A Guide for Engineers*. [Online] Available at: http://www.raeng.org.uk/societygov/engineeringethics/pdf/engineering_ethics_in_practice_short.pdf [Accessed 27 November 2013].

Simons, H.W., Morreale, J. & Gronbeck, B., 2001. *Persuasion in Society*. Thousand Oaks, California: Sage.

Slade, G., 2006. *Made to Break: Technology and Obsolescence in America*. Cambridge, Mass.: Harvard University Press.

Smith, K., 2013. *T-Mobile Will Now Let You Upgrade Your Phone Whenever You Want*. [Online] Available at: http://www.businessinsider.com/t-mobile-announces-new-upgrade-plan-2013-7 [Accessed 23 November 2013].

The Economist, 2011. *Rolls Royce Per Ardua*. [Online] Available at: http://www.economist.com/node/18073351 [Accessed 23rd November 2013].

Tofel, K.C., 2013. *T-Mobile's un-carrier strategies help add 1M customers in the third quarter*. [Online] Available at: http://gigaom.com/2013/11/05/t-mos-un-carrier-strategies-help-add-1m-customers-in-the-third-quarter/ [Accessed 23 November 2013].

United Nations, 1987. *UN Documents: Our Common Future, Chapter 2: Towards Sustainable Development*. [Online] Available at: http://www.un-documents.net/ocf-02.htm#I [Accessed 26 November 2013].

Weizsäcker, E.v. et al., 2009. *Factor Five: Transforming the Global Economy through 80% Improvements in Resource Productivity*. London: Earthscan.

Weizsäcker, E.v., Lovins, A.B. & Lovins, L.H., 1998. *Factor Four: Doubling Wealth, Halving Resource Use*. London: Earthscan.

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[i] See, for example, (Dictionary.com, n.d.).
[ii] Carbon dioxide *equivalent* emissions.
[iii] My italics
[iv] See, for example, (Smith, 2013), (Tofel, 2013) and (Kameka, 2013).
[v] Selective serotonin reuptake inhibitors, usually used to treat depression.
[vi] Single lens reflex.
[vii] Others may raise concerns about the economics, but not at the level of individual companies or individual products, but on a larger scale, worrying that my suggestions would be detrimental to the economy. I cannot address this in detail here, but will make two comments here. First, my approach needn't be in opposition to economic growth, but may instead focus more on a service economy (discussed in more detail in the following). Second, even if there is a conflict here, it is not clear that we should assume that economic growth must win over environmental concerns. See, for example, (Jackson, 2011) and (Heinberg, 2011).
[viii] Also see the various discussions of the "welfare state" and a "safety net" throughout.
[ix] From 1 minute 20 seconds.
[x] Miles per gallon, or equivalent if we are including electric cars as well.

[xi] The 25 mpg and 65mpg figures are based – roughly – on a Porsche 911 and a Toyota Prius (Fuel-economy.co.uk, 2013).
[xii] Carbon dioxide *equivalent* emissions.
[xiii] Paragraphs 1, 4 and 5 (my italics), and also 39, 43, 46, and 47.
[xiv] And many would also point out that this is something that we are failing to do, already, because the needs of the present clearly isn't meant to refer only to the needs of the present in the UK or USA and other wealthy countries.