Broken Dreams, Blunted Lives:
What is to become of the low skilled in the wealthy world?

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Preface by Niall Campbell, CEO Strategic Planning Society

We elected Oliver Sparrow and a Honorary Fellow of the Strategic Planning Society in 2014, doing so in acknowledgement of his decades of professionalism in the field. He suggested – and I was glad to accept – the notion that new fellows should write a monograph on a topic of strategic concern, and this publication is the first such example.

_Broken Lives, Blunted Dreams_ explores a deep socioeconomic issue which could have a major role in all of our strategic plans. The ideas which it presents are ideas are provocative, strategic and topical. It is hoped that this text will be a major element in a scenario planning exercise which will take place on line during the latter part of 2015. Readers who are interested in participation should contact Oliver Sparrow directly.

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Summary.
The industrial countries have been experiencing a dynamic which is both an inevitable adaptation to commercial realities and also socially divisive. The rise of the emergent economies and consequent competitive pressure will exacerbate this, as will prospective developments in technology. Demographics within most of the industrial economies will limit what individual countries can do about this. The potential for populist, damaging politics is self-evident. Indeed, many of the policies which this politics is likely to endorse – autarchy, rejection of technology – are certain to worsen an existing bad situation. This paper examines these dynamics and assesses the very limited policy measures that are available to the old rich countries.

Introduction.
The incomes of the low skilled in the wealthy world have been under pressure for a generation. More recently, middle income families have seen static or falling wages and wealth. This is the consequence of a wide range of powerful and often global forces, trends which can only intensify. In addition, increasingly autonomous and intelligent systems will have a major impact on employment, perhaps creating new jobs, certainly destroying existing ones.

Beyond the existing wealthy world, the emerging economies are set to become the chief source of economic power. Billions of their graduates are due to enter the work force. Existing high skill industries will continue to pass to these economies and as a result of intense competition, be quickly commoditised. As a result, the skill level at which a worker adds enough value to justify a “rich world” income will continue to rise. Some rich world citizens – or their children - will be able to rise with this, but many will not.

These forces present the industrial nations with a massive political challenge which, if they fail to handle it adroitly, may well plunge them into destructive populism, a nationalist autarchy that seeks to shut off the rest of the world, ban technologies and slow productivity growth. The room that a typical industrial nation will have to manoeuvre is yet further restricted by the major demographic change, with its huge and generally unfunded costs.

Wealth generation in the complex nations is very likely to be focused on elite groups, intensely networked globally, physically if temporarily located in sophisticated and attractive environments that are economically stable and physically safe. The result of this is, unavoidably, two-speed societies. At its best, this will conceal a powerful undercurrent of resentment and alienation between the resulting social classes. At best, too, these societies will be open about the situation and manage what is in effect a dual culture.
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A shattered social narrative.

Most of today’s industrial societies still conform to a view of the world which was formed in the middle of the Twentieth century. Two world wars and a desperate economic depression had demolished the old consensus and had set in its place something both idealistic and communal. We were going to build a new world, and it would be a world with a place for everyone who was prepared to play by its rules. There was to be a clear pathway through life – education, job, family, retirement – along which the state was to play a helpful role. An individual’s self-worth was greatly defined by conformity to this pattern. In particular, having a job or raising a family conveyed a sense of individual value, of duty fulfilled. Not to be working was unfortunate if you were disabled, shameful if you were not. And if you fitted into the system, then life was supposed to get better every year.

That consensus is rooted in economic and demographic realities that are, however, either crumbling or already dust. It stemmed from a time when labour intensive mass manufacture was expanding. The differences in abilities between the industrial and the poor nations was stark and absolute. The workforce was demographically young and in thrall to consumerism and the novelty of disposable wealth.

This social narrative has failed for the low skilled in the rich world. Figure 1 shows data for the USA. In real terms, low skill individuals have seen static or falling incomes since the late 1960s. The middle classes have been effected since the 1980s, but they were generally able to mask this by borrowing against inflated assets, such as houses. The 2007 recession was both triggered by this excess debt and, in the long run, the end of it.

This phenomenon is by no means confined to the USA. Figure 2 shows similar trends for Europe and Japan, and flags an additional factor.
Economic activity generates a surplus that is partitioned between investment, labour, tax and returns to capital. The US Bureau of Economic Analysis shows that until the investment pause after 2007, the economy-wide profit had been broadly constant between 4½ and 7% of GDP, down from the higher levels of the 1950-70 period, when low skill wages were growing.

As Figure 3 shows, Labour’s share of output in the economies of the industrial economies has fallen only modestly from those days, from something around 65% in the 1960-1980 period to somewhat around 60% today.

We can draw a clear lesson from this. There is no capitalist conspiracy that is aimed against the low skilled, extracting profit. The overall flow of wealth to workers has not
changed radically. What has changed is how that flow is partitioned, chiefly on the basis of skill.

Figure 4 shows that roughly a half of all of the hours worked in the US are done by graduates. That is, of itself, a remarkable fact: low skilled jobs are not merely low paid, but also increasingly rare.

The picture is, then, reasonably clear. Increasingly, low skilled people are not required in the industrial economies. The sorts of enterprises that used to employ them – mass manufacture, small businesses, the services that are required by large companies have all been swept aside. In addition, a completely new set of factors came into play in the late 1980s, exacerbating these trends. It is these issues which we examine in the section which follows.

Change and its impact on the low skilled

The world is changing at exponential speed, so that we pack into years what used to take us decades to achieve. In the first Industrial Revolution, it took Britain something like forty to sixty years to double its output. Japan, exploiting the second Industrial Revolution – mass production, and doing so from a relatively clean base - took over 20 years. China, operating at the fringes of the third such revolution, took only six-and-a-bit years to double. We are now on the fringes of the fourth such revolution, characterised by autonomous, intelligent systems. It will be a revolution that is backed by over two billion graduates in the emerging economies and an emerging middle class of perhaps four billion consumers. The emerging economies are even now drawing into the lead as the source of the world’s wealth.

Four Industrial Revolutions

We are all familiar with the first Industrial Revolution. It grew from major changes in agriculture that in turn led to a surplus of food and labour. That in turn permitted the creation of organised industry, urbanisation, mass markets and systematic transport. International trade and banking moved from being ad hoc coffee-shop activities to structured enterprises that changed the world. The focus was, however, on agricultural production, mining and other primary enterprises.
The second revolution abandoned primary production in favour of mass manufacture, developing energy intensive industries and creating the wealth that underpinned burgeoning and sophisticated demand. It invented new management disciplines to handle the requirements of enormous activities, homogenised its treatment of the labour force and in the process, created labour unions. The many wars of the period no doubt had an impact on all of this.

It is the third revolution that we need to understand in more depth. This began in the late 1970s, and the industrial transformation that has occurred as a result of it has been extraordinary. There are two relatively separate elements that are relevant to this discussion: what was happening within the industrial world and what took place beyond its bounds.

**Change in the industrial world**

The economies of the wealthy world were transformed from a primarily manufacturing base to an economy of services. Manufactured goods began to embody ever-increasing quantities of intangible services: design software, legal issues, brand and the like. Consider the rotary telephone of the 1960s – a manufactured object – with the cell phone of today, in which embodied intelligence is the dominant feature and value.

An entrepreneur in the first revolution was required to do virtually everything for himself, from building the factory to constructing the machinery that it would use. There was, in essence, nothing that existed on which an entrepreneur could build. In the third revolution, by contrast, entrepreneurs found themselves embedded within an enormous toolkit, in which virtually any reasonable need could be met by third party suppliers. Instead of physical supplies and equipment, what limited ambition was the ability to manage the enormous complexity that is involved in working in this way.

Firms which prospered in this environment placed intense demands on their workforce, requiring from them flexibility, high cognitive ability and a mix of skills that transcended traditional training. Some could contribute – and did very well from this, as their skills were rare – and others could not. Some hung on by their fingernails, not really understanding their new environment and so living in intense stress, but many fell off the ride.

Technology also played a role in changing the nature of employment. Armies of clerks had once managed information with forms and paperclips. First the Holerith (punch
card) machine and then the early mainframes displaced these armies of clerical workers. The personal computer eliminated the typing pool and the secretary. And the need for carbon paper and its supporting industry, typewriters and their ribbons, filing cabinets and paperclips and all the people who made those things. One person with a CAD system removed the need for a platoon of draughtsmen; automatic exchanges eliminated telephonists.

The finance industry had, up to this point, been a quiet backwater. Grand deals were of course done, undervalued assets were acquired and sold off in nationally-spectacular ways, but the sector was parochial and, for the most part, dominated by retail banks and national savers. Brokers, merchant banks, commodity traders and others were separate activities that hardly came into contact with each other.

Regulatory change and information technology changed that in a spectacular manner. A new class of analysts emerged to support this, focussing their attention on companies with an analytical weight that was previously unknown. Investment became an international matter, and large sums were brought to bear very quickly on areas where analysis suggested that assets were improperly valued. It was notorious in the 1980s oil industry that you could drill more cheaply in the stock market than you could in the ground.

The medium term impact of this on management was profound. Other people were comparing them to best practice, and frequently finding them wanting. Major acquisitions showed second tier firms how vulnerable they were to the industry majors which seeking scale, or simply to shareholder activism aimed to remove poorly-performing boards. Yields had to be raised and risk profiles cut. Some approached this by cost cutting, some borrowed to pay dividends. All were suddenly under acute pressure to perform better than before, and better than their peers.

Into this situation came three new disciplines: quality management, just-in-time supply and process re-design. None of them were particularly important on their own. Taken together, however, they sparked the Third Industrial Revolution.

Each of these elements is, of course, very well known. It is their interaction that is important. For example, the initial aim of just-in-time was to manage working capital. However, the discipline of quality management plugged neatly into it, defining identical, modular deliverables that were to be delivered from a supplier precisely when needed. The IT of the period was rudimentary – no Internet, only occasionally digital telephonics – and so processes needed to be redesigned so as to fit with its limitations. As this was done, a critical eye was turned on every step, eliminating costs, automating what could be made automatic.

That marriage of techniques and technology had a number of consequences. Everything suddenly became modular, specified and open to audit. Responsibilities could be assigned, targets set and routine business subject to an endless process of cost cutting. Disciplines such as benchmarking emerged to help find industry leaders in particular process steps and then to copy them. Firms became increasingly like each other as they used the same equipment to do the same tasks, the marginal firms were pushed out or absorbed, and supply curves flattened. Prices fell towards marginal costs and margins disappeared. If a firm did not comply, it became a road-stain on the highway of history. If it embraced the new approach, it became caught in a Red Queen
race to retain its position. Cost cutting measures mounted, and as the Internet became a viable business tool, the entire process stepped up a gear.

Modular and clearly defined things are subject to easy contractual definition and can be bought in from third parties; that is, out-sourced. Outsourcing exploded in the early 1990s. Most manufacturing industries bought in 10-20% of the goods and services that they used in the 1970s. That had risen to around half by the early 1990s and to three quarters or more by the end of the century. [6]

Management theorists began to ask whether a firm could be entirely virtual, and if it needed to certain activities, then what these were. Earlier the 1980s, Michael Porter had surfaced the notion of the competitive rent, the source of exceptional profitability that an organisation had to protect at all costs: its scale, intellectual property or physical location. [7] That was hybridised with the long-established notion of distinctive competencies, the set of skills that an organisation needed to have in order to defend that rent. Finally, the notion of the “core business” emerged, as the elements of knowledge, capital resources, skills and permissions that made your firm different and desirable. These were inalienable, and could not be outsourced. Everything else could be, and often was.

The culture that emerged in this period had a potent effect on the work force. Low skill jobs were outsourced. Where this was done domestically, the new supplier companies were equally aware of the need for focus, low cost and scale. That in turn drove them to treat their people as replaceable automata, and indeed to replace them with automation wherever possible.

The result of all of this was a marked increase in domestic productivity. Economists understand economic output as the consequences of the resources that are put to its generation. Classically, these ‘factors of production’ are labour, capital, physical resources such as land and an ill-defined left-over element that used to be called “enterprise” but which is now called total factor productivity, or TFP. If TFP – efficiency – remains the same, then output growth responds only to increased labour or investment.

Figure 6 shows the cumulated growth of US TFP since 1973. The onset of the Third Revolution is self-evident, leaping out of the stagnation of the 1970s and growing exponentially until the crisis of 2007. It is a necessary truth that if productivity grows more slowly than its output, then an industry will absorb factors of production: capital, workers and so forth. If productivity grows faster than output, however, then it will shed these factors. That is exactly what happened during this period, and the factors most shed were low skilled workers.

Historically, as one industry shed its surplus, factor prices such as wages fell until other industries opened to absorb these. Young industries tended to be very inefficient and
fast growing, so they were hungry for surplus workers. In addition, a very elastic range of craft workshops, small businesses and small-scale retailing all stood ready to use cheap labour. However, the Third Revolution had put a stop to that. The new industries wanted only high skilled people. Small scale retail underwent a precipitate contraction as the entire industry integrated at huge scale. Services – security, laundry and the like which firms had outsourced were now serviced by major, highly efficient companies. Life had become very hard for the low skilled.

**Events beyond the industrial world**

If the industrial world was subject to commercial change, this was as nothing to what was occurring in the rest of the world. Nations were able to leap from the beginnings of their First Revolutions to the margins of the Third in the course of a generation. Our understanding of the process of economic and social development allows us to identify the key component in achieving this, which is the quality of a nation’s institutions. From property ownership to tax collection, the suppression of corruption to the provision of schooling and public health, institutions precede and enable economic development. And, of course, it is precisely these rules of engagement that allowed outsourcing to spread from the rich nations to the low wage areas.

This did not happen suddenly. Japan had been using Korea and Taiwan as low wage suppliers throughout the 1960s, and had moved most of its energy intense activity to coal-rich Korea after the 1973 oil crisis. Indeed, the fact that Japan invented both the TQM and JIT disciplines followed on from and permitted this to happen. However, it remained exceptional and most industrial countries accessed low wage workers by importing them, the US with its Mexicans, Germany with its Turks.

Outsourcing from the remainder of the industrial world was stimulated by the fall of communism and by Europe’s access to the former USSR. In the US, it grew steadily during the 1990s, notably within NAFTA and with the Little Tigers. It became a truly major influence, however, when China opened itself up to international trade in the late 1990s.

Cheap, high quality goods flooded into first world markets. The US Department of Labor estimated that in around 1995 that for every dollar lost to the local manufacturing, a $1-38 was gained by the economy as a whole. [9] The academic world is still uncertain as to the overall impact of labour outsourcing on domestic jobs. Most believe that the US exported about a quarter of a million jobs every year, but that is a small number as compared to its overall workforce of 150 million. Indeed, not all of the flow of jobs was out of the industrial nations. US productivity had become such that it is now believed that the early NAFTA relationship resulted in a net loss of jobs to Mexico.

The impact on the industrial countries was, then, probably much less than its public profile suggests, whilst the radical changes in industrial organisation that we discussed in the preceding section were very large. Immigrant labour was and is the subject of much criticism. After Poland joined the European Union in 2004, the wages of a London-based electrician are said to have fallen by 50%. Most academic studies agree, however, that if this was true, it was a rare outcome. Research suggests that
immigrants instead tend to do jobs that would otherwise be automated, or not done at all – for example, domestic service.

If the impact has been less radical than might be expected, the long-run consequences of competition from the emerging economies must, nevertheless, be deeply significant. World population is expected to rise towards 9 bn by the early 2040s. The OECD countries will amount to under a billion of these. Between them, the OECD nations generated 60% of world output in 2000, about half of it today and they will probably create less than 40% of it in 2030. Three or four hundred new cities of ten or more million inhabitants that will have been established by that time, all of them in the emerging economies. Demographically young – excepting China – these will support a middle class measured in billions. At least two billion of these will be some kind of graduate. There will, then, be at least twice as many graduates in the emerging economies as there will be people living in the ageing rich world.

In the longer run, therefore, this must stimulate competition and the drive still faster race to productivity with which we began. The tools with which the industrial nations respond to this will be those of the Fourth Industrial Revolution, tools likely to be deeply challenging to the status of the low and middle-skilled people in those countries.

The Fourth Industrial Revolution

The currently-industrialised countries will need to move to a new way of operating if they are to prosper. We have hinted at this as being the Fourth Industrial Revolution. [5] Plainly, if we knew what that was we would already be doing it. But we can guess at what elements of it might be. It is characterised by four primary qualities.

- It will be knowledge-intensive. The year 2030 is around eight knowledge doublings away from today, as measured by expansion in new, useful science and technology. In terms of access to data, however, foreseeable developments are beyond our current imagination.

As a way towards this, however, please recall that the Internet was originally a passive structure, where site owners put up material and the public read it. Web 2.0 brought in user-created content, and with it the industry giants of today. Web 3.0 will be interactive. Users will write to it, but it will answer them back, with coach them, frame their lives, find them friends and work, opportunities and warnings. It will keep children safe and mentor their waking lives, but it will expose them to learning in ways exactly tailored to them as individuals. In companies, the system will broadly understand what the firm is about, and tailor transactions and resource use to best advantage. It will call meetings and arrange conversations. It will orchestrate the process necessary to take vague, cloudy possibilities into something that can be let out to subcontractors to stitch together

A way to think about data volumes is the following. Consider a sheet of fine cloth, a thousand stitches to the yard. A square yard has a million stitches, therefore, and let’s call that a megabyte.

Estimates of the knowledge that humanity had written down in 1920 would, on this measure, have provided a cloth to cover the island of Mauritius. By 1950, the cloth would have covered the Congo, and by 1960, all of Africa. Things then began to grow rapidly, and all of the continents would have their duvet by 1990, covering the entire globe by 1995. Today’s data would cover the Earth about a thousand times. By 2030, by perhaps a million times. [10]
The process by which value is added at the heart of the Fourth Revolution will be extremely social, and will be strongly based on a specific kind of trust. That is, the things that people can do better than machinery are chiefly to do with dealing with other people, with innovation that involves complex brews of skills and with judgement around complexity and risk. These topics are not susceptible to detailed specification – it is not possible to specify the innovation that is required, for then it would not be an innovation. It follows that work has to be commissioned on the basis of trust and reputation, much as Hollywood selects its directors. Communities of trust, in which new members are selected by an existing cadre, already characterise whole sweeps of economic activity, from software to entertainment. Such systems tend to self-police, because it is hard to enter the more prolific, wealth-generating circles, and once inside, nobody wants to be thrown out.

It will be focused around very tight physical locations. Businesses tend to cluster. In some instances, this is because it is convenient for customers, or because they are close to a supply network or a physical facility, such as a port. But clustering is at its most intense in the service industries, often in ways that seem to make no economic sense. There is no seeming operational reason why US financial services focus themselves on a few streets in some of the most expensive real estate on the planet. The explanation for this comes down to intangible infrastructure – the

Since the early 1980s, Stanford Research have supported a technique for measuring the types of people who exist in an industrial country. Their human types have shifted around somewhat over time, but remain conceptually stable. At one end of the scale there are the Innovators and Thinkers. Makers – people who ‘make do and mend’, self-sufficient and reliable – and Survivors lie at the other extreme. [11]

For current purposes, the US population as a whole consists of ten roughly equal-sized categories. But Los Alamos has 34% of Innovators and 26.5% of Thinkers, and only a scatter of Makers and Survivors. West Virginia – in common with many rural areas, is depleted of Innovators and Thinkers, but has Believers as a quarter of its population, people who are characterised as traditional, literal minded, moral and idealistic.

Figure 7: National income per capita and the complexity of the underlying economy. [12]
network of casual contacts, specialist services and the like that focus minds. It is now well-established that technology diffuses very poorly in social networks, and that people need to be in close and lasting physical proximity, however informal, for ideas to spread. Some regions are spectacular in the way in which they get this right. San Francisco bay area attracts 40% of the entire US expenditure on venture capital.

- It will take place in complex environments. Figure 7 shows the results of a study that measured the economic complexity and wealth of a society, factoring out the impact of primary production in the economy and exports. That is, nations that were wealthy solely by virtue of, for example, oil exports had this effect removed by principle component modelling. Wealth and complexity are clearly strongly related ($r^2 = 0.73$), and few would argue that the wealth preceded the complexity. Rich countries can do things which poorer, less complex ones cannot, and that is why they are rich.

These social phenomena are already important to innovative industries, and patents and other proxies of innovation are found to focus on a few cities; and indeed, on tiny sub-sets of those cities. Commercial innovation consists of understanding a problem sufficiently well, and spreading that understanding through a sufficiently diverse and expert community, that unrelated potential is recognised and fused into a whole. Systems can help to manage and realise that, but they cannot undertake it. But the milieu that are currently rich in such abilities are utterly unlike the firms of the earlier revolutions. Data suggest that they are physically attractive, have high quality and diverse leisure facilities, are physically safe and socially diverse. But diverse along one particular axis – diverse in the range of high talents that they bear.
Richard Florida has been mapping what he calls the “creative class”, as opposed to the service or old working classes. He shows how extremely focused the creative classes are in where they live in cities. His assessment of London shows that about 30% of the population are creative class and that there are now no districts left that are majority working class. [13]

These centres for the creative class are populated by a highly mobile elite. About half of London’s inhabitants were not born in Britain. Much more than half of the property in the heart of London is foreign-owned. As the Financial Times observed (19 Sept 2014):

*Foreigners bought almost three-quarters of the new homes sold in inner London last year. More than half of all residences worth more than £1m are sold to foreign buyers. Some of the city’s most exclusive neighbourhoods go dark at the end of the social season, when wealthy residents return to their primary residences in Delhi, Moscow or Shanghai.*

Most nations will become eager gardeners of the flowerbeds from which these elites grow. To deter them is, of course, economically suicidal in the kind of economy that we have just sketched. If a nation is not pouring out the good ideas that get licensed to and developed in low wage areas, or in highly automated domestic facilities, then they have no means with which to maintain their economic status. Deterrence is not so much that elites will go elsewhere, but that the attractive milieu will never develop in the first place, given all of the alternatives. If New York’s financial district was not constantly renewed, it would have lost its shine entirely after the passage of a few
years. The determinants of success are almost all of them intangible and to do with organisation, law, the talented population and the multiplicity of small advantages that accrue from physical participation in the milieu.

Nations can destroy the foci of the Fourth Revolution, but they cannot directly cause these to appear. They can provide the human capital, the physical, social and legal infrastructure, but that is all. Indeed, this will be China’s great challenge - to make itself a pleasant, exciting place to live. At present, nearly half of the Chinese middle class say that they intend to retire somewhere other than China.

**Automation and the Fourth Revolution**

In August 2014, Pew, the US-based opinion research company, reported on an inquiry that they had carried out amongst over a thousand IT practitioners. They were asked to predict the job losses that would result from automation. Roughly half thought that automation would create more jobs than it destroyed. The other half did not, but agreed that many established jobs would go. Everyone agreed that it would be the low skilled jobs that would be most affected.

We have already seen that automation is a rather poor term, covering everything from the designing-out of tasks from a system to the installation equipment that directly replaces a job. Automation also comprises completely new capabilities that have work-related implications, from company networks to effect of cell phones on independent workers. We have also discussed active, situationally-aware systems. These have the potential to blend into every application and activity that we can imagine, from driving a car to doctoring a patient, handling tax affairs or coaching a shy person into social exchange.

Working from altogether more conventional perspectives on automation, Frey and Osborne looked in detail at today’s jobs and assessed their individual vulnerability to automation. The result is shown in Figure 9, with around a half of all jobs nearly certain to disappear. Fourth Revolution capabilities will drive this yet further, as will the commoditisation of Third Revolution activities. Wild guesses abound, but if the Fourth Revolution arrives as expected, perhaps a quarter of existing jobs will have survived to the 2030s. At issue is whether new jobs will arise to replace them. It is likely that these will not be of a low skill nature.
It is, of course, possible to overstate the impact of this. Virtually everyone who lived a hundred and fifty years ago worked in primary production, and most did so in agriculture. Few lived in cities, and even in 1900, only London had more than a million inhabitants. Virtually all manufacturing was carried out in craft workshops of fewer than twenty people. A farm worker used wooden tools with hand-worked metal edges, and did everything manually that could not be done by animal power or in a water or wind-powered mill.

![Figure 9: Automation and its impact on existing classes of employment](image)

Today, the agricultural sector in most industrial countries is under one percent of GNP, and it employs a still smaller fraction of the population. Today’s farm worker, however, operates and maintains a formidable array of complex equipment, deploys the subtle technologies and systems of optimisation that have been developed by an enormous and ramifying industry – GPS-controlled fertiliser application, feed specific to individual animals, the radical consequences of a hundred generations of seed breeding, highly specific agrochemicals, risk reduction in futures markets, near-market technologies such as on-site freezing and so on. An observer from 1850 would have thought this impossible for the farm worker of their time, yet it has come about.

**Capacity upgrade: can we continue to get more intelligent?**

The farm worker – indeed, the modern world – shows that we are able to work at unprecedented levels of skill. We are taught to do this with a mixture of formal instruction and informal learning. But is our ability to “upgrade” boundless, or are there innate limits? Could today’s low skill worker universally rise to greater heights if the proper means of instruction was applied?

The general IQ test was introduced in a broad way from the 1930s, and the records from these have been preserved. The median IQ was, of course, set at 100 and any score over 127 was regarded as “exceptional”. Today’s identical tests generate a
median of about 130, the so-called Flynn effect. This has been widely replicated and is regarded a real phenomenon. Today’s average person in the industrial world would have been classified as highly gifted seventy years ago. Why this has occurred is not clear: nutrition has a role to play, as does formal and informal education. (Figure 10 gives a sense of the radical change that has occurred since the 1970s.)

Figure 10: Radical changes in educational outcomes in the USA, 1970 and 2012 [15]

Our young people are exposed to facts and explanations of the world around them, shown connections and generally stimulated in a way that was not true in earlier times. Further, their exposure to social interactions have changed, with broadcast media giving “worked examples”, perspectives that take them inside another’s head in ways that only novel readers could have enjoyed in the 1930s.

Figure 11: OECD’s PISA score plotted against purchasing power corrected national income per capita. [16]

The stock of human capital in a nation is set by the effort put into developing it, and by the responsiveness of the culture to that effort. Formal education responds to investment with the usual law of diminishing returns, as Figure 11 shows. Noting this,
OECD have suggested that the best way to raise a national outcome in a high spending country is to concentrate on trailing edge: on poor schools marginalised groups and so on. This is not a new thought, and plans to do precisely that have generally had disappointing outcomes.

In common with many other research groups, the OECD find that once direct spending on education is factored out, much of the residual variance in attainment between individual children is explained by their parents’ education, by their family’s social class and by the child’s access to educational materials. Private tuition has a significant role in this.

The success of the children of affluent families has been attributed to differences in innate ability, to the model that each social environment puts forward for a child to absorb and the extra-curricular help that the children receive. (And, in poorer countries, it is known that the difference is dominated by diet, disease avoidance and parasite control.) General intelligence is, however, known to be highly heritable. Further, it is strongly selective in choosing a spouse. Clever people tend to marry other clever people, focusing innate ability. Educated couples also tend to push their children to learn, following the first of the two models. Around two fifths of children from an affluent background in London received private tuition in addition to their education, 83% of those with parents who had a graduate background. The national average was 17%. Figures for the US are yet more extreme.

If genes dominate, of course, then a certain determinism limits the “upgrade” that we can expect from a population. If, by contrast, it is the cultural factors which chiefly explain the seeming heritability of talent, then the upper limit is removed and we need to have no low skill people in the population. The reality is likely to be an element of both of these, and that places renewed stress on the machinery of education.

Formal education follows a pattern that is centuries old. This has been described as following a “cannon” model, an initial blast which puts a person into a lifetime trajectory. In contrast, the “rocket” model implies continued, chaperoned learning and mentoring that runs throughout a lifetime. This seems better fitted to future challenges. It also seems exactly tailored to the capabilities that we can foresee as central to the usefulness of Fourth Revolution consumer devices.

This is best understood through an example. Consider a situation in which the future equivalent of your cell phone or tablet will understand your role in life, where you are at the moment and what you are about. As a result, it is able to offer advice, briefings and other information as it is needed – perhaps throwing an overlay onto your vision if you are doing a physical task – “It’s that nut, there” – or briefing you when you meet a new person as to their background and interests.

It might also go a step further, into mentoring. It would offer advice on how an event or encounter might have been handled better, of how other people have responded to a given tone of voice; and so forth. Applied to the world of children, that ability creates the possibility of perfectly safe adventure, of the active creation of social and practical situations designed to provoke learning, about how things work, but also about people and their strange behaviour. Applied to low skill people, this technology
may have the effect of augmenting their ability, as much as farm equipment radically changed the scythe-and-corn-stook agriculture of a hundred years ago.

**Demographics and welfare: the ageing of the industrial world**

As Figure 12 shows, the populations of many industrial countries are ageing, as they are in China. Many countries have made scant provision for the implications of this.

![Population aged 65 and over as a percent of the working age population](image)

**Figure 12: Population over 65 years of age as a percent of the working aged population. [17]**

The direct cost of support to the elderly in the average OECD country will increase by 7-10% of GDP by 2030. This means that the nation in question will have to raise taxes, cut other expenditure or borrow in order to balance the budget. However, secondary effects – the diversion of resources – will typically be at least double that figure, approaching a fifth of gross domestic product. In the most improvident nations – Italy and France sit at the worst end of the scale, the UK and Netherlands, and the US at the other. The OECD expects mean debt to GDP to rise to over 200% by 2030 in the more strongly affected countries. Such nations will find it hard to raise loans, and will be confronted by a major economic impasse that can only be solved by tax and by cutting in other areas.

These figures do not, however, take account of three additional factors.

- People are living for much longer, but they are not, in general, economically active in a proportionate way.
- The rapidly increasing scope and cost of health care will lead to rising per capita lifetime costs of support.
- This voting block will agitate for extensions of welfare support, no doubt augmented by health care interests and themselves assisted by a lifetime of Internet use and advocacy.

States expenditure has grown over the last century. However, the proportion of this spent on the nation’s core activities – on its security and law, transport, public health
and so on - has not changed very much. Almost all of the growth has occurred within the provision of social support, either in kind – as education, health, housing – or in cash welfare.

The state spends between forty percent (US) to the high fifties percent (Denmark, France) of all value added in the industrial countries. The highest decile funds the lives of the lowest quartile in the average European country. [18] This can be seen as charity on a heroic scale, as the ‘purchase of civilisation’ or else as pure bribery that is aimed to avoid civil strife. Such spending is, however, at its political limit and is being wound back in many countries. Spending on education – on knowledge – must necessarily increase. Massive borrowing by the state may meet with resistance from savers in the fast growing, young emergent economies. As a result, the demographic transition will strain adult welfare provision to the limit.

Care for the elderly presents an interesting example of how Fourth Generation capabilities could generate new jobs, or jobs for people who would never be trusted in the caring professions. The European Union has made some estimates of the amount of adult care it will need in the mid-century, and arrived at the need for tens of millions. The equipment that was discussed earlier – under education – will, of course, monitor how an individual behaves and will instruct them on what to do. Those millions of jobs could go to the low skilled, suddenly made capable and reliable by means of a network of scrutiny carried out by systems that understand the situation that they are watching.
The politics of disaffection.

The Moscow Times reports (18 September 2014) that:

Russian Public Opinion Research Centre found that 45 percent of Russians believe in the existence of an omnipotent, conspiratorial force that lords over state governments, controlling the affairs of humanity. Only one-third of the population expressly rejects this hypothesis, while another 23 percent of Russians remain undecided, according to the survey.

Across the industrial world, populations express increasing disaffection with politics and a lack of trust for mainstream politicians.

Fringe parties have gained sudden prominence – the anti-immigration ‘Sweden Democrats’, Jobbik in Hungary, Austria’s Freedom Party, the French National Front, the Alternative for Germany, Holland’s Dutch Party for Freedom, the Five Star Movement in Italy, Ukip in Britain, the Norwegian Progress Party, the United Left in Spain. Japan has Zaitokukai and a host of others.

The press tends to refer to these groups as being Right wing. However, they sit less on the traditional political polarity so much as the protest against change or against an establishment that they feel has failed them. They grope to understand what has happened to them and fumble for ways to put things back the way that they once were. Many have a mixture of unemployed young and disaffected elderly as their members, and all of them are heavily weighted to the views of precisely the people whom we have been discussing as harmed by recent change. They generally dislike international affiliations, such as the European Union, disapprove of immigration and foreigners. Nine of them are actively anti-Semitic, anti-Muslim or both. Similar groups in the US have found a voice in the Tea Party, with the stranger offshoots of this cropping up in libertarian movements. The working classes do not fit the profile of the Tea Party, but they have yet to find a spokesperson as was George Wallace, or the Huey Long of a generation before.

“We have trouble, my friends, in the country, because we have too much money owing, the greatest indebtedness that has ever been given to civilization, where it has been shown that we are incapable of distributing the actual things that are here, because the people have not money enough to supply themselves with them, and because the greed of a few men is such that they think it is necessary that they own everything, and their pleasure consists in the starvation of the masses, and in their possessing things they cannot use, and their children cannot use, but who bask in the splendour of sunlight and wealth, casting darkness and
despair and impressing it on everyone else. […] Now, my friends, we have got to hit the root with the axe. Centralized power in the hands of a few, with centralized credit in the hands of a few, is the trouble.” Huey Long 23 February 1934

Developed world politics has long been dominated by two hermetic clans of professional politicians. Many are the children of an earlier generation of politicians, much as doctors follow their parents. A cosy dialogue between the centre-right and the centre-left revolves around a set of common economic and social assumptions, views that are not shared by the people to whom Huey Long was speaking. The establishment see such voices as express dissent as bigots, as uneducated people who simply do not understand the situation or as groups who have been seduced into an uncivilised stance by populist leaders. The establishment responds to incoherent rage with polite disdain.

The figure contrasts the preoccupations of the historical Left and Right with what most studies detect as centres of opinion in modern populations. This more complex view is shown as a hexagon, on the right of the figure. Sociometrics studies often use different terminology, but they generally arrive at broadly the same typologies.

The hexagon shows these broad blocks of opinion as these exist in most industrial societies. The lines between them show the major linkages that have arisen between them. Social Liberals tend to have a lot in common with the Systems Aware, for example, but they also share opinions with the Traditional Left.

Most of these groups are self-explanatory. Libertarians seek self-sufficiency and self-determination, resent the state and are somewhat contemptuous of welfare recipients. The Systems Aware tend to think in terms of grand structures, both economic and natural. They are concerned with the environment, for example, but also with issues such as trade, systems-distorting arrangements such as cartels, tariffs and subsidies.

The shaded triangle marks the zone in which traditional politics has been conducted. Immediately, it is evident that a significant range of opinion is not represented. The triangle does capture all of the concerns on the political board, least of all the extremes of opinion. You still find hapless journalists trying to put someone like Rand Paul into a Left or Rightist box, and finding that if they do this, then large amounts of
baggage simply does do not fit. Libertarians are not Right, and Systems people are not Left; although when they argue it may sound as though they are. Such groups occupy different dimensions of belief and values. This is very important when considering the rejectionist parties with which we began. Part of their values may be conventionally Left and part of them Right. But other values may be scattered around the diagram, expressing religious conservatism, for example. There is no contradiction in this.

In the lower left of the figure are a group labelled “Deprivation values”. These are the people who are least able to make their way in the modern world. Their values are often traditional, retrospective and communal in focus – ‘how we used to do things properly’ – and their attitudes mix bewilderment, resentment and aggression towards apparent sources of unwelcome change. That can be anything from technology to the sense with which we began this section, that the world is controlled by a predatory elite, and that they are its prey, people “who bask in the splendour of sunlight and wealth, casting darkness and despair”

Figure 15: Multi-polar pre-occupations. [21]

The figure that is show opposite repeats what we have just seen, but describes how these groups relate to each other. The lack of connection between the Systems and Traditional Left groups are obvious, and mirrored in real world politics. The Environment is not a ‘Left’ issue. Libertarians abhor the Left.

The “Deprivation values” group connects politically and socially with other groups in two chief ways. In one direction, they link with the Social Conservatives around religion, traditional values and the desire to find and follow a true leader, someone who will make sense of the world and set it to rights. In the other direction, however, they are tied to the Traditional Left.

The diagram notes some of the themes: dependency on the state, a sense of the unfairness of current arrangements, all of the issues of low skill employment and its
lack with which this paper began. But neither of these two neighbouring groups fully capture the heart of deprivation values. The Left is not of them, but is an external force that appears to knows better than they do as to what they want. The Social Conservatives shares some views, but it would not want its sons to marry their daughters.

There have been many attempts to dissect populations into types – for marketing, for political reasons or for academic interest. These tend to agree about the dominant characteristics of the Deprivation Values group, which is a frustrated version of the Social Conservative block. These feel rank and affiliation is very important. They are very concerned with social order and their place in it. “Affiliation” means that they see themselves as an example of a community, or a nested set of communities, each of which has a clearly defined social order to it: our town, our religion, our nation. Order, morality and rank are all given by the community, often in a retrospective way. Indeed, the future is often seen as threatening, as the source of disruption of order as it once was. Future-oriented activities and technologies are a part of that threat.

This sense of embedding in the community explains the extreme sense of betrayal, of enemies within that characterise the slide from Social Conservative to Deprivation Values. It defines the targets – people – foreigners, high achievers – who are not a part of the core group, people and processes that disrupt the norms of the community, social change and the headlong flight into modernity. Huey Long [22] appealed to this same group:

But the Lord gave his law, and in the Book of James they said so, that the rich should weep and howl for the miseries that had come upon them; and, therefore, it was written that when the rich hold goods they could not use and could not consume, you will inflict punishment on them, and nothing but days of woe ahead of them. [...] [Of the current system] I say: It is a kind of religion people have read of when women, in the name of religion, would take their infant babes and throw them into the burning flame, where they would be instantly devoured by the all-consuming fire, in days gone by; and there probably are some people of the world even today, who, in the name of religion, throw their tear-dimmed eyes into the sad faces of their fathers and mothers, who cannot given them food and clothing they both needed, and which is necessary to sustain them, and that goes on day after day, and night after night, when day gets into darkness and blackness, knowing those children would arise in the morning without being fed, and probably to bed at night without being fed.

This group is going to grow. The Deprivation Values group and its immediate allies are currently less than a fifth of most rich-world populations. The forces that we have described and, of course, demographics are likely to push this much higher by 2030. Nations could find that half or more of the population were at least sympathetic to this perspective.

What might a political party formed around deprivation values propose as its policies? There are four likely themes:

- Cultural purity: clear values based on folk truths and nostalgia; our land for our people. A retrospective fundamentalism, of a return to the vaguely defined basic principles of an imagined golden age.
• Rejection of the perceived sources of change: competition, industrial efficiency, technology – particularly frightening branches of it, such as artificial intelligence and advanced biology – of the suppression of alarming ideas and foreign influences. Active suppression of public dissent with the overall populist narrative.

• An attempt to lessen the impact of international economics on the domestic job market, which may include tariffs and related measures. “Our jobs for our people”, and so on.

• Redistributive policies, or policies based upon deficit spending that are justified by ill-defined but all-encompassing values: ‘social justice’, ‘our nation for our people’, ‘a fair society’.

Taken together, these frame a monstrous poisonous pill for a nation to swallow in the economic environment of the 2030s. An attempt to block off competition, to penalise the creative class and to borrow heavily would bring a country down in months. A few horrid examples would, presumably, cause the others to learn. Yet large minority parties with these values have the potential to cause irresolute politics, to generate friction and to prevent a whole-hearted response. The nation would be divided, and seen to be divided, and not much could be expected of it.

What is to be done?

Individual industrial nations are faced with a challenge that many will fail to meet. They will be particularly hampered by political trends that oppose the necessary adaptive moves. The natural question is how an advanced nation is to achieve this transition without alienating a significant part of its population. Second, given the almost inevitable existence of such a group, then how are they to be managed politically?

The issue of competitiveness – of what has to be done - goes beyond this paper. That said, a nation has to shape itself – or parts of itself – to be properly structured for the Fourth Revolution. The realisation that only a minority of the population, and of only a few discrete locations, will be involved in the core of this is, in many ways, liberating. It sets up a situation which is solidly different from the past and from its social narratives and unfulfillable expectations. It does not require us to pretend that everything is just the way that it was. In addition, it is a model that is extremely familiar to the rest of the world – a creative class, a cognitive elite and a service class that benefits from their activities.

The issue then becomes how to manage adaptation to the Fourth Revolution in ways that maximise the number who are to play a part in it. And, of course, what sort of life to offer those who are not so involved.

Adaptation has two basic thrusts to it: human capital and intangible infrastructure. Backdrop requirements such as transport, physical security, political and financial stability are necessary, but not sufficient conditions for entry into the Fourth Revolution. Intangible infrastructure relates to the ability to manage high levels of complexity in a predictable way, whilst enabling even more complex possibilities. An example might be the removal of uncertainty as to what is or is not permitted in a
potentially controversial industry – for example, biotechnology – by means of firm and forward looking regulation. The firms then know what is permitted and what is not. The society has been through a process which settles this, and is not open to retrospective change. Firms are thereby enabled to experiment and develop ideas, doing so without an overshadowing fear that this or that activist group will suddenly render a decade of work worthless, or start attacking their staff.

Knowledge and human capital are entwined, but separate. Science is both abstract, accessible knowledge and the product of a social process in which individual experience plays a major role, and social networks an even greater one. National expenditure on science must prevent this from being tucked away in an academic environment that makes it socially inaccessible to the rest of the society. That is precisely what innovative clusters seem to avoid, and what a two-culture model of academia brings about. Equally, highly specialised education is very useful, but hugely multiplied when the individual is also multi-talented, socially connected and him or herself learning and developing along with other clever minds. Research by Richard Florida and others on the nature of creative milieux show that these hubs bring together clever minds from different disciplines in a cityscape that is attractive, safe, filled with facilities and blessed with a vibrant entertainment sector. This is what intangible infrastructure means, as well as excellent government and stable economics.

There are two basic considerations which can be taken from all of this.

**First**, no industrial society can long survive without its cognitive elite. Such elites will continue to supply the bulk of the tax base on which a nation survives. Their activities will become increasingly de-located and so easy to steer around nations which present difficulties to it. An element of competition between advanced nations to attract these activities will continue to limit options towards them. What attracts the cognitive elite is a complex mixture of intangible institutions, low cost burdens that include taxation and social factors such as the presence of their fellows, competitors and collaborators.

**Second**, the world view and techniques of this elite will be less and less rooted in the narrative of the host nation. There is a world of difference between an industry that has developed endogenously from native resource, and one which has perched briefly in order to enjoy this or that tax break. This mobile elite will appear alien and alarming. Nations which fail to manage – perhaps, paper over - this social and attitudinal gap will become particularly vulnerable to damaging populism.

The industrial societies have always been multi-speed, in fact if not in aspiration. We are accustomed to community members going off to do incomprehensible things whilst we stay home and prune the roses. There is an absolute inevitability to the forces that we have discussed and what that does to a society has already been shown to result in the “foot on the elastic tape” outcome. The capable move up exponentially in what they can do, the less capable do not. Earnings follow. That can, however, result in one of two outcomes: a society that displays a continuum between the extremes, or one which has fallen into two camps, of an elite and of a second nation, either
following Third Revolution activities at commodity returns or existing on the margin, dependent and alienated. It is probably clear that the first of these is the most attractive. The US, however, seems set on achieving the second.

Proper management may increase the proportion of the able and give them a role. It will not, however, eliminate the problem of the existence and growth of those with no role to play. The potential for an alliance between the dependent elderly and the excluded groups clearly exists, notably in Europe and Japan, where demographics are at their most extreme, and the consequent and catastrophic politics have already been discussed. These are, almost by definition, people with little understanding as to what is happening, but with a strong sense of betrayal by enemies within. The image comes from an earlier time, but the villains will answer to similar stereotypes.

The Fourth Revolution is absolutely essential to the industrial nations. Economic growth that depends on the Third Revolution industries will be slower than hitherto. That is because of the competition and swift commoditisation that we have already discussed. Costs will be higher as commodity and energy prices rise, following higher global demand. Over and above that, environmental constraints raise the cost base. Tax take will, as a consequence, be proportionately lower.

We have seen, however, that Fourth Revolution assets – essentially people – are both mobile and clustered around desirable locations. They are not at all a whole-nation phenomenon. Many nations will compete to attract them. Raising taxes on this group will, of course, continue, but within clear limits.

For all their remarkable technology and industry, therefore, states may see only a slowly rising tax base. They face greatly expanded aspirations, however, both in areas essential to competition – such as education and physical infrastructure – and unavoidable facts of life, such as age and dependency, an increasing health budget.
and security in a turbulent world. The scope to support or subsidise the low skilled is, therefore, limited. That fact constrains very greatly the options for what to offer to people for whom none of the human capital “upgrade” policies are applicable.

- To allow wages to fall into equilibrium with employment opportunities. That policy will further reduce the incomes of low skill people, and set them into direct conflict with immigrants from low wage countries.

- Specific industries can be made deliberately inefficient, so as to soak up low-skill labour: construction, retailing and low-skill care provision are three candidates. This could be done through a subsidy to the industry, as with agriculture in the EU and US, or employment-related tax relief. Tariffs and other measures would, on occasion, continue to be needed in order to blunt foreign competition.

- The state could define certain occupations as socially useful, and employ people at more than market-clearing wages to occupy them. The British government followed this notion in the early 2000s, when state employment rose to nearly three quarters of all jobs in some depressed areas.

- A more radical viewpoint is also possible. Work has always been regarded as a desirable state, with unemployment as an exceptional and temporary falling away from this ideal. However, it may be better to accept that there will be a new leisure class, and act accordingly.

That last option is the inversion of Wells’s 1895 novel, The Time Traveller. In the novel, an aristocratic, effete race of consumers, the Eloi, are served (in both senses of the word) by the producer-troglydotes, the Morlocks. In our own future, however, a small class of Morlocks will have to support a much larger group of Eloi. Today, in virtually every industrial country, the top few percent provide the entire income and indirect services due to the lowest quartile. In a prospective future, that same few percent are to carry most of the rest of the society.

![Figure 16: Population earnings pyramids (schematic) showing the drift into a world of “two nations”][23]

Culturally, the society could develop as sequestered, two-track environment. The elite would anyway find little in the mass media to entertain them, for example, and the popular media would press a culture of low-brow celebrities and immersive entertainment. It is worth noting that interactive games are now outselling Hollywood, with a turnover of over $80 bn. These will provide the perfect retreat to fantasy achievement for those who may have little to relish in the mundane world.
The machinery by which to deliver this is straightforward, if its financing is not. Democrat commentators in the US are talking about Basic Income, whereby everyone would be entitled to an annual income, perhaps to replace all welfare and other means tested benefits. Others have discussed negative income tax, where taxes owed go negative – become payments from the state – below a nationally determined threshold. An infant, with no income, would receive the maximum payment, perhaps in cash, more likely in entitlements.

Whether this is a more or less appropriate model of the future than the view in which everyone works is not clear. In extreme notions of automation, in which every job is better done by machines by the middle of the century, then it is hard to see an alternative. Hard, that is, until one thinks of how previous times have been unable to foresee just how much change has enabled new activities. The Guardian (11 August 2014) noted that:

*Fifty years ago this week, Isaac Asimov imagined a visit to the World’s Fair of 2014: hovering cars, fusion power plants, moving sidewalks, robot maids, compressed-air transit tubes and colonies under the sea... or on the moon. Asimov’s 2014 looked like a cross between Futurama and The Jetsons, staffed by bumbling chore-bots that might be the offspring of Rosie and drunken Bender.*

We may be able to see something of the structure of the future, but not the surface detail. Structurally, however, technology continues to grow exponentially, as does education across the world. We are connected and educated as never before, and perhaps a half of humanity has never been so healthy or well-nourished. Vast new markets in the emerging economies will be realised. Scarcity and environmental imperatives will demand innovation.

All of this points to change. It is change that will empower the ingenious and the educated, and on balance it will probably be good for the poor world. But for the poor in the rich world, it is a future of great danger. And what marginalises a significant proportion of the population of those countries, which rips up the social consensus and offers no hope, that is something that demands constructive political attention.
Footnotes

[5] There is a lengthy paper on the broader aspects of the Fourth Revolution, what we called the “New Narrative”, at http://www.chforum.org/scenario2012/paper-4-4.shtml
[8] FRED data, Challenge Network graphic
[10] Sundry sources, metaphor by Challenge Network
[16] Data from OECD PISA program, World Bank; graphic from the Challenge Network.
[17] OECD data plot from Challenge Network
[18] For example, of UK 2013 expenditure 25% was on core activities, 6% on debt interest and the remainder of social spending: Pensions 20%, Health 18%, Welfare 17%, Education 14%. In the UK, the richest households have a pre-tax income of 14 times that of the poorest. However, that falls to 4 times once all taxes and redistributive benefits are considered. The lowest quintile household receive £10,387 more in benefits than paid in taxes. According to the Institute for Fiscal Studies, the bottom half make no net contribution to the state once benefits (as above) are taken into account.
[19] Eurostat, Eurobarometer, graphic from Challenge Network
[20] Analysis by Challenge Network
[21] Analysis by Challenge Network
[22] Speech excerpt by Huey Long: Every Man a King. On video here: www.youtube.com/watch?v=YWqbbpJcaXU
[23] The Challenge Network