1.

The first thing to understand about the "Internet of Things" is that it's not about Things on the Internet. It's a code term that powerful stakeholders have settled on for their own purposes.

They like the slogan "Internet of Things" because it sounds peaceable and progressive. It disguises the epic struggle over power, money and influence that is about to ensue. There is genuine internet technology involved in the "Internet of Things". However, the legacy internet of yesterday is a shrinking part of what is at stake now.

Digital commerce and governance is moving, as fast and hard as it possibly can, into a full-spectrum dominance over whatever used to be analogue. In practice, the Internet of Things means an epic transformation: all-purpose electronic automation through digital surveillance by wireless broadband. In this essay I'll describe how this is likely to work, and what the major players think they are doing to get there.

To begin, though, I must first free the reader from any folk ideas about the Internet of Things.

So, let's imagine that the reader has a smartphone in one hand, as most people in the Twenty-Teens most definitely tend to. In the other hand, the reader has some "thing". Let's say it's the handle of his old-fashioned domestic vacuum cleaner, which is a relic of yesterday's standard consumer economy.

As he cheerfully vacuums his home carpet while also checking his Facebook prompts, because the chore of vacuuming is really boring, the reader naturally thinks: "Why are these two objects in my two hands living in such separate worlds? In my left hand I have my wonderfully advanced phone with Facebook – that's the "internet".

But in my right hand I have this noisy, old-fashioned, ineffective, analogue "thing"! For my own convenience as a customer and consumer, why can't the "internet" and this "thing" be combined?

This concept sounds pretty visionary, and it's certainly enough to impress most people born during the Baby Boom, so this paradigm has been doing well in the popular press. If the reader thinks it over, he can easily refine the basic idea. "This vacuum should be equipped with wireless connectivity and sensors! Also, as its owner, I should have a mobile app or dashboard that can tell me many useful and healthy things about my vacuum – such as how much energy it is using, or how many toxins it found in my carpet. Also, the vacuum should run around in robot fashion, all by itself!"

That's the standard Internet of Things scenario. It's framed in the traditional language of consumer electronics. People often mock it, because they don't like so much unnecessary technical complication in their daily lives. It seems baroque, maybe even fraudulent.

That's not what's going to happen.

The real problem with this scenario is that the reader thinks he's the hero of the story. To the vacuum company, he was the "customer" or "consumer". In the legacy internet days, he was the "user". In the Internet of Things, he lacks those privileged positions, "user" and "customer". An Internet of Things is not a consumer society. It's a materialised network society. It's like a Google or Facebook writ large on the landscape.

Google and Facebook don't have "users" or "customers". Instead, they have participants under machine surveillance, whose activities are algorithmically combined within Big Data silos. They don't need the reader to be the hero. He's not some rational, autonomous, economic actor who decides to encourage the Internet of Things with his purchasing dollars. They're much better off when those decisions are not his to make.

The reader may be allowed to choose the casing of his smartphone and the brand of his vacuum cleaner, but the digital relation between the two of them is not his decision. He still has a role of sorts, but it's much like the role he has within Google and Facebook. He gets fantastic services free of charge, and he responds mostly with dropdown menus and checkboxes, while generating data whose uses and values are invisible to him.

The reader didn't build the phone or the vacuum cleaner. He can't repair or modify them. He doesn't understand their technical workings, and when the two of them interact (by various adroit forms of wireless communication), he's not in charge of that, or of where the data goes. The Internet of Things is not a capitalist marketplace. It's a new platform for radically broadening digital activity. At the moment, it's actually many balkanised intranets for digital activity, but it's called "internet" by the power players, because they aspire to that catholic universality.

The reader is not a "customer" of Facebook because he never paid for Facebook. Facebook's genuine customers are the marketers – those who pay Facebook for the hard labour of surveilling the billion people on Facebook. Facebook is one of the "Big Five" of Facebook, Amazon, Google, Microsoft and Apple.

None of them are conventional corporations as corporations used to be known. The Big Five all have important central features that previous companies never possessed: an operating system, some dedicated way to sell cultural material (music, movies, books, software), tools for productivity, an advertising business, some means of accessing the internet that they themselves more or less control (tablets, smartphones, phablets), a search engine capability, a social network, a "payment solution" or some similar private bank, a

"cloud" capability and, very soon, some dedicated, elite high-speed access that used to be the democratic internet.

The Big Five are the genuine heroes of the Internet of Things. The epic drama of the Internet of Things is really their story. It's not a popular uprising – except in the sense that the Big Five are really, really "popular" – because billions of people are willingly involved in their systems. The Internet of Things is basically a recognition by other power-players that the methods of the Big Five have won, and that they should be emulated.

The Big Five are smart, profitable, capable and colossal. They are as entirely free of political constraint as the railroads or Standard Oil were in their own heyday. They sense that they can dominate because the enterprises that already dominate are much worse than they are.

Lesser enterprises, and governments as well, have grown bitter and tired of being bossed around by oil companies and bankers in a jobless, terror-riddled World Depression. They see the Internet of Things as a way to break the stasis, attract new investment, and flood the world with yet another tidal wave of cheap, connected silicon. They're willing to go for this prospect because they don't see anything else happening. Certainly nothing else with hundreds of billions in potential new wealth, that is.

The standard IoT pitch – about the reader's smart, chatty refrigerator – is a fairy tale. It's like the promise of a talking chicken in every pot. Politically speaking, the relationship of the reader to the Internet of Things is not democratic. It's not even capitalistic. It's a new thing. It's digital-feudalism. People in the Internet of Things are like the woolly livestock of a feudal demesne, grazing under the watchful eye of barons in their hilltop Cloud Castles. The peasants never vote for the lords of the Cloud Castles. But they do find them attractive and glamorous. They respect them. They feel a

genuine fealty to them. They can't get along in life without them.

This is not what people expected from "the internet" back when it was a raw, anarchic, electronic frontier. But that was then, this is now. The internet has seen a full generation's worth of political, economic and social development. The feudal lords of popular mass computation, Microsoft, Apple, Google, Amazon and Facebook, are colossal enterprises today. They can dominate by virtue of their sheer bulk. They are global, gargantuan entities with the power and the revenue to dwarf most national governments.

Much the same goes for their lesser-known feudal dukes and earls, such as Intel, Cisco, IBM, Samsung – and even their historical enemies, AT&T, Verizon, Comcast, Nokia – as well as the entirety of the Japanese electronics business.

What's new about this entity called the "Internet of Things" is the demonstrated willingness of entirely alien enterprises to recognise the supremacy of this new power, and swear fealty to it. It's not much like the scientific, military, anti-commercial "internet" was. Instead, it's much like a Holy Roman Empire. It's full of obscure but powerful leagues and consortia, and baronies and dukedoms, and even some Free Cities. It's about entities like General Electric, which has joined AT&T, Cisco, IBM and Intel in the all-American "Industrial Internet Consortium". It means the Europeanised "Smart Cities Council" of Mastercard, Bechtel, Alstom, Enel and Qualcomm, an alliance of actors who might seem completely alien to one another, but who suddenly see the chance to conquer whole towns.

These grand, world-scale alliances did not form in order to sell the reader a smart refrigerator. Most of them would really like the reader to dwell in a "Smart City" where they supply the "smartness" on their own terms – and they're not much concerned about the reader's consent as a citizen.

The Internet of Things is not about a talking refrigerator, because that is the old-fashioned consumer retail world of electrical white goods. It's an archaic concept, like software bought in a plastic-wrapped box from a shelf. The genuine Internet of Things wants to invade that refrigerator, measure it, instrument it, monitor any interactions with it; it would cheerfully give away a fridge at cost. Amazon dominates shopping by selling at almost no profit, while deftly seizing digital control of the entire logistics of retail.

Consumer electronics is well understood and easy to promote and publicise, but personal gadgetry is just one battlefield. For the Internet of Things is an across-the-board modernisation effort. It attempts to use the Big Data, network-centric methods pioneered by Apple, Microsoft, Facebook, Google and Amazon, to seize control over as much of the planet's industrial terrain as possible. That means power grids, water systems, transport systems, police networks, fire and disaster-response networks, heating, air conditioning, factory production, storage and logistics. Basically: anything with a barcode, a knob, a lever, a faucet, a dial or an off-switch. They want it all. They want to become modernity.

That doesn't mean that the Internet of Things will triumph, because, in some ways, it can't win. It's too broad and vague to win; it's a huge, looming infrastructural phenomenon, much like "electrification" or "automation" once were. People never voted to become electrical or automated. Those processes came from a rough consensus among the political and managerial classes of the developed nations: "we must electrify, we must automate". Those who disagreed were reduced to the state of the Amish; they were just routed-around.

The Internet of Things doesn't want to electrify or automate because that work, for better or worse, is mostly done now. Basically, it wants to "electronically automate through digital surveillance by

wireless broadband". There's a pretty good chance that a civilisation that went for 1 and 2 will be willing to go for 3. It might even exult in it, take pleasure in it, embrace the Internet of Things and take it to its heart.

The IoT (as its friends like to call it) has one distinct advantage: everyone already has a smartphone in their hands. The smartphone is the basic pass-ticket, the voucher, the proof of existence. The smartphone is the Thing in our modern world that is the most Internetted of our Things. Once the reader has one of those in his pocket or her purse, she is assimilated. And the reader has one.

So does everybody else. All of the great and the good of the planet: bankers, senators, regulators, venture capitalists, engineers, designers, coders, the military, the church, the academy – every last one of them has a wireless broadband lozenge that's chock-full of responsive sensors and sophisticated electronics. There is no power-group of consequence in the world today that successfully renounces smartphones. No one who matters refuses what they offer.

The smartphone business was the fastest trillion-dollar business in human history. It was faster and stronger and much more popular than its predecessors, the mainframe, the desktop, the laptop. All one has to do, from that grand perspective, is to forget about the talking fridge. Instead, imagine an Android or iPhone unbundled into its tiny component parts and scattered across the whole world.

That would mean that every "thing" would rejoice in some fraction, larger or smaller, of the many, many powers inherent in a smartphone. This is a Manifest Destiny for silicon.

There's a certain engineer's lucidity in this techno-paradigm: yes, in its preordained shrinkage, the smartphone might pause a little while at "wearables", at wireless-broadband consumer-friendly form-factors like bracelets, shoes, earrings, spectacles, Bluetooth ear

adornments and so on. However, the logical endpoint must be planetary "smart dust". It means full-service computers, with radios, that can fit within the printed letter "o". It's a lower-case, fine-print internet of microscopic things. Connected things so cheap and plentiful that we treat them like incense or holy water.

For Internet of Things zealots, this vision is what energy-too-cheap-to-meter is for nuclear zealots. It's like the vision of a flying car in every garage, back in the visionary days of aviation and mass-production lines. In other words, it's a utopian vision of technological determinism. If we've learned anything from a generation's marriage to the internet, we should know that that's not how things work out in real life.

The Internet of Things is not like the internet, which was an unplanned and spontaneous advent with a certain off-the-wall, sprightly and vividly manic quality. The Twenty-Teens are not the Nineteen-Nineties; politically, economically and socially, the Twenty-Teens are a Depression. The internet brought many laudable things, but prosperity, stability, accountability and honest politics were not four of them.

The Internet of Things has a slight utopian tinge, but mostly it has a certain melancholy, even grim air. It's not some psychedelic exploration of the cyberspace of the digital. It's material labour, it's hardware, it's a hard slog. The Internet of Things has already been tried once, and it failed.

The original, failed "Internet of Things" was based around the invention of the Radio Frequency ID chip. Its grand champions were Wal-Mart and the Pentagon. The great American retailer of Chinese-made goods and the US military-industrial complex united to impose electronic barcodes on the host of "things" they bought or commissioned.

This premature, imperial effort was stunted for a number of painful, complex reasons. The main failure was political. The RFID Internet of Things failed through the overweening arrogance of Wal-Mart and the Pentagon in thinking they could get away with it, simply impose a technology by fiat. They thought that they could paste little interactive radios onto everything that mattered, and that no other power-player would catch onto their hack of the infrastructure.

The suspicious Chinese immediately said no, which blew away much of Wal-Mart's interest. The Pentagon's electronic presence in world manufacturing and shipping was about as popular as the NSA's is right now. The Pentagon is the ultimate sucker consumer: they'll blindly pay any sum for anything, and its military contractors like the process kept that way.

As for the general populace, there seemed to be nothing for them in the elite and secretive world of electronic barcodes. Whenever mere civilians expressed some interest in RFID and "auto-identification", they were insulted, dismissed or fed a pack of childish lies by hired PR firms. The first Internet of Things revolution was hugely ambitious, arrogant, intrusive, fundamentally dishonest, and a failure; so much so that the new IoT movement carries on as if there had never been one at all.

Despite selling memory by the bucket-full, the computer business has a very short memory, and the new IoT is back a mere decade later – this time with bigger coalitions, more political support, and radically upgraded hardware and software. But it's still an epic struggle, and it could still fail again.

It's clear that today's Internet of Things isn't just a techno-revolution; it's a reaction. It's not by and for the oppressed, the disruptive, the hungry, the have-nots, the start-ups, the shut-outs.

The Internet of Things is very much in the interests of certain groups who can already count themselves among the haves. Many of its architects are clearly inspired by fear – they're powerful, but afraid to lose the things they already command and control. By intensifying their command and control systems, they hope to maintain their hold.

The Chinese are happy to call their own strange activities the Internet of Things too. If it ever exists, the Chinese IoT will likely be much better known as the "Firewalled Internet of Heavily Censored Things with Chinese Characteristics". The Chinese know that this blanket of techno-affirmation, the Internet of Things, requires no Western shibboleths of civil rights or individual autonomy. It'll work for them just as well as it works for anybody, and maybe better.

It gets worse. Due to its louche, unruly internet heritage, the Internet of Things is already infested with spies and thieves. They're not minor threats either, but colossally powerful, nationally financed spies, along with persistent, vicious, clever, socially networked, high-tech thieves.

The internet, although beloved by all including Al Qaeda, went straight from barbarism to decadence without ever encountering a civilisation. It was never utopian, although it was free. Its lawyers are patent trolls. Its political parties are flash mobs in the streets. Its wealthy are nouveau-rich cranks. Its poor are a tidal wave of Third World young people. The Twenty-Teens are quite an interesting cultural period.

The Internet of Things makes no attempt to redress, or even address, the many real problems that the internet brought to the world. On the contrary, it's an international effort to bring everything that wasn't internet within the purview of the techno-elite that currently dominates the internet.

What will that really be like? Who benefits? Where do the rewards go? Who loses? If the reader looks objectively at places in the world that are already dominated by the techno-elite of the internet, the reader may well feel concern. California, for instance, never lacks for charm. However, California is suffering a desperate climate-change drought. Its state politics in Sacramento are dysfunctional, its urban affairs almost unmanageable. The divisions between its mega-ultra-wealthy and its poor are some of the worst in the world.

Californians are superb at hardware and software, but if the reader asks if this skill of theirs translates well into the everyday management of political power, well, it doesn't. Modern California is not a peaceful, just or well-organised place. California never has been like that, and those who aspire to understand and promote the Internet of Things should understand that California is a golden realm that is beset with earthquake, riot, tsunamis, cult religions, volcanoes… Well, it's California, basically.

Both Google and Apple are ingenious, powerful, Californian enterprises. They're also Napoleonic empires run by very small elites of cranky eccentrics. They may "think different", they may "not be evil", but the reader didn't elect them. The activities in their ever-growing clouds and big-data silos are opaque to the reader, and they like it that way. Even though they have elaborate and well-designed relationship-management software, even though they are huge, profoundly popular social-media machines, they are not the reader's bosom friends. Google and Apple don't even much like each another these days.

Ask Nokia what it's like to fall afoul of Google and Apple. Before the smartphone arrived, Nokia was the global queen of cell phones. Apple hit them high, Google hit them low, and Nokia lost a planetary

empire in a matter of months. Nokia's ruins were deftly vacuumed up by Microsoft at fire-sale prices.

Microsoft is, as everyone knows, even worse than Google and Apple. From Seattle rather than Silicon Valley, Microsoft seems to actively enjoy the resentment of its user-base and the enmity of national governments. If the reader is enamoured with the IoT, the reader should think hard about the implications of a Microsoft kitchen. Or a Microsoft car. Or, as London currently has, a Microsoft Internet of Things subway system.

Amazon is underestimated, because its fantastic logistics enterprise actually does resemble an authentic "internet" that packages and ships a host of "things". But imagine Amazon subways. The Internet of Things is not a world where Amazon literally buys, owns and manages your subways. Instead, it's a world where Amazon's skills at logistics have crushed the subway unions and are managing the riders as if they were packets in one of Amazon's gigantic robotic distribution plants.

That's a good idea of what an Internet of Things looks like and feels like. It's not a novelty fridge that talks, it's a state of daily affairs that is truly strange and different. It needs to be justly compared to our actual, existent state of affairs. One can't complain about the vistas of the Internet of Things without comparing it to what we have today, in broad daylight.

Google smart cars, for instance, are very Internet of Things – self-driving broadband robots using meticulously mapped highway databases generated and maintained with Big Data. Modern highways, without self-driving cars, are slaughterhouses. They kill more people than major wars.

"Smart City" parking means a bonanza in traffic fines for cities. That is why city managers really like the idea. It also means that legal

parking becomes more efficient and children breathe less smog. It's not the newness of the Internet of Things that is bad. Its good and bad aspects are ethical, legal, social, political. They're human.

None of the many things that the Internet of Things seeks to transform have ever been particularly good for us. The power grids have already wrecked the climate, and are fast making it even worse. The leaky water pipes damage rivers, lakes and streams. The highways kill us. The attention of the overworked police is distributed through cities in haphazard, unfair, even ludicrous ways.

The Internet of Things doesn't politically reform the failings of the past – in fact, it doesn't even care about the failings, it simply wants those new forms of digitised command and control. The IoT isn't a social reform movement, or a source of progress, any more than Amazon, Facebook, Google, Apple and Microsoft are reformers seeking progress. It's better in some ways, worse in others; mostly, it's just different. The clues to that future culture are already here.

These are hard times. It would be a wondrous thing if some supreme genius could bend the enormous power of the Internet of Things toward, say, the creation of a just and sustainable economy. Or toward liberty, equality, fraternity, whatever social purpose the reader finds laudable.

However, a movement that wanted to do that would somehow have to seize control over the means of internetting things.

That movement would need what the Big Five already have: a political operating system, some dedicated political way to sell cultural material (music, movies, books, software), political tools for productivity, a politicised advertising business, some means of accessing the internet that is under political control (tablets, smartphones, phablets), a political search engine, a social network that was actually a political party, a political "payment solution", a

political “cloud” capability and, most of all, political control over wireless spectrum, cables and data-transfer protocols.

Rather than being a “government”, that state would have to become a “platform”. I could be wrong, but this prospect doesn’t seem likely to me, even in an authoritarian state. Nations are patriotic, they’re about land, language and a people’s aspirations, while railroads and electrical networks and fibre-optic cables aren’t patriotic, they’re infrastructure. The internet’s a generation old, but we have no internet nations, or provinces, or even a fully digital city council of a modest village. States have functions that aren’t supplied by infrastructure, even of the digital kind.

So the Internet of Things is not a coup d’état, it’s not Orwellian totalitarianism at work. However, it’s definitely about power, and also wealth and fame. Making your refrigerator talk to your toaster is a senseless trick that any competent hacker can achieve today for twenty bucks. It is trivial, but the Internet of Things is epic. It will entail a struggle – not *for* the Internet of Things, or against it – but inside it, as it both grows and fails.

2.

In this part of my essay, I want to name and number some of the players, and describe what they want and how they work. If the Internet of Things spreads widely, the way these people behave today is the key to the way most everybody else will be compelled to behave. They'll be society's leading actors, the exemplars of progress.

So let's start with the champions of the Internet of Things, the Big Five: Microsoft, Apple, Google, Amazon and Facebook. One might think that since they're all American corporations, and all on the West Coast, they would see their common institutional interests and unite as some kind of trust. This was certainly true of large American corporations in the past: oil companies, steel companies, railroads, the telephone industry, aerospace companies and so on.

All these traditional American industries realised that competition was tiresome. They were constantly scheming to unite in continental-scale monopoly conglomerates that could simply buy Congress, and then live off the fat of the land.

Amazon, Facebook, Google, Apple and Microsoft almost try that, in some ways. Google, Facebook and Microsoft are especially good at burning off the competitive landscape by acquiring smaller companies that might pose a threat. Microsoft, and increasingly Google, are often decried as monopolies.

But they don't unite as a vast, conglomerate trust: the terrifying GAFAM Inc. They can't become a monopoly because they don't directly compete. The reader rarely sees any direct price war between Google, Amazon, Facebook, Apple or Microsoft. They don't bother to "compete" because their real strategy is to "disrupt".

Each of the Big Five has a theological conviction that the other Four have it all wrong. For each of the Big Five, the other four are

not the competition, but something like heretics. Rather than "competing" – becoming more efficient at doing something specific – "disruption" involves a public proof that the rival shouldn't even exist. The rival's services are meaningless; they should, properly, be mere commodities, or even given away for free.

Microsoft, one of the oldest and long the richest, was the pioneer of this practice. Having seized control of the desktops of both business and governance, Microsoft carried out the "embrace and extend" practice of copying software innovations by other companies, folding them into their almighty operating system, and giving them away as mere features of Windows OS. Microsoft once even dared to appropriate the entire internet as a minor area of the Windows screen that they called the Internet Zone.

Microsoft was notorious for its colourful practice of "knifing the baby" and "stealing the oxygen". It's important to realise that this isn't capitalist competition as described in economics textbooks. Life in the Internet of Things isn't about buying a smart toaster and keeping it. No: it's a silent, semi-covert, digitally interactive struggle of baby-knifing and oxygen-stealing.

"Knifing the baby" means deliberately appropriating the work of start-ups before they can become profitable businesses. "Stealing the oxygen" means seeing to it that markets don't even exist – that no cash exchanges hands, while that formerly profitable activity is carried out on a computer you control.

It commonly takes money to knife the baby and steal the oxygen. And Microsoft had vast hoards of loose cash from the supremely valuable, and very complicated, Microsoft Windows operating system. By tactically giving away free dead babies, they were strategically protecting their core asset, Windows. Windows was commonly stolen by pirates but Windows had no real peer

competitor.

Once, Apple had been in near-direct competition with Microsoft for command of the desktop. Apple was beaten to an apple-pulp. Apple wisely decided to "disrupt" instead of wasting time and energy directly competing with the Blue Monster of Redmond.

Apple therefore created new, networked alliances that allowed it to sell music, creating a monetisable, digital entertainment retail system instead of some mere desktop operating system. Apple even removed the unfortunate legacy term "computer" from its name and created a comprehensive data-system of music players and smartphones.

Microsoft attempted to directly compete in these arenas, and it still does, but failed through lack of the necessary negotiation and design skills. The music industry despised Microsoft's Zune media players. The phone service providers loathe Microsoft Windows phones because they know that Skype, which is included in Microsoft's phones, is a brazen attempt to "steal their oxygen" by removing their toll revenues.

The phone service providers therefore engaged in a quiet conspiracy to crush Windows on phones, while beaming in joy at the sudden advent of Google Android. The reader may note that he loves Skype and is willing to pay for it, but that's not the consumer's decision. The reader may wonder why Microsoft doesn't sue all the world's phone service providers and force them to install Skype. That's because the legal approach doesn't work either.

Google sells network surveillance and collective intelligence. This is Google's actual, profitable, monetisable product. "Search" is merely Google's front end, a brilliant facade to encourage free interaction by the public. People are not Google's "customers" or even Google's "users", but its feudal livestock.